

B. A. ECONOMICS

Semester - I

E120 - Economic Thought

5 Hours / 5 Credits

Objective

- To introduce various economic ideas to learners in a combined and chronological order.

Unit- I: Mercantilism and Physiocracy

Mercantilism; characteristic - Physiocracy; primacy of agriculture, social classes.

Unit- II: Classical School

Classification – features, Adam Smith – Division of labour, theory of value, capital accumulation, distribution, views on trade, economic progress, Thomas R Malthus, David Ricardo, J.B. Say – economics ideas of Say.

Unit- III: Neo-Classicals

Knut Wicksell- Main theories of Wicksell, theory of capital and interest, Monetary reforms, competition, J.B Clark- Tausig – Institutional theory of Veblen, Karl Marks.

Unit- IV: Keynesian Ideas

Liquidity Preference Theory and Liquidity Trap, Marginal Efficiency of Capital and Marginal Efficiency of Investment, wage rigidities, underemployment equilibrium- Aggregate Demand and Supply.

Unit- V: Recent Indian Economic Thought

Modern Economics Ideas: - Gandhiji - R.C Dutt - Amartya Sen's Poverty approach - Abhijit Banerjee's

Text Book:

1.Loganathan. V. 'A History of Economic Thought' –S. Chand and Company Ltd. New Delhi

References:

- 1.Black house. R, A History of Modern Economic Analysis, Basil Blackwell, Oxford 1985.
- 2.Haney.H 'History of Economic Thought' Macmillan –Calcutta, 1992.
- 3.Girija M., History of Economic Thought, Virinda Publications (P) Ltd, Delhi -2000.
- 4.Ganguli. B.N., *Indian Economic Thought: A 19th Century Perspective*, Tata McGraw Hill, New Delhi, 1977.
- 5.Gide and Rist 'History of Economic Thought' George G Harap Pub. London, 1956
- 6.Ghosh B.N & Roma Ghosh, 'Concise History of Economic Thought' Himalaya Publishing House, New Delhi, 2010.
- 7.Grey, A. and Thomson. A.E., The Development of Economic Doctrine, Longman Group,
- 8.London, 1980.
- 9.Frederic L. Pryor, 'Economic Evolution and Structure' Cambridge University Press UK 2000
- 10.Srivatsava S.K 'A History of Economic Thought' S.Chand and Company Ltd. New Delhi 2011.

Semester - I E121 - Statistics for Economics 5 Hours / 5 Credits

Objective

- To make the students understand the basic concepts of Statistics and its applications

Unit -I: Concepts of Statistics

Meaning and definition, functions, Source of Data: Primary and secondary data, method of collection of primary data and sources of secondary data. Classification, tabulation of data. Diagrammatic and graphic representation of data. Measures of Averages- Arithmetic mean median, mode, geometric mean and harmonic mean.

Unit- II: Measures of Dispersion

Need for the study of measures of deviation. Range, quartile deviation, mean deviation, standard deviation and coefficient of variation. Skewness and Kurtosis.

Unit- III: Bivariate Data Analysis

Correlation Analysis- meaning and definition, types of correlation, limit of correlation coefficient, methods of study of correlation: scatter diagrammatic method, Karl Pearson's coefficient of correlation, Spearman's rank correlation.

Unit- IV: Regression Analysis

Meaning and definition, two regression lines, two regression equations. Regression equation of X on Y and regression equation on Y on X. Two regression coefficients.

Unit- V: Index Numbers

Methods of construction of index numbers – Cost of living Index - Laspeyres, Paache's, Marshall – Edgeworth's, Fisher's Ideal index number; Time reversal and Factor reversal test.

Note: For question paper setting 60 percentage for problems and 40 percentage theory.

Text Book

1.Vittal P.R, Business Mathematics and Statistics, Margham Publications, Chennai, 2012.

References:

- 1.Pillai S.R.N and Bagavathi, Statistics: Theory and Practice, S. Chand & Co Ltd. New Delhi, 2008.
- 2.Gupta S.C and Kapoor .V.K, Fundamentals of Applied Statistics, Sultan Chand & Sons Publications, New Delhi, 2003.
- 3.Gupta S.P, Statistical Methods, Sultan Chand & Sons Publications, New Delhi, 2010.

Semester - IIE219 - Mathematics for Economics 5 Hours / 5 Credits

Objective

- To make the students understand the fundamentals of mathematics and its application in Economics.

Unit - I: Set Theory

Definition - description - types – operations – laws - Venn diagram - Number of elements of a set, Cartesian product.

Unit - II: Matrix

Definition, types of matrices, addition and subtraction, matrix multiplication, transpose of a matrix, determinant of a matrix, inverse of matrix, Cramer's rule for solving simultaneous equations.

Unit – III: Differentiation

Concept of differentiation, rules of differentiation, differentiation of an implicit function, successive differentiation and partial differentiation.

Unit - IV: Functions and curves

Positive and negative quadrants, distance formula, straight line, its slope and equations. Circle and equation of a circle. Demand function and curve.

Unit - V: Derivation

Cost functions and curves, Revenue Functions: Total - Average - Marginal. Profit functions.

Note: For question paper setting 60 percentage for problems and 40 percentage theory.

Text Book:

1.Madnani G.M.K., and Metha B.C., Mathematics for Economists, Sultan Chand & Sons, 9th Edition, 2008.

References:

- 1.Vittal P.R, Business Mathematics and Statistics, Margham Publications, Chennai, 2012.
- 2.Chiang. A.C, Fundamentals methods of Mathematical Economics, McGraw Hill Publications, New Delhi, 2002.
- 3.Edward T. Dowling, Mathematical Methods (Schaman's Series), McGraw Hill Publications, New Delhi, 2003.
- 4.Agarwal C.S and Joshi R.C, Mathematics for students of Economics, New Academic Publications, 2008.

Semester - III

E218 - Micro Economics – II

5 Hours / 5 Credits

Objective

•This course intends to expose the student to the basic principles in Microeconomic Theory.

Unit I: Perfect Competition

Features - Equilibrium of firm and industry - Perfect vs Pure Competition - Pricing under Perfect Competition under Short run and Long run - Importance of time element in price theory.

Unit II: Imperfect Competition

Monopoly: Features - Price and output determination – Price Discrimination – Monopolistic Competition: Features - Price and output determination - Group equilibrium – Excess Capacity. Oligopoly: Features - Cournot Model, Kinked Demand – Collusive and Non Collusive.

Unit III: Theory of Distribution: Rent

Ricardian theory of rent - Criticisms - Modern theory of Rent - Rent and Price: - Quasi rent

Unit IV: Theory of Distribution: Wages

Functional and Personal distribution – Factor pricing and Product pricing – Marginal productivity theory of distribution – Criticisms - Money wages and real wages – Theories of Wages: Adam Smith, JS Mill - Trade Unions and Collective Bargaining.

Unit V: Theory of Distribution: Interest and Profit

Gross and Net Interest - variations in interest rates - Classical theory of interest – Loanable fund theory. Keynes Liquidity preference theory.

Gross Profit and Net profit - theories of profit - Dynamic profit - Risk theory of profit - Uncertainty bearing theory.

Text Book:

1.Ahuja H.L., Advanced Micro Economic Theory - S.Chand, New Delhi, 2017.

References:

- 1.Samuelson P.A 'Economics', TATA Mc Graw Hill, New Delhi-1985.
- 2.Stonier A.W and Hume D.C 'A text book of Economic Theory', Longmans Green London, 1980.
- 3.Bell and Todaro M.P 'Economic Theory', Mac Millen, London-1980
- 4.William J. Baumol 'Economic Theory and Operations Analysis', Prentice Hall-London, 1961.
- 5.Gregory Mankiw 'Principles of Economics' - Thomson Australia, 1998.
- 6.Jhingan.M.L 'Micro Economic Theory'-Vrinda-New Delhi, 2002.

Semester – III

E317 - Macro Economics – I

5 Hours / 5 Credits

Objective

•To make the students understand the functional relationship between Macro Variables like National Income, Employment, Consumption and Investment.

Unit – I: Introduction to Macro Economics and National Income

Definition – Nature and Scope of Macro Economics – Significance and Limitations – Macro Variables: stock and flow variables - National Income: Meaning – Definitions – Different concepts – Methods of Measurement – Difficulties in national income estimation – Circular Flow of income (Four sectors models).

Unit – II: Theory of Employment

Concept of employment - Say's Law of Market - Classical theory of employment: Features - Keynesian theory of employment: Determination of effective demand – Comparison and contrast between Classical and Keynes contribution.

Unit – III: Consumption Function

Factors affecting consumption - Keynes Psychological law of consumption - Relationship between Average and Marginal Propensity to Consume.

Unit – IV: Theories of Consumption Function

Absolute Income Hypothesis of Keynes - Relative Income Hypothesis of J.S. Duesenberry - Permanent Income Hypothesis of Milton Friedman - Life cycle Hypothesis of Ando and Modigliani.

Unit – V: Investment Function

Types of investments - Marginal efficiency of capital (MEC) and Marginal Efficiency of Investment (MEI) - Determinants - Multiplier: Investment multiplier - Accelerator – Interaction between multiplier and accelerator – Super multiplier.

Text Book

1.Deepashree & Vanita Agarwal, “Macroeconomics”, Ane Books Pvt.Ltd, New Delhi. 2017.

References

1.Wendy Carlin & David Soskice, “Macroeconomics”, Oxford University Press, New Delhi, 2010.

2.Edward Shapiro, “Macro Economic Analysis”, Galgotia, New Delhi. 2009.

3.Ahuja H.L., “Macro Economic Analysis”, Chand S., Publications, New Delhi, 2010.

B.Com (Commerce) Allied Subject

Semester: I

AE106 - Principles of Economics – I

6 Hours/4 Credits

Objective:

- To know the fundamental Principles in Economics.

Unit – I: Nature and Scope of Economics

Economics: Definitions, Nature and Scope – Central Problems of Economy – Divisions of Economics – Production Possibility Curve (PCC) and Allocation of Economic Resources – Difference between Micro and Macro Economics.

Unit – II: Utility and Demand Analysis

Utility – Cardinal and Ordinal Utility – Total Utility and Marginal Utility – Law of Diminishing Marginal Utility – Consumer's Surplus – Demand; Meaning, Definition, Types – Factor affecting demand – Law of Demand – Elasticity of Demand: Types.

Unit – III: Consumer Behaviour

Indifference Curve: Definition – Indifference Scheduled and Curve – Characteristics – Budget Line – Consumer's Equilibrium and its Conditions.

Unit – IV: Producer Behaviour

Production – Production Function: Factors of Production: Land, Labour and Capital and its Characteristics – Organization: Functions of Entrepreneur – Law of Variable Proportion – Law of Returns of Scale – Producer's Equilibrium – Cost and Revenue Analysis.

Unit – V: Market Structure

Market: Meaning – Classification – Market Equilibrium: Perfect Competition – Importance of Time Element in Price determination – Imperfect Competition: Monopoly, Monopolistic Competition, Oligopoly and Duopoly.

Text Book:

1.Sankaran. S, "Business Economics", Margham Publishers, T.Nagar, Chennai.2010.

References:

1. Ahuja.H.L, "Business Economics", Sulthan Chand & Co, New Delhi, 2005.
- 2.Nelli and Parker, "The Essence of Business Economics", Partia Hall, New Delhi, 2005.
- 3.Ferguson. P.R, Rothschild. R and Ferguson. G.J., "Business Economics", Mac Millan Hampsphive, 2003.
- 4.Cauvery.R, "Business Economics", Sterling Publishers Pvt.ltd, New Delhi, 2003.

Semester: II

AE206 - Principles of Economics – II

6 Hours / 4 Credits

Objective:

- To develop the knowledge in Economics and to find solution for the Business problems.

Unit – I: Demand Forecasting

Meaning – Steps involved in Demand Forecasting – Characteristics and Importance of Demand Forecasting – Methods of Demand Forecasting; Survey Method, Consumer Survey Method – Sales Force Opinion Method – Expert Opinion Method – Statistical Methods.

Unit – II: National Income, Inflation and Business Cycle

Meaning – definition – Related concepts – Measurement of national income. Inflation: definitions – classifications – types – causes – controlling measures. Business Cycle: definitions – phases – Causes - controlling measures.

Unit – III: Public Finance

Fiscal Policy: Objectives – Public Finance and its Components – Public Revenue – Public Expenditure – Public Debt – Fiscal Sector Reforms in India – Causes for increasing deficit at the Central and State levels – Budget: Types.

Unit – IV: Monetary Economics

Money: Definitions and its Functions – structure of banking system RBI and its Functions - Monetary Policy: Objectives – Commercial Banks: Meaning – Functions – Credit Creation – Nationalization of Banks – Performance of Public Sector Banks in India.

Unit – V: Indian Economic Issues

Sectors in Indian Economy: Primary, Secondary and Service Sectors. Poverty - Unemployment - The Economic and Social Inequality - The Regional Imbalances – Foreign Direct Investment (FDI) in India.

Text Book:

1.Sankaran.S, “Business Economics”, Margham Publishers, T. Nagar, Chennai.2012

References:

- 1.Ahuja.H.L, “Business Economics”, Sulthan Chand & Co, New Delhi, 2005.
- 2.Nelli and Parker, “The Essence of Business Economics”, Partia Hall, New Delhi, 2005.
- 3.Ferguson.P.R, Rothschild.R., and Ferguson.G.J., “Business Economics”, Mac Millan Hamsphive, 2003.
- 4.Cauvery.R, “Business Economics”, Sterling Publishers Pvt.ltd, New Delhi, 2003.

Websites:

- 1.<http://economics.about.com/od/pricing>
- 2.www.studyfinance.com
- 3.<http://www.economicwebinstitute.org/glossary/costs.htm>
- 4.www.netmba.com
- 5.www.nationalanalysts.com

Semester - III

E317 - Micro Economics – II

5 Hours / 5 Credits

Objective

•This course intends to expose the student to the basic principles in Microeconomic Theory.

Unit I: Perfect Competition

Features - Equilibrium of firm and industry - Perfect vs Pure Competition - Pricing under Perfect Competition under Short run and Long run - Importance of time element in price theory.

Unit II: Imperfect Competition

Monopoly: Features - Price and output determination – Price Discrimination – Monopolistic Competition: Features - Price and output determination - Group equilibrium – Excess Capacity. Oligopoly: Features - Cournot Model, Kinked Demand – Collusive and Non Collusive.

Unit III: Theory of Distribution: Rent

Ricardian theory of rent - Criticisms - Modern theory of Rent - Rent and Price: - Quasi rent

Unit IV: Theory of Distribution: Wages

Functional and Personal distribution – Factor pricing and Product pricing – Marginal productivity theory of distribution – Criticisms - Money wages and real wages – Theories of Wages: Adam Smith, JS Mill - Trade Unions and Collective Bargaining.

Unit V: Theory of Distribution: Interest and Profit

Gross and Net Interest - variations in interest rates - Classical theory of interest – Loanable fund theory. Keynes Liquidity preference theory.

Gross Profit and Net profit - theories of profit - Dynamic profit - Risk theory of profit - Uncertainty bearing theory.

Text Book:

2.Ahuja H.L., Advanced Micro Economic Theory - S.Chand, New Delhi, 2017.

References:

7.Samuelson P.A 'Economics', TATA Mc Graw Hill, New Delhi-1985.

8.Stonier A.W and Hume D.C 'A text book of Economic Theory', Longmans Green London, 1980.

9.Bell and Todaro M.P 'Economic Theory', Mac Millen, London-1980

10.William J. Baumol 'Economic Theory and Operations Analysis', Prentice Hall-London, 1961.

11.Gregory Mankiw 'Principles of Economics' - Thomson Australia, 1998.

12.Jhingam.M.L 'Micro Economic Theory'-Vrinda-New Delhi, 2002.

Semester – III

E318 - Macro Economics – I

5 Hours / 5 Credits

Objective

•To make the students understand the functional relationship between Macro Variables like National Income, Employment, Consumption and Investment.

Unit – I: Introduction to Macro Economics and National Income

Definition – Nature and Scope of Macro Economics – Significance and Limitations – Macro Variables: stock and flow variables - National Income: Meaning – Definitions – Different concepts – Methods of Measurement – Difficulties in national income estimation – Circular Flow of income (Four sectors models).

Unit – II: Theory of Employment

Concept of employment - Say's Law of Market - Classical theory of employment: Features - Keynesian theory of employment: Determination of effective demand – Comparison and contrast between Classical and Keynes contribution.

Unit – III: Consumption Function

Factors affecting consumption - Keynes Psychological law of consumption - Relationship between Average and Marginal Propensity to Consume.

Unit – IV: Theories of Consumption Function

Absolute Income Hypothesis of Keynes - Relative Income Hypothesis of J.S. Duesenberry - Permanent Income Hypothesis of Milton Friedman - Life cycle Hypothesis of Ando and Modigliani.

Unit – V: Investment Function

Types of investments - Marginal efficiency of capital (MEC) and Marginal Efficiency of Investment (MEI) - Determinants - Multiplier: Investment multiplier - Accelerator – Interaction between multiplier and accelerator – Super multiplier.

Text Book

2. Deepashree & Vanita Agarwal, “Macroeconomics”, Ane Books Pvt.Ltd, New Delhi. 2017.

References

4. Wendy Carlin & David Soskice, “Macroeconomics”, Oxford University Press, New Delhi, 2010.

5. Edward Shapiro, “Macro Economic Analysis”, Galgotia, New Delhi. 2009.

6. Ahuja H.L., “Macro Economic Analysis”, Chand S., Publications, New Delhi, 2010.

Objective

- To make the students to understand Macro Economic Equilibrium and its operations in the Economy.

Unit - I: IS-LM Models

Derivation of IS curve and LM curve - General Equilibrium in Macro Economics: Fiscal and Monetary Changes and effects – The crowding in and crowding out effect - The four Sector IS-LM Model – The IS-LM Model with the Balance of Payment Function.

Unit - II: Inflation and Deflation

Types and Causes – Methods of measuring Inflation – Economic Effects of Inflation - Measures to control Inflation - Anti-inflation Policy – Deflation and its Effects – The difference between inflationary and deflationary gap - Phillip’s Curve – Rational Expectation Hypothesis.

Unit - III: Trade Cycle

Characteristics – Phases – Effects – Theories of Hicks, Hatrey, Schumpeter, Keynes – Policy Measures to control Trade Cycle.

Unit - IV: Growth Models in Macro Economics

Significance – Uses – Limitations – Tests - Neo Classical Models: Solow and Meade – Balanced and Unbalanced Models – Static and Dynamic models in Macro Economics.

Unit - V: Macro Economic Policy

Income policy: Monetary policy and Fiscal policy – Objectives – Instruments – Conflicting in Macro Economic goals – Present Macro Economic Scenario in India.

Text Book:

1. Jhingan M. L., Macro Economic Theory, Twelfth Edition. Vrinda Publications, Pvt., Ltd. Delhi, 2006.

References:

1. Ahuja H.L. Macro Economic Analysis, Chand and Sons Publications, New Delhi, 2010.
2. Dwivedi D.N., Macro Economic Theory and Policy, Tata McGraw – Hill Publishing Company Ltd., New Delhi, 2005.
3. Seth M.L., Macro Economics, Lakshmi Narayan Agarwal Educational Publishers, Agra, 1997.
4. Dr. Sankaran S, Macro Economics, Margham Publications, Chennai, 2013.

Semester- IVE420 – Industrial Economics 5 Hours /5 Credits

Objective:

- To provide a thorough knowledge about the economics of Industries particularly in the Indian context.

Unit – I: Role of Industries

Role of industries in economic development – Industry and sectoral linkages; industrial organization- private sector, public sector- joint sector and cooperative sector.

Unit – II: Location of Industries

Location of industries- Weber's- Sargant Florence theories of industrial Location, Integration and Merger of industrial units – problems of regional imbalances -Special economic Zones.

Unit – III: Classification of Industries

Large Scale, Medium and Small Scale Industries; Industrial Production and Productivity in India, Industrial Disputes-.

Unit – IV: Industrial Finance, Sicknesses and Policy

Industrial finance – Role, Nature, Sources of industrial finance; financial institutions –IFCI, ICICI, IDBI, State Financial Corporations: TIC, DIC, SIDCO, Industrial Sickness – Industrial policy

Unit – V: Industry Development

Geography and industrial dynamics, innovation, Firm survival and the evolution of industries, industry life cycle, Turnover and mobility of firms, Regulation: regulation of firms with market power under symmetric information; regulation under asymmetric information.

**** Internship**

Students have to go for internship during their semester holidays. Minimum of 15 days are fixed and for each student separate Faculty will be appointed and they will look into their performances. (Additional credit will be given to each student after their successful completion of their internship).

References

- 1.Cherunilam, F, Industrial Economics: Indian Perspective (3rd Edition), Himalaya Publishing House, Mumbai. 1994.
- 2.Desai, Bindustrial Economy in India (3rd Edition), Himalaya Publishing House, Mumbai.1999.
- 3.Kuchhal. S.C Industrial Economy of India (5th Edition), Chaitanya Publishing House, Allahabad. 1980.
- 4.Singh. A and A. N. Sadhu, Industrial Economics, Himalaya Publishing House, Bombay. 1988.
- 5.Ahluwalia, I. J Industrial Growth in India, Oxford University Press, New Delhi. 1995.
- 6.Devine P.J et, al An Introduction to Industrial Economics (3rd Edition) George Allen and Unwin, London.1978.
- 7.S.P Singh, Industrial Economics and Management, Aitbs Publishers (2008).
- 8.Donald A. Hay Derek J Morris. Industrial Economics: Theory and Evidence, Oxford University Press. (1979).
9. Pau R. Ferguson. Industrial Economics: Issues and Perspective, Palgrave Macmillan. (1994).
10. Sharma A.K. Industrial Economics, Anmol Publisher. (2007)
11. Ranjana Seth. Industrial Economics. (2010).

M. A. ECONOMICS

Semester-I

I MA Advanced Micro Economic Theory-I

Code No: E748

Objectives:

- To provide an opportunity to learner for developing theoretical skills in economics with analytical ability.
- To induce in – depth knowledge about the various concepts of micro economics and its related subject matter.

Unit – I: Methodology of Economics

Scarcity and Choice – Choice under Risk and Uncertainty – Functions of Economic Systems. Methods of Economic Models.

Unit – II: Applications of Demand Analysis – Cardinal Approach

Elasticity of demand – Price – Income – Cross Elasticity – Factors affecting elasticity of demand – Methods of measuring Elasticity of demand – Utility analysis of Marshall – Consumer equilibrium and derivation of demand curve – Consumer Surplus.

Unit – III: Applications of Demand Analysis – Ordinal Approach

Revealed Preference Theory – Hicks Revised demand theory – Indifference Curve approach – Neumann Morgenstern Utility Hypotheses – Consumer equilibrium – Decomposition of Price Effect – Compensation Variation Principle – Price effect – Income effect – Substitution effect – Slutsky effect.

Unit – IV: Cost and Production Functions

Cost functions: Different Cost Concepts – Short run and Long run Costs – Traditional and Modern Theory of Costs – Importance of Cost in Decision making. Production functions: Short run and Long run Production Function – Economies of Scale – Cobb Douglas Production function – CES Production Function – Iso-Quant - Producer's Equilibrium.

Unit – V: Game Theory

Strategic and Non-Strategic Model – Finitive and Infinitive Model – Repetative and Non-repetitive Model – Business Dilemma – Beach Game Model.

Text Book:

1.Dominick Salvatore, Microeconomics: Theory And Applications, Publisher: Oxford University Press, 2002

References:

- 1.Ahuja.H.L. Advanced Economic Theory- Micro and Macro Analysis. New Delhi, S.chand, 1995.
- 2.Bell and Todaro.M.P. Economic Theory. London, Mac Millan, 1980.
- 3.Gregory Mankiw. Principles of Economics. Australia, Thomson, 1998.
- 4.Jhingan.M.L, Micro Economic Theory. New Delhi, Vrinda, 2002.
- 5.Lipsey.R.G and O.P.Steiner. Economics. New York, Harper and Row, 1969.
- 6.Samuelson.P.A, Economics. 5th Ed, New Delhi, TATA McGraw Hill, 1985.
- 7.Stonier.A.W and D.C Huge. A text book of Economic Theory. London, Longmans Green, 1980.
- 8.William J.Baumol. Economic theory and Operations Analysis. London, Pretice Hall, 1961.

Semester-I

I MAAdvanced Macro Economic Theory - I Code No: E749

Objective:

- To make students to improve their wide capacity in assessing macro-economic variables with theories.

Unit – I: Scope of Macro Economics

Micro – Macro Relations – stock and flow concepts - Scope of Macro Economics – Macro Economic paradox - Importance and Limitations of Macro Economics – Static, Comparative, static and dynamics.

Unit – II: National Income Accounting

National Income - Concepts of National Income – Methods of measuring national income – Difficulties in calculating national income – Need for measuring national income – Social Accounting: Meaning and uses or importance – Circular flow of income (Four Sector).

Unit – III: Theory of Employment and Output

The classical theory – features – The classical theory of employment with saving and without saving and Investment – Say's Law of Market and It's criticism – The Keynesian theory of Effective Demand – The concept of Under Employment Equilibrium – Criticism of Keynesian theory.

Unit – IV: The Consumption and Investment Function

Factors determinants – MPC and APC – Keynes psychological law of consumption – The post Keynesian theories of consumption functions -The investment function and its types and determinants – Multiplier – Accelerator and Super multiplier.

Unit – V: General Equilibrium

ISLM Equilibrium – shifts in ISLM Functions - The effectiveness of monetary policy and fiscal policy in different regions – The Three Ranges Analysis – The Crowding – out Effect and crowding in effect– The Four Sector ISLM Model – The ISLM Model with Balance of Payments Functions.

Text Book:

- 1.Shapiro.E. Economic Analysis. New York, Harcourt Brace Jovanovich Inc, 1994.

References:

- 1.Dwivedi.D.N. Macro Economics. New Delhi, Tata McGraw Hill, 2005.
- 2.Ahuja.H.L. Macro-Economic Analysis, New Delhi, Chand and Company Ltd. 2005.
- 3.Keynes.J.M. The General Theory of Employment, Interest, Money. London, McMillan, 1961.
- 4.Seth.M.L. Macro Economics. Agra, Lakshmi Narain Agarwal, 2002.

Objective

- To make the students understand the concepts of Statistics and its applications.

Unit - I: Probability Theory

Concept of probability, conditional probability and Bayes' theorem; Random variables –discrete and continuous, Density and distribution functions, joint, marginal and conditional distribution, moment generating function, law of large numbers and Central Limit theorem

Unit - II: Sampling Theory

Population and Sample (parameter and statistic) – sampling with and without replacement- random samples, random numbers – sampling distributions – sampling distributions of means, sampling distributions of proportions, sampling distribution of differences and sums – standard error.

Unit - III: Estimation

Estimator and estimate – point and interval estimate – reliability of an estimate - sampling variants and mean – square error – properties of a good estimator – methods of estimation – Least squares, methods of moments, Maximum Likelihood method.

Unit - IV: Sampling Techniques and Time Series

Sampling methods: Random and non-random sampling, Simple random sampling, Stratified random sampling – Concept of an estimator and its sampling distribution – Desirable properties of an estimator – Time series analysis.

Unit - V: Correlation and Regression

Correlation analysis: Types, Methods, Karl Pearson's correlation, Spearman's Rank Correlation, Limitations – Regression analysis: The Model and estimation of regression coefficients – Economic applications.

Note: For question paper setting 60 percentages for problems and 40 percentage theory.

Text Book:

1.Pillai R.S.N and Bagavathi, "Statistics: Theory and Practice", S. Chand & Co Ltd. New Delhi, 2010.

References:

- 1.Vittal P.R, "Business Mathematics and Statistics", Margham Publications, Chennai, 2001.
- 2.Gupta S.C and Kapoor .V.K, "Fundamentals of Applied Statistics", Sultan Chand & Sons Publications, New Delhi, 2014.
- 3.Gupta S.P, "Statistical Methods", Sultan Chand & Sons Publications, New Delhi, 2012.

Semester – I

I MA Economics of Growth and Development Code: E751

Objective:

- To make the students to understand about economic development and planning.

Unit – I: Concepts of Economic Development

Concepts of Economic Development – Economic Development and Growth – Human Development Index – Characteristics of Developing Economies – Economic Backwardness – Factors of Economic Growth: Economic and Non – Economic – Characteristics of Modern Economic Growth.

Unit – II: Theories of Economic Development

Growth Vs Development – Marxian Theory – The Schumpeterian Theory – Rostow's stages of Economic Growth – Nurkse's Theory – Lewis Theory – Fei and Ranis Theory – Nelson's Low level Equilibrium Trap – Big Push Theory - balanced and unbalanced Growth.

Unit – III: Growth Models

The Harrod and Domar Model – Joan Robinson's Model – The Solow Model of Long run growth – Kaldor's Model of growth – The Model of Technical change: Neutral and Non – Neutral – Growth models in Indian planning.

Unit – IV: Measurement for Economic Development

Capital Formation: Importance, reasons for low rate of capital formation and sources; Role of Agriculture and Industry – Monetary and Fiscal policies for Economic Development – Price policy – Role of State in Development – Role of Entrepreneurship in Economic Development.

Unit – V: Policy for Development

Economic planning and its objectives – Trade Policy in development : (a) import substitution (b) export promotion- Fiscal policy for development: (a) direct Vs indirect taxes (b) pattern and level of taxation – Regional disparities – Role of public sector and Central Bank in Development.

Text Book:

1.Misra. S.K and V.K. Puri. Economics of Development and Planning. Mumbai, Himalaya Publishing House, 2006.

References:

- 1.Debraj Ray. Development Economics. New Delhi, Oxford University Press, 1998.
- 2.Kausikh Basu. Analytical Development. New Delhi, Oxford University press, 1999.
- 3.Agarwal.A.N. and Kundanlal. Economics of Development and planning. New Delhi, Vikas Publishing House, 2006.
- 4.Dr.Karnati Lingaiah. Economic Growth and Development Models. New Delhi, Chand & Co. Ltd, 2001.
- 5.Robert J.Barro and Xavier Sala –i- Martin. Economic Growth. USA, The MIT Press, 2007.
- 6.Jhingan.M.L. The Economics Of Development and Planning. New Delhi, Vrinda Publications, 2003.

Semester-I

I M.A

Demography (Elective Optional) Code No: E752A

Objective:

•To educate the students about the inter relationship between economic development and population, along with an exposure to the established theories of Population.

Unit - I: Introduction

Population study and Demography; its relation with other disciplines- Theories of population: Malthusian theory, Optimum theory of population-theory of demographic transition; Historical evidence of population growth in developed and developing countries.

Unit - II: Sources of Demographic Data in India

Census - Civil registration system and demographic surveys; National family health survey 1 and 2 their relative merits and demerits.

Unit - III: Technique of Analysis

Crude birth rate and Death rate, Standardized birth rate and death rate -Study of fertility: Total fertility rate, gross reproduction rate, and net reproductive rate- Study of marital status - Life table : meaning, columns and uses -Reproductive and child health in India-Temporal and spatial ratio in sex ratio.

Unit - IV: Population Projection

Technique of population projection-Concept of stationary, stable and quasi stationary population, aging of population in India- changes in family structure and old age security.

Unit - V: Population Policy

Salient features of Recent Population Census-Evolution of population policy in India, demographic factors and household behaviour – education ,women's autonomy and fertility- population, health, poverty and environmental linkages in India; New population Policy.

References:

- 1.Agarwala S.N -India's Population Problems, TATA Mcgraw- Hill Bombay -1985
- 2.Agarwal U.D – Population Projection and their Accuracy B.R Publishing Corporation,New Delhi.-1999
- 3.Bhende A.A and T.R Kanitkar –Principles of Population Studies, Himalaya Publishing House Bombay -1982
- 4.Bogue, D.J –Principles of Demography-John Wiley, NewYork-1971
- 5.Bose.A –India's Basic Demographic Statistics, B.R Publishing Corporation, New Delhi.-1996
- 6.Census of India, Various Reports-Government of India.New Delhi.

Semester - I

I MA

History of Economic Thought

Code No: E752B

Objective:

- To enable the student to understand how contemporary economics is performing.

Unit - I: Development of Socialistic Ideas

St.Simon, Sismondi and Robert Owen - Economic Ideas of Karl Marx: Dynamics of social change, Theory of value, Surplus value, Profit and crisis in capitalism.

Unit - II: Marginalists School

Main Characteristics of Marginalism; Economic Ideas-Jevons, Karl Menger, Walras and Alfred Marshall: role of time in price determination, economic methods, ideas of consumer's surplus, elasticities, external and internal economies, quasi-rent, organization as a factor of production, nature of profits.

Unit - III: Neoclassical School

Institutionalist Theory of Veblen - Gunnar Myrdal- J.K. Galbraith. J.A.Schumpeter: Role of entrepreneur and innovations, Mrs. Joan Robinson: Imperfect Market C.A. Chamberlin: Monopolistic Competition.

Unit - IV: Pre-Independence

Early economic ideas: Kautilya, Thiruvalluvar; Modern economic ideas: Naoroji, Ranade, R.C. Dutt and M.N. Roy; Economic ideas of Gandhi: Village, Swadeshi, place of machine and labour, cottage industries, trusteeship.

Unit - V: Post-Independence

J.C.Kumarappa - Nehru: Early approaches to planning (The National Planning Committee); Gadgil: co-operation as a way of life and strategy of development - J.K. Mehta: Wantlessness – A.K. Sen's economic idea.

Text Book:

1.Loganathan. A., A History of Economic Thought, S. Chand and Company, New Delhi, 1987.

References:

- 1.Blackhouse. R, A History of Modern Economic Analysis, Basil Blackwell, Oxford 1985.
- 2.Ganguli. B.N, Indian Economic Thought: A 19th Century Perspective, McGraw Hill, New Delhi, 1977.
- 3.Gide.C. and Rist.G, A History of Economic Doctrines, George Harrop, London, 1956.
- 4.Grey, A. and Thomson. A.E., The Development of Economic Doctrine, Longman Group, London, 1980.
- 5.Kautilya, The Arthashastra (Edited, Rearranged, Translated and Introduced by L.N. Rangaranjan), Penguin Books New Delhi, 1992.
- 6.Roll. E., A History of Economic Thought, Faber, London, 1973.
- 7.Schumpeter. J.A., A History of Economic Analysis, OUP, New York, 1954.
- 8.Seshadri. G.B., Economic Doctrines, B.R. Publishing Corporation, New Delhi, 1997.

Semester - I
M.A

Economics of Infrastructure

Code: E752C

Objective:

- To study the role of infrastructure and to understand the issues involved in development of infrastructure.

Unit – I: Introduction

Infrastructure and economic development – Infrastructure as a public good – Social and physical infrastructure – Special characteristics of public utilities – Economies of scale of Joint supply – Marginal Cost Pricing vs. other methods of pricing in public utilities; Cross-subsidization – free prices, equity and efficiency.

Unit – II: Communications

Rate-making in Telephone Utilities – Principles of Decreasing Costs in Telephone Industry – Characteristics of Postal Services – Criteria for Fixation of Postal Rates – Measurement of Standards of Service in Telephone and Postal Utilities – e commerce and cashless economy.

Unit - III: Education and Health

Education and Economic Growth – Approaches to Educational Planning – The issues in education policy; Health dimensions of development; Determinants of Health – Economic dimensions of health care – Demand and supply of health care – Financing of health care and resource constraints; Inequalities in health – class and gender perspectives.

Unit – IV: Electricity, Gas and Water Supply

Bulk Supply and Pricing of Electricity – The Relative Economies of Thermal – Hydel and Nuclear Power Plants – The Case for a National Power Grid – Financing Water Utilities – Urban and Rural Water Supply – The Exploitation of Natural Gas – Pricing Problem.

Unit - V: Social Infrastructure

Organization and Financing of Supply of Social Services – Private vs. Public Sector Financing – Recent debate about the fixation of prices of social services – Development of social services in the successive Indian Plans.

Text Book:

- 1.Indian Council of Social Sciences Research (ICSSR) (1976), Economics of Infrastructure, Vol. VI, New Delhi.

References:

- 1.Crew, M.A. and P.R. Kleindorfer (1979), Public Utility Economics, Macmillan, London.
- 2.National Council of Applied Economic Research (NCAER) (1996), India Infrastructure Report Policy Implications for Growth and Welfare, NCAER, New Delhi.
- 3.Parikh, K.S. (Ed.) (1997), India Development Report 1997, Oxford, New Delhi.
- 4.Parikh, K.S. (Ed.) (1999), India Development Report 1999-2000, Oxford, New Delhi.
- 5.Turvey, R. (Ed.) (1968), Public Enterprises, Penguin, Harmondsworth.

Semester – I

I MAE753S - Communication Skills Hours – 2

Objective:

- To enhance the students to acquire more communicative skills.

Unit – I: Introduction to Communication

Purpose of Communication – Process of Communication – Importance of Communication in Business – Difference between Technical and General Communication – Barriers to Communication – Types of Communication.

Unit – II: Communication for Employment

Dialogues for daily communication: Spotting the errors and Reading comprehension – Interview skills – Group discussion – Debate and Tele Interviews. Types of Interviews – Listening skills (Testing through passages). Contents of Good Resume – Guidelines for Writing Good Resume – Different types of Resumes – Need for a cover letter for applying Job – Format of Cover Letter – Different types of Cover Letters.

Unit – III: Presentation Skills

Speaking skills – Power point presentation techniques – Preparation of Welcome address, Master of Ceremony, Chief Guest Introduction, Vote of Thanks. Report writing: features of writing good report – purpose of report writing – importance of communication in report writing – Guidelines for report writing – steps in report writing – structure of report – types of reports and different formats.

Unit – IV: Writing Business Letter

Importance of Business Letters – Difference between Personal and Business Letters – Structure and format of business letters – Types of Business Letters.

Unit – V: Communication in Organizations

Internal Communication – Stake holders in Internal Communication – Channels of Internal Communication – External Communication – Stake holders in External Communication – Channels of External Communication.

References:

- 1.Manmohan Joshi, How to deal with your Manager, Bookboon.com
- 2.Effective Communication Skills, MTD Training, Bookboon.com
- 3.Advanced Communication Skills, MTD Training, Bookboon.com
- 4.Paul Newton, How to effectively Communicate, Bookboon.com
- 5.Adir, John. Effective Communication, Pan Macmillan Ltd., London, 2003
- 6.Ajmani. J. C. Good English: Getting it Right, Rupa Publication, New Delhi, 2012
- 7.Bonet Diana, The Business of Listening: Third Edition, Viva Books, New Delhi, 2004
- 8.Bovee, Courtland.L, Jhon. V Thill & Barbara E Schatzman, Business Communication Today: Tenth Edition, Prentice Hall, New Jersey, 2010.

Semester – II

I M.A

Advanced Micro Economic Theory-II Code No: E855

Objectives:

- To provide an opportunity to the learner for developing theoretical skill in economics with analytical ability
- To make the students to understand the difference in Product pricing and Factor pricing as well as Product and Factor market.

Unit – I: Price and Output Determination under Perfect Competition

Perfect Competition: Features – Price and Output determination of Firm and Industry in Short run and Long run – MC – MR Approach – Role of Time elements in Price determination – Economic Efficiency of perfect competition.

Unit – II: Price and Output Determination under Imperfect Competition

Monopoly: Features – Price and Output determination of Firm and Industry in Short run and Long run – Price Discrimination – Types – Control of Monopoly. Monopolistic Competition: Characteristics – Individual and Group Equilibrium – Theory of Excess capacity – Selling Cost and Advertising Cost. Oligopoly: Features – Collusive and Non-Collusive Oligopoly – Kinked demand Curve Theory of Oligopoly – Cournot Duopoly Model.

Unit – III: Factor Pricing under Perfect Competition

Product and Factor Pricing – Personal and Functional Distribution – Concepts of Factor Productivity – Physical Productivity (PP) – Revenue Productivity (RP) – Factor Cost under Perfect Competition – Marginal Productivity Theory of Distribution.

Unit – IV: Factor Pricing under Imperfect Competition

Wage determination under Monopsony – Exploitation of factors under different forms of market Wage determination Monopsony in Factor market Perfect competition in Product in Product market, Monopsony in Factor market and monopoly in Product market – Role of Trade Union and Collective Bargaining – Ricardian Theory of Rent, Quasi Rent and Economic Rent

Unit – V: General Equilibrium and Welfare Economics

Meaning – Edgeworth Box and General Equilibrium of Exchange, Production and Distribution – Pareto Criterion of Social Welfare – Conditions of Pareto Efficiency – Critical evaluation of Pareto Criterion and Pareto efficiency.

Text Book:

1.Dominick Salvatore, Microeconomics: Theory And Applications, Publisher: Oxford University Press, 2002

References:

- 1.Ahuja H.L: Advanced Economic Theory, Micro Economic Analysis. 14th Revised Edition 2004.S.Chand & Company Ltd. New Delhi-110 055, 152 Anna Salai, Chennai.
- 2.Bell and Todaro.M.P. Economic Theory. London, Mac Millan, 1980.
- 3.Gregory Mankiw. Principles of Economics. Australia, Thomson, 1998.
- 4.Jhingan.M.L, Micro Economic Theory. New Delhi, Vrinda, 2002.
- 5.Lipsey.R.G and O.P.Steiner. Economics. New York, Harper and Row, 1969.
- 6.Samuelson.P.A, Economics. 5th Ed, New Delhi, TATA McGraw Hill, 1985.
- 7.Stonier.A.W and D.C Huge. A text book of Economic Theory. London, Longmans Green, 1980.
- 8.William J.Baumol. Economic theory and Operations Analysis. London, Pretice Hall, 1961.

Semester - II

I MA

Advanced Macro Economic Theory-II

Code: E856

Objective:

- To make the students to have awareness on Macro Economic Issues and their operations in the Economy.

Unit - I: Inflation and Deflation

Inflation: Causes – Types – Methods of measuring Inflation – Economic Effects of Inflation - Theories of Inflation - Measures to control Inflation - Anti-inflation Policy – Deflation and its Effects – The difference between inflationary and deflationary gap - Phillip’s Curve

Unit - II: Trade Cycle

Trade Cycle: Characters – Phases –Theories: Hicks – Samuelson - Cobweb – Schumpeter – Policy Measures to control Trade Cycle

Unit – III: The Modern Macro Economics

Radicalism – The Radicalists Attack on Keynesian Macro Economics – Rational Expectations – The Supply Side Economics: Features and it’s Central Theme – It’s Major Criticisms – Monetarism and Fiscalism : Similarities and Differences between them.

Unit - IV: The Basic Growth Models in Macro Economics

Significance – Classifications – Uses and Limitations of growth Models – The Classical Model of Economic Growth – Marxian Growth Theory – Schumpeterian Theory –Harrod- Domar Growth Models – Neo Classical Growth Model – Endogenous Growth Model.

Unit - V: Macro Economic Policy

Income policy–Monetary policy and Fiscal policy- Targets – Instruments – Objectives – problems of coordination of Macro Economic policy objective – Lags in Effects - Demonetization of Currency — Present Macro Economic Scenario in India.

Text Book:

- 1.Edward Shapiro, “Macro Economic Analysis” Galgotia, New Delhi, 2009.

References:

- 1.Jhingan M. L., Macro Economic Theory, Twelfth Edition.Vrinda Publications, Pvt., Ltd., New Delhi, 2006.
- 2.Ahuja H.L. “Macro Economic Analysis “Chand and Sons Publications, New Delhi, 2010.
- 3.Dwivedi. D.N., Macro Economic Theory and Policy, Tata McGraw – Hill Publishing Company Ltd, New Delhi,2005.
- 4.Seth M.L., Macro Economics, Lakshmi Narayan Agarwal Educational Publishers, Agara, 1997.
- 5.Dr. Sankaran S. Macro Economics, Margham Publications, Chennai, 2013

Semester - II

I MA

Mathematics for Economist

Code: E857

Objective:

- To make the students understand the fundamentals of mathematics and its application in Economics.

Unit - I: Matrix Functions

Definition, types of matrices, addition and subtraction, matrix multiplication, transpose of a matrix, determinant of a matrix, inverse of matrix, Cramer's rule for solving simultaneous equations

Unit - II: Differentiation

Demand function and curve, Total Revenue, Average Revenue and Marginal Revenue functions and curves. Total cost, Average cost and Marginal cost functions and curves. Elasticity of demand, Profit function: Maxima and Minima.

Unit – III: Game Theory

Meaning, Classification, strategy of Game theory, Saddle point solution – Odds method and Dominance Method, limitations.

Unit – IV: Input Output Analysis

Meaning, types and strategy of input - output analysis - Simon Hawkin conditions - Production function - dynamic input-output model, limitations.

Unit – V: Integration

Meaning and rule of Integration – integration by parts – Properties and application of integration in Economic theory – Costs, Revenue, Consumer's Surplus and Producer's Surplus.

Note: For question paper setting 60 percentages for problems and 40 percentages theory.

Text Book:

1.Vittal P.R, "Business Mathematics and Statistic's, Margham Publications, Chennai, 2001.

References:

- 1.Chiang. A.C, "Fundamentals methods of Mathematical Economics", McGraw Hill Publications, New Delhi, (2012).
- 2.Edward T. Dowling, "Mathematical Methods (Schaman's Series)", McGraw Hill Publications, New Delhi, 2008.
- 3.Agarwal C.S and Joshi R.C, "Mathematics for Students of Economics", New Academic Publications, 2009.

Semester - II

I MA Entrepreneurship Development

Code: E860S

Objective:

- This paper provides a wealth of information on entrepreneurship and related issues.

Unit – I: Introduction to Entrepreneurship

Definition and structure - Entrepreneurial culture – Origins – Barriers – Classification and Types of Entrepreneurs – Entrepreneurial skills – Micro credit and Entrepreneurial Development.

Unit – II: Entrepreneurial Development Programmes

Objectives – Evolution of EDP – Developments of Women Entrepreneurs, Entrepreneurial Development Training – Institutions involved in Entrepreneurs Training – Role of SIDCO – DIC – Various Consultancy Organizations.

Unit – III: Project Proposal

Meaning and importance – Project identification – Contents of a Project Proposal – Format of a Report – Project Appraisal – Feasibility Analysis.

Unit – IV: Marketing and Industrial Finance

Methods of Marketing – Market Segmentation – Marketing Channels – Functions of Marketing Channels – Marketing Consortium – Role and functions of IFCI – SIDBI – IDBI – ICICI – TIIC – Other Industrial Finance.

Unit – V: Small Scale Industry

Steps to Starting Small Business – Selection – Registration – Tax Benefits to Small Scale Industry – Assistance – Government Policy on Small Scale Enterprises.

Note: Write a mini project about profile and performance of an entrepreneur. (Max. 20 – 25 pages) Internal component.

Text Book:

1. Gupta. C. B and N. P. Srinivasan, Entrepreneurial Development, New Delhi, Sultan Chand & Sons, 2009.

References:

1. Vasanth Desai. Dynamics of Entrepreneur Developments & Management. New Delhi, Himalaya Publishing House, 2010.
2. Jose Paul N. Ajith Kumar Paul T. Mampilly. Entrepreneurship Development. New Delhi, Himalayas Publications House, 2011.
3. Khanka. S.S. Entrepreneurial Development. Chennai, S.Chand & Company Ltd., 2010.
4. Poornima. M.C. Entrepreneurial Development and Small Business Enterprises. New Delhi, Dorling Kindersley Pvt. Ltd, 2008.
5. Renu Arora and S.K. Sood. Fundamental of Entrepreneurship and Small Business. Chennai, Kalyani Publishers, 2009.

Semester - II

I MA

Managerial Economics

Code:E858

Objective:

- To make the students to equip with advanced managerial concepts in modern business activities.

Unit – I: Principles of Managerial Economics

Definition – Nature and Scope – Principles of Managerial Economics: The Concept of Incremental Cost-Opportunity Cost –Time Perspective – The Discounting Principle –The Equi - Marginal Principle – The Discounting Principle –Relation with other Disciplines like Marketing, Finance and Personnel.

Unit – II: Modern Managerial and Behavioral Theories of Firm

Theory of Baumol's Sales Revenue Maximization –O. Williams Theory – Marry's Theory on Managerial Enterprise – Behavioral Theories of Firms: Simon Theory – Cyert and March's Theories.

Unit – III: Advanced Areas in Pricing Practices

Peak-Load Pricing – Administered Prices – Dual Pricing –Pricing Behaviors in Large Enterprises and Small Businesses – The Pricing Process: Individuals Concerned with Pricing Decisions – Multistage Process – Pricing Considerations.

Unit – IV: Risks and Uncertainties in Decision and Project Analysis

Business Decision Making – Certainty Risk and Uncertainty Risk – Pay off Matrix – Sources of Business Risks – Steps involved in the analysis of Risky Decisions – Risk Premium and Risk Adjustment – Certainty Equivalent Approach – Decision Tree Approach – Sensitivity Analysis.

Unit – V: Advertising and Modern Techniques in Investment Appraisal

Advertisement: Meaning- Importance and Nature – Sales Relationship – Budgeting in Advertisement with different Media – Optimum Level of Advertisement – Economic Effect of Advertisement - Modern Techniques in Investment Appraisal: Cash Flow Approach – Net Present Value Criteria – Internal Rate of Return – Profitability Index – The Traditional Methods of Appraisal.

Text Book:

- 1.Metahp.L., Managerial Economics, Sultan Chand and Sons, New Delhi, (Latest Book)

References:

- 1.Ahuja H.L., Business Economics, Sultan Chand and Company, Pvt. Ltd. New Delhi, 2004
- 2.Varshney R.L., and Maheshwari K.L., Managerial Economics, Sultan Chand and Sons, New Delhi, 2009
- 3.Dominick Salvatore, Managerial Economics, Oxford University Press, New York,2014
- 4.Cauvery R., and Sudhanayak, Managerial Economics, Chand and Company, Pvt. Ltd. New Delhi.2009

Semester - II

I MA

Industrial Economics

Code: E859A

Objective:

- To understand the ways in which economics forces operate within the industrial sectors.

Unit - I: Industrial Concepts

Scope and objectives of industrial economics - Classification of industries - organization of a firm- ownership, control and objectives of the firm.

Unit - II: Industrial Location

Nature and measurement of market concentration - indices of concentration - Theories of industrial location- Central Place theory of Losch, Renner's Theory - factors affecting location - Product pricing. Theories and empirical evidence on Mergers, Acquisitions and Diversification.

Unit - III: Indian Industrial Growth and Pattern

Recent industrial policy of India - Role of public and private sectors, recent trends in Indian industrial growth, MNCs and transform of technology, liberalization and privatization, regional industrial growth in India.

Unit – IV: Industrial Labour

Structure of industrial labour - employment dimensions of Indian industry- industrial legislation; industrial relations; Exit policy and social security, wages and problems of bonus- labour Market reforms.

Unit - V: Industrial Concentration

Concepts and measurement; extents, causes and likely effects of concentration; analysis of diversification in industry, Rationalization: aspects – objectives – need – facilities – problems; Automation: benefits – problems – guidelines.

Text Book:

1.Roger, Clark, Industrial Economics, New York Blackwell Publishers. (2013).

References:

- 1.Ahluwalia .J, Industrial Growth in India, Oxford University Press New Delhi (1985).
- 2.Barthwal, R.R. Industrial Economics, Wiley Eastern Ltd., New Delhi (1985).
- 3.Cherunilam F, Industrial Economics, Indian Perspective 3rd Edition, Himalya Publishing House, Mumbai. (1994).
- 4.Desai B. Industrial Economy in India, 3rd Edition, Himalaya Publishing House, Mumbai. (1999).
- 5.Kuchhal S.C. Industrial Economy of India 5th Edition Chaitanya Publishing House Allahabad. (1980).
- 6.Singh.A and A.N.Sadhu, Industrial Economics, Himalaya Publishing House, Bombay. (1988).

Semester - II

I MA

Economics of Urbanization

Code: E859B

Objective:

- To enable the students to achieve a specialized knowledge of urban economics.

Unit – I: Introduction to Urban Economics

Nature and scope of urban economics – structure and growth of urban economy – urban public services – Growth of urban Economy.

Unit – II: Growth of Urbanization and Theories

Urban growth – Central place theory and its application to the study of urban growth – the urban economic base and urban growth – the communication theory of urban growth – City size and urban growth – Urban spatial structure – Concentric zone hypothesis – the radial sector theory – the multiple Nuclei hypothesis.

Unit – III: Urban Housing, Labour Market and Poverty

Housing market imperfection – Trends in slum housing – Tearing down the slums. Urban labour market: Determination of labour income-wage differentials – The culture of urban poverty – Measures of urban poverty – The causes of urban poverty - Public policies for reducing urban poverty – macroeconomic policies – Maintenance policies – Negative income taxes.

Unit – IV: Problems of Urbanization

Urban development problems in India – Land prices and land speculation – Urban land celling – Congestion and urban transport pricing policy – Cost and supply of alternative urban transport system.

Unit – V: Urban Growth Strategies

An approach to metropolitan planning in developing countries – National urbanization policy with reference to India – Concept of smart and satellite cities.

Text Book:

- 1.Odeyar D. Heggade, Urban Development in India, Mohit Publications, New Delhi, 1998.

References:

- 1.Harry W. Richardson, Urban economics (Penguin Modern Economics), Library of Congress cataloging –in-Publication Data, USA, 1990.
- 2.Edwin S.Mills & Bruce W. Hamilton, Urban Economics, Scott Foresman and Company, Glenview, Illionis Boston, London, 2000.
- 3.Alan Gilbert & Josef Gugler, Cities, Poverty, and Development, Oxford University Press, London, 2000.

Semester - II

I MA

Economics of Gender and Development

Code: E859C

Objective:

•To emphasis the students on invisibility of women's work and gender issues in organized and unorganized sectors.

Unit – I: Introduction and Conceptualization of Gender Studies

Importance and concepts of women Studies- Women in patriarchal and matriarchal societies and structures, relevance to present day society in India; analysis of women's work. Valuation of productive and unproductive work; visible and invisible work; paid and unpaid work; economically productive and socially productive work, Female contribution to National Income.

Unit – II: Women and Labour Market

Factors affecting female entry in labour market; Supply and demand for female labour in developed and developing countries, Female work participation in various sectors of Indian Economy. Wage differentials in female activities; Determinants of wage differentials, gender, education, skill, productivity, efficiency, opportunity.

Unit – III: Women and Technology

Women, Technology and Environment: Impact of technological development and modernization on women's work participation; various sectors agriculture, non-agriculture, rural activities, small and cottage industries and organized industry; Role of new technologies in helping women.

Unit – IV: Social Security and Protection

Social Security and Social Protection for Women: entitlements ensuring economic independence and risk coverage, access to credit and insurance markets; Role of voluntary organizations, self-help groups; Schemes for safety net for women; Need for female labour unions; Affirmative action for women and improvement in their economic and social status.

Unit – V: Gender and Policy

Gender Development Policies and Governance: Gender and development Indices; Mainstreaming gender into development policies; Gender sensitive governance; Paradigm shifts form women's well-being to women's empowerment; Democratic decentralization (pantheist) and women's empowerment in India.

References:

- 1.Mishra, S. (2000), Voluntary Action in Health and Population: The Dynamics of Social Transition, Sage Publications, New Delhi.
- 2.Sen, A.K. (1990), Gender and Cooperative Conflicts in Tinker (Ed.) Persistent Inequalities: Women and World Development, Oxford University Press, New York.
- 3.Amsden, A.H (Ed) (1980), The Economics of Women and Work, Penguin, Harmondsworth.
- 4.ILO (1978), Women's Participation in the Economic Activity of Asian Countries, ILO, Geneva.
- 5.Seth, M. (2000), Women and Development: The Indian Experience, Sage Publications, New Delhi.
- 6.Srinivasan K. (1998), India: Towards Population and Development Goals, Oxford University Press, New Delhi.
- 7.Wazir, R. (2000), The Gender Gap in Basic Education: NGOs as Change Agents, Sage Publications, New Delhi.
- 8.Narasimhan, S (1999), Empowering Women: An Alternative Strategy from Rural India, Sage Publications, New Delhi.

- 9.Purushothaman, S. (1998), The Empowerment of Women in India: Grassroots Women's Networks and the State, Sage Publications, New Delhi.
- 10.Jhabwala, R. and R.K. Subramanya (Eds.) (2000), The Unorganized Sector: Work Security and Social Protection, Sage Publication, New Delhi.

Semester-II Certificate Course - I Code: E860S

Part - I: Using SPSS

Objective:

- To make the student to have knowledge about SPSS

Unit – I: Introduction

Introduction to SPSS - Data analysis with SPSS: general aspects, workflow, critical issues - SPSS: general description, functions, menus, commands - SPSS file management.

Unit – II: Input and Data Cleaning

Defining variables - Manual input of data - Automated input of data and file import Data manipulation - Data Transformation - Syntax files and scripts- Output management

Unit – III Descriptive Analysis of Data

Frequencies – Descriptive – Explore – Crosstabs – Charts Statistical tests - Means - T- test – One -way ANOVA - Non parametric tests – Normality tests

Unit – IV: Correlation and Regression

Linear correlation and regression-Multiple regression (linear)

Unit – V: Multivariate Analysis

Factor analysis - Cluster analysis – Correspondence analysis.

Text Book:

- 1.Mishra A.K. “Handbook on SPSS for Research Work”, Himalaya Publication, 2014.

References:

- 1.Kiran Pandya, “SPSS in Simple Steps” Dreamtech Publishers, 2011.
- 2.Asthana, “Statistics for Social Sciences (SPSS Application), PHI Publications, 2016.

Part - II: SPSS AMOS – Structural Equation Modeling

Objective:

- To make the student to have knowledge about the modeling

Unit – I: Introduction

Basic concepts – Terminology – Matrix Algebra- Equations and Diagrams, Normality – Linearity – Multivariate Normality – Discussion about SPSS Amos Software.

Unit – II: Factor Analysis

Factor Analysis: Exploratory Vs Confirmatory analysis – Measurement model – Pre Vs Post Analysis Issues – second order Confirmatory analysis – measured error in observed variables.

Unit – III: Path Analysis

Mediation – traditional path analysis – pre and post analysis issues.

Unit – IV: Covariance Analysis

Analysis for covariance models – power analysis – latent analysis – algebra model – identification.

Unit – V: Estimation

Algorithms – goodness of fit – missing data issues – writing of Structural equation modeling and Confirmatory factor analysis results.

Text Book:

1.Barbara M. Byrne “Structural Equation Modeling with SPSS AMOS” , Routledge Publishers, 2016.

References:

- 1.Neils J. Blunch “Introduction to Structural Equation Modeling using IBM SPSS Statistics and AMOS”, Sage Publication, 2012.
- 2.Randall E. Schumaker and Richard G. Lomax “A Beginner’s Guide to Structural Equation Modeling”, Routledge Publishers, 2015.
- 3.Timothy A. Brown “Confirmatory Factor Analysis for Applied Research”, Guilford Press, 2015.

Semester-III

II M.A.

International Trade

Code: E940

Objective:

•To help the students to acquaint the theoretical foundations of international trade, its pattern, structure and policy framework.

Unit – I: Theoretical Foundations of International Trade

Reasons for International Trade - Modern Theories: Hecksher and Ohlin theory and Paul Krugman theory – Opportunity Cost Theory Stophler – Samuelson Theorem – Rybczynski Theorem.

Unit - II: Instruments of Commercial Policy

Trade policy of developing countries: Gains from trade – Balance of Payment – Devaluation-Importance of devaluation in foreign trade - Marshall-learner condition-Jcurve effect-Foreign trade multiplier

Unit – III: Regional Economic Integration

Regional Economic Integration- Free Trade Area, Customs Union, European Economic Union, and Common Market, Trade Creation and Diversion effects - Regional trade agreements.

Unit – IV: Foreign Trade Policy

Foreign Trade Policy -Features, Objectives, Strategy, Provision regarding Import & Export, Highlights of India's current Foreign Trade policy.

Unit -V: Policy Framework and Promotional Measures

India's foreign trade Policy and Mechanism. Export Promotion Measures and Infrastructure Support, Export and Trading Houses, Export Promotion Schemes and Incentives, Institutional Arrangements for Export Promotion, Export processing Zones and Special Economic Zones.

Text Book:

- 1.Dominic Salvatore, International Economics, 13th Edition, Publisher: Wiley, 2019.
- 2.Triveni Batham Rajendra .P Maheswari, "International Trade", International Book House Pvt. Ltd, Mumbai, 2015.

References:

- 1.Paul Krugman, Maurice Obstfield and Marc Melitz, "International Trade : Theory and Policy", Pearson International Publication, New Delhi, 2014
- 2.Nihanika Vij, "International Trade Law", Universal Law Publishing House, New Delhi, 2016.
- 3.Ram Singh, "International Trade Operations", Excel Books Publishing, New Delhi, 2009.
- 4.Sharma.G, "International Trade: Theory and Practice", Centrum Press, Anmol Publications, New Delhi, 2012.
- 5.Parthapratim Pal, "International Trade and India", Oxford University Press, New Delhi, 2014.
- 6.Robert C. Fenstra, "Advanced International Trade", Princeton University Press, USA, 2015.
- 7.Francis Cheurnilam, "International Trade and Export Management", Himalaya Publishing House, Mumbai, 2013.
- 8.Carbugh. R. International Economics, Noida, Ultra Pradesh; cengage Learning.

Semester - III

II MA

Public Economics

Code: E941

Objective

•To enable the students to understand the concepts in public finance and working of the public economics.

Unit – I: Nature and Scope

Role of the Government in the economic activity – Fiscal Functions: Allocation, Distribution and Stabilization functions – Provisions of private goods, public goods, social goods, merits goods and mixed goods – Welfare economics: Theory of Second Best – Arrows – Bergson.

Unit – II: Tax Revenue and Non-Tax Revenue

Principle of fiscal neutrality – Excess burden – Doctrine principle of equity – Benefit principle – Bowen and Lindhal models – Ability to pay principle – Application of taxation principles in developing countries – Impacts and Incidence of Taxes: Theories of shifting and incidence: Diffusion – Concentration and Modern Theory.

Unit – III: Public Expenditure and Public Debt.

Wagner's Law – Wiseman – Peacock hypothesis – Pure theory of public expenditure – Cannon of public expenditure – Effects of public expenditure – Causes for increasing public expenditure. Public debt: Classification – Burden – Management – Redemption – Sources – Causes for increasing public debt.

Unit – IV: Budget

Budget: components –Types - Preparation, presentation and execution of budget – Economic classification of budget – Budget deficits and their implications – Central, state and local budget (Current union budget).

Unit – V: Federal Finance and Fiscal Policy

Federal Finance: Principles of federal finance – Assignment of functions and devolution of resources and grants – Vertical and Horizontal imbalance – Transfer of resource from union to states – Recommendations of current finance commissions – Centre-state conflicts on finance. Fiscal Policy:

Text Book:

1.Richard A.Musgrave, Peggy B.Musgrave. Public Finance in Theory and Practice, New Delhi, Tata Mcgraw Hill Publishing Company Limited, 2010.

References:

- 1.Lekhi. R.K., Public Finance, New Delhi, Kalyani Publications (P) Ltd., 2015.
- 2.Mithani. D.M. Principles of Public Finance and Fiscal Policy. New Delhi, Himalaya Publishing House, 2015.
- 3.Sundharam. K.P.M and K.K.Andly. Public Finance in Theory and Practice. New Delhi, Chand.S. Company Limited, 2015.

Objective:

•To enable the students to understand the basic concepts regarding money and the functioning of a pecuniary economy.

Unit – I: Nature, Demand and Supply of Money

A) Nature and scope of monetary economics: meaning – importance – functions, Definitions: Theoretical and empirical – concept of liquidity – Newlin – Radcliff committee.

B) Demand and supply of money (a brief analysis) – factors that determine demand and supply of money in India-components of money supply.

Unit – II: Classical and Neo-Classical Theories

Classical Theory of Money: - The cash transaction version – critical analysis – Cash Balance version – critical analysis – superiority of cash balance over cash transaction version.

Unit – III: Neutrality and non-neutrality of Money

A) Classical and Neo-classical dichotomy – Patinkin's integration of monetary and value theories – real balance effect.

B) The Keynesian theory of integration of monetary and value theories – Milton Friedman's Re-statement quantity theory of money.

Unit – IV: Liquidity theories

Liquidity theory of money – Baumol's transaction demand for money – Tobin's portfolio balance theory of money.

Unit – V: Monetary Policy

Objectives – targets and indicators – monetarism and Keynesian, monetary transmission mechanism – time lags – monetary policy in India-Narasimhan Committee Banking in India, Rangarajan Committee on Financial Reforms

Text Book:

1.Vaish.M.C, Monetary Theory, New Delhi, Vikas Publication

References:

- 1.Growth.G. An Outline of Money. London, Longmans Green, 1963.
- 2.Gosh.B.N. and Rama Gosh. Fundamentals of Monetary Economics. Bombay, Himalaya Publication, 1989.
- 3.Gibson.W.E. and George G.Kaufman. Monetary Economics. New Delhi, Tata McGraw Hill, 1975.
- 4.Friedman.M. Studies in Quantity Theory of Money. Chicago, Chicago University Press, 1990.

Objective:

- To provide knowledge about the social science research and its relevance in tackling real issues of the society.

Unit - I: Nature and Significance of Social Science Research

Objectives, Types and significance of research – Research methods and methodology – Steps of research process – Criteria of good research– Research problem – Technique of formulating a problem.

Unit - II: Research Design and Sampling Design

Research design- meaning, need and features - different models –Experimental designs – developing a research plan – Census, sample survey and participatory survey – Steps in sample design – Probability and Non Probability – Simple and complex – systematic, stratified, cluster, area, multistage and sequential sampling designs.

Unit - III: Data Collection and Scaling Techniques

Methods of Collecting Primary data. Sources of Secondary data: Measurement in research – Nominal, ordinal, interval and ratio – Sources of Error in Measurement – Tests of Validity, Reliability and Practicality. Scaling Techniques: Rating and Ranking Scales – Scale Construction Techniques - Thurstone, Likert type, Cumulative Factor and Multi-dimensional scales

Unit - IV: Testing of Hypothesis

Null and Alternative Hypothesis - simple and composite hypothesis – Type I and Type II errors – critical region – level of significance – one sided and two sided tests – power of a test – decision making – small sample distributions - 't', 'F' ' χ^2 ' – Distributions – application – testing of Mean and Variance (ANOVA) – Goodness of fit.

Unit - V: Research Report Writing

Steps in writing report – Layout of reports – Types of reports – Mechanics of writing a research report – Precaution for writing reports.

Text Book:

- 1.Deepak Chawla and Neena Sondhi, Research Methodology: Concepts and Cases: Concepts & Cases, 2nd Edition, Vikas Publishing.
- 2.Kothari.C.R. Research Methodology Methods and Techniques. 2nd Revised Edition,

References:

- 1.Donald R.Cooper and Pamela S.Chindles. Business Research Methods. 9th Edition, New Delhi, Tata McGraw Hill Publishing, 2007.
- 2.Mire.R.P. Research Methodology A Hand Book. New Delhi, Concept Publishers, 1988.
- 3.Kurian.C.T. Guide to Research in Economics. Madras, MIDS Publication, 1973.

Semester-III

II MA

Data Analysis using Software

Code: E945S

Objective:

- To enable the students to apply SPSS in Economic Research.

Unit - I: Introduction to Statistical Packages

Creating SPSS data file , opening existing data file, importing data from Non-SPSS file Format, Merging data from multiple files, transforming variables- editing output; Editing tables, charts and graphs, Exporting output ,Creating and using syntax file.

Unit - II: Diagrammatic Representation

Simple, multiple and Drop line diagrams Area graph, Pie chart, Range, simple high low close, cluster high low close simple and cluster box plot.

Unit - III Descriptive Statistics in Economics

Mean, median, mode, percentiles, Quartiles, standard deviation, variance, range, Minimum, maximum, skewness, kurtosis –‘t’ tests – cross table and chi square test, one way ANOVA.

Unit - IV Correlation Regression

Correlation Martix, regression, dummy variables, Multi collinearity, test for detecting multicolliniarity.

Unit - V Serial Correlation

Durbin-Watson Statistics, Ljung-box Q-statistic, unit root test, time serious models.

Text Book:

1.George Darren Mallery Paul, (2009), SPSS FOR WINDOWS, Pearson education. New Delhi.

References:

- 1.Foster Jeremy.J, (2001), Data Analysis Using SPSS For Windos Version 8 to 10: A Beginners Guide ,Sage Publications, New Delhi.
- 2.Croxton, Fredric.E.Dudley.J, Cowden and Sideny Klein, (1988), Applied General Statistics, Prentice Hall of India Ltd., New Delhi.
- 3.www.spss.co.in
- 4.www.spss.com
- 5.www.spsstools.net/spss.htm

Semester-III

II MA

Econometric Methods (Elective Optional) Code: E944A

Objective:

- To develop the application of econometric methods in economics and business data.

Unit - I: Introduction to Econometrics and Problems of Error Estimation

Meaning, Nature and scope of econometrics, Simple and general linear regression model – Assumptions, Estimation through OLS approach and properties of estimators. Problems of Heteroscedasticity, Multi collinearity and Auto-Correlation.

Unit - II: Regression with Qualitative and Dummy Variables

Regression with Qualitative and Lagged Variables, Dummy Variable Techniques. Testing structural stability of regression models, Regression with dummy dependent variables, Uses of Dummy variables.

Unit - III: Simultaneous Equation Models

Simultaneous equation models: equation bias and inconsistency of OLS estimators, The identification problem and the rules of identification. Methods of estimating simultaneous equation system, instrumental variables. Estimation of demand, production: Cobb Douglas and cost functions.

Unit - IV: Stationary and Forecasting of Data

Stationary, unit roots, co-integration-spurious regression, Dickey-Fuller test, Error correction mechanism. Forecasting with ARIMA modeling- Box-Jenkins methodology.

Unit - V: Vector Auto Regression and Volatility Structure Model

Vector Auto Regression-problems with VAR modeling and its applications. Volatility Structure Model: ARCH and GARCH.

Note: For question paper setting 60 percentages for problems and 40 percentage theory.

Text Book:

- 1.Kajal Lahari G.S Maddala, “Introduction to Econometrics”, Wiley Publications, Mumbai, 2012.

References:

- 1.Jeffery Wooldridge, “Introductory Econometrics”, Cengage Publications, New Delhi, 2014.
- 2.Damodar G. Gujarati, Dawn Porter and Sangeetha Gunasekar, “Basic Econometrics”, McGraw Hill Publications, New Delhi, 2011.
- 3.Walter Endens, “Applied Econometric Time Series”, Wiley Publication, Mumbai, 2013.
- 4.Steven C. Wheelright and Rob J. Hyndman and Spyros Makridakis, “Forecasting: Methods and Applications”, Wiley Publications, Mumbai, 2008.
- 5.Samprit Chaterjee and Alis Hadi, “Regression Analysis by Example”, Wiley Publications, Mumbai, 2013.
- 6.Dominik Salvatore and Derrick Reagle, “Schaum’s Outline of Statistics and Econometrics” (Schaum’s Outline Series), McGraw Hill Education, New Delhi, 2011.
- 7.William H. Greene, “Econometric Analysis”, Pearson Education, New Delhi, 2003.

Semester-III

II MA

Health Economics (Elective Optional)

Code: E944B

Objectives:

- To understand the importance of health economics with due awareness.

Unit – I: Health Economics

Definition – Approaches to measurement of values of Life – The role of economists in the health sector – Demand for health care – health Indicators – Elements of Health Care Systems – Medical Care as an Investment.

Unit – II: Health Production Function Approach

Health Inputs and output – production, efficiency and health care – skills and efficiency of production of health services – choice of health care, Mother and Child Health Care – Pre and Post natal care.

Unit – III: Supply and Cost Health Care Services

Production and cost – Estimating cost functions in health care – Theory of managed care – Demand, Supply and Equilibrium – The information problem – The market for health services.

Unit – IV: Economic Evaluation in Health Care

Measuring costs in economic evaluation – Cost of illness method – Measuring benefits in economic evaluation – measuring and valuing outputs – Standardized measures of outcome and utility scores – QALY and DALY measures – measuring health gains and utilities.

Unit – V: Health Policies and Health Insurance

WTO and its Impact on Public Health Care System – WHO and India on Health Issues - Risk and Insurance – Voluntary Insurance – Social Insurance System – Reimbursement Method of Third Party Payers – Recent National Health Policy in India and Tamil Nadu.

Text Book:

1.Himanusha Skar, Rout and Prashant Panda. Health Economics in India. New Delhi, New Centuary Publications, 2007.

References:

- 1.Fuchs.V.R. Who Shall Live? Health Economics and Social Choice. USA, World Scientific Publications Company, 1998.
- 2.Rosalind Reed and Thomas A.Lang. Health Behaviours. New Yark, West publishing Company, 1997.
- 3.Getchell, Pippin, Varnes. Perspectives on HEALTH. Boston, McDougal Littell, 2003.
- 4.Chalkley.A.M. A textbook for the Health worker (ANM) Volume I. New Delhi, Wiley Eastern Ltd., 1987.
- 5.Myron Winick.M.D. Nutrition in Health and Disease. New York, A wiley interscience publication, 1980.
- 6.Dr.Mahendra Gaur. National Rural Health Mission (NRHM). New Delhi, Alfa publications, 2008.
- 7.Ghosal.B.C. Health and Social Development in south and south East Asia. Faridabad, OM Publications, 2000.
- 8.Culyr A J Dictionary of Health Economics, Edwasd Elgas Publications Holland 2010.

Semester - III

II MA

Personnel Management (Elective Optional)

Code:E944C

Objective:

•To develop an understanding of the management of human resource with special reference to various aspects of human resource management.

Unit – I: Introduction to Personnel Management

Personnel Management: Definition- Characteristics – Objectives – Importance – Functions and scope of personnel management – Evolution to the concept of personnel management - Qualities of HR Manager – Environment of personnel management.

Unit – II: Human Resource Planning, Job Analysis and Design

Human Resource Planning – Objectives – Need and importance – Process and Levels - Problems in HRP – Guidelines for effective resources planning. Job Analysis: Concept – Objectives – Uses – Process – Techniques. Job Design: Approaches - Methods – Recent trends in job design.

Unit – III: Recruitment, Selection, Placement and Motivation

Recruitment: Process – Sources – Techniques – Considerations in recruitment. Selection: Meaning – Steps in selection process – Selection testing - selection interviewing. Concept of Placement and Motivation.

Unit – IV: Training, Induction and Socialization

Training: Need for training – Importance – Types – Objectives – Methods – Techniques of training -Evaluating training effectiveness. Induction: Concept of induction and orientation – Objectives of induction – Advantages of formal induction – Induction in Indian Industries - Effectiveness of induction. Socialization: Process.

Unit – V: Emerging Horizons in Personnel Management

Virtual Organization: Distinction between traditional and virtual organization – Types – Technology of Virtual Organization – Economic liberalization of personnel management.

Text Book:

1.Gupta C. B., “Human Resources Management”, Sultan Chand & Sons Publication, New Delhi, 2015.

References:

- 1.Subba Rao., “Personnel & Human Resource Management”, Himalaya Publishing House, New Delhi, 2015.
- 2.Aswhathappa K., “Human Resource and Personnel Management”, Tata Mc Graw Hill Publishing Co. Ltd, New Delhi, 2015.
- 3.Venkata Rathnam C.S., & Srivastava B.K., “Personnel Management & Human Resources”, Tata Mc Graw Hill Publishing Co. Ltd, New Delhi, 2015.

Semester-III

Certificate Course - II

Part I: E – Views

Objective:

- To make the student to have knowledge about E-Views

Unit – I: Introduction

Basic Concepts – Work files – file format – import data – sample size – Time series and cross sectional data.

Unit – II: Data Series

Creating series – bringing data into series – different views of series – data function – random number generation – time series function – statistical function – date function.

Unit – III: Data Conversion

Frequency conversion – basic graphs – objects and its explanation – statistical analysis – dummy variables.

Unit – IV: Estimation

Tables and Spools - Summary statistics - Linear regression – weighted least squares – time series estimation – using lags, differences and standard errors.

Unit – V: Forecasting

Static and dynamic – programming and language – using addins – different methods of forecasting.

Text Book:

1.Conzalez – Rivera & Gloria “Forecasting for Economics and Business with Eviews 7”, Routledge publishers, 2016.

References:

1.Hill R. Carter, William E. Griffiths and Gay C. Lim “Using Eviews for Principles of Econometrics” John Wiley & Sons, 2011.

2.Studenmund A.H “Using Econometrics- A Practical Guide – 6th Edition with Eviews” Pearson Publishers, 2011.

Part - II: R-Programming

Objective:

- To make the student to have knowledge about R- Programming

Unit – I: Introduction to R Programming

R Overview – Evaluation of R – Features of R – R Environment Setup – R Basic Syntax – R Data Types – Vectors, Lists, Matrices, Arrays, Factors and Data Frames – R Variables – R Operators – R Decision Making and R loops.

Unit – II: R-Function

R Function – Function Definition – Function Components – Built-in Function – User Defined Function – Calling a Function – Lazy Evaluation of Function – R Strings – R Vectors – R Lists – R Matrices – R Arrays and R Factors.

Unit – III: R-Data Frames

R Data Frames – R Packages – R Data Reshaping – R CSV Files – R Excel File – R Binary Files – R XML Files – R Data Bases.

Unit – IV: Charts and Graphs

R Pie Charts – Pie Chart Title and Colors, Slice Percentages and Chart Legend, 3D Pie Chart –R Bar Charts – Bar Chart Label, Title Colors, Group Bar chart and Stacked Bar Chart – R Boxplots – Creating the Boxplot and Boxplot with Notch – R Histograms – R Line Graphs – Line Chart Title, Color and Labels, Multiple Lines in a Line Chart – R Scatterplots.

Unit – V: R-Statistics

R Mean, Median and Mode – R Linear Regression – R Multiple Regression – R Logistics Regression – R Normal Distribution – R Binomial Distribution – R Poisson Regression – R Analysis of Covariance – R Time Series Analysis.

Text Book:

1.Robert Gentleman and Ross Ihaka, “R Programming”, Tutorials Point (I) Pvt. Ltd., 2016.

References:

- 1.W. N. Venables and D. M. Smith, “An Introduction to R: A Programming Environment for Data Analysis and Graphics”, 2016.
- 2.Norman Matloff, “The Art of R Programming”, A Tour of statistical software design 2009.
- 3.Robert J Knell,” Introductory R: A beginner’s guide to data visualization, statistical analysis and Programming in R”, Walton on Thames United Kingdom, 2014.

Semester - IV

II MA

Indian Economy Issues and Policy

Code: E1039

Objective:

- To understand and analyze Indian economic problems and policies.

Unit - I: Characteristics of Indian Economy

Characteristics - Determinants of Economic Development- Economic and Non Economic Factors - Economic Planning Commission - Niti Aayog.

Unit - II: Poverty, Unemployment and Human Development.

Nature - Regional variations in Poverty and Unemployment - The Recent Government programmes for eradication of Poverty and Unemployment - Human Development Index - Demographic features: Population growth - India's population policy and Development.

Unit - III: Agriculture and Industrial Development

(i) Agriculture: Growth of Indian agriculture and constraints; Regional variations in agricultural development - Sustainable agriculture: Need and Policies - Recent agricultural policy of India - WTO and Indian agriculture – e-NAM.

(ii) Industry: Growth and structure of Indian industry - Regional disparities in industrial Development - Impact of New Economic Policy on Indian Agricultural and Industry.

Unit - IV: Financial Sector

Nationalization of banks and their performance - banking sector reforms since 1991- Capital market : growth - problems - role of Securities Exchange Board of India (SEBI) - Black and Parallel Economy in India – Demonetization of currency.

Unit- V: Trade Policy

Trade policy: impact of WTO on India's import, export and tariff policies- the policy of flexible exchange rates and its impact on Indian economy. Urbanization: providing urban amenities: housing, drinking water- sanitation.

Text Book:

1.Dhingra, I.C, Indian Economy, S.Chand and son Co., Pvt., Ltd., New Delhi. (2010)

References:

1.Ahluwalia, L.J.and IMD Little (EDs), India's Economic Reforms and Development, Oxford University Press, New Delhi. (1998).

2.Byres.T.J, The Indian Economy, Major Debates since Independence, Oxford University Press, New Delhi. (1998).

3.Kausik Basu, (ed) Oxford Companion to Indian Economy, 3rd Edition OUP, New Delhi (2012).

4.Agrawal. A.N, Indian Economy: Problems of Development and Planning, Wishwa Prakashan, Chennai, (2001).

Semester - IV

II MA

Environmental Economics

Code: E1040

Objective:

- To apply economic theories into the environmental problems to solve the social issues.

Unit – I: Introduction to Environmental Economics

Environmental Economics – Economy and Environment Linkages – The Material Balance Principle – Public and Private goods, Private versus Social Cost- Market Failure – Trade-Off between Economic Growth and Environment – Environmental Quality as a Public Good - Sustainable Development.

Unit – II: Environmental Problems

Sources and Types of Pollution: Domestic and Industrial Pollutions (Air, Water, Solid Waste, Land Degradation) – Causes and Effects of Environmental Degradation – Urban and Rural Environmental Problems – Energy: Renewable and Non-Renewable Resources – Global Environmental Problems: Global Warming; Climate Change

Unit – III: Environmental Economic Theory for Resource Allocation

Economic Theory for Resource Allocation – Externalities – Pareto Efficiency and the Market – Limits to Growth – Coase's Theorem - Simon Kuznet's Theory - Technology Versus Environment – Population and Environment

Unit – IV: Environmental Management

Economics of Pollution Control - Environmental Impact Assessment (EIA) – Benefit/Cost Analysis – Contingent Valuation Method – Travel Cost Method – Willingness to pay approach - Valuing Environmental Benefits: Hedonic Price Approach.

Unit – V: Policy Measures

International Environmental Policy – India's Environmental Policy – Law and Environmental Protection in India.

Text Book:

- 1.Charles D. Kolstad (2000): “Environmental Economics”, Oxford University Press, New York.

References:

- 1.Karpagam (2000), Environmental Economics Sterling Publisher Pvt. Ltd., New Delhi
- 2.Ramprasad Sengupta (2000), Ecology and Economics Oxford University Press, New Delhi
- 3.Shankar (2000) Environmental Economics, Oxford University Press, New Delhi
- 4.Eugene T. (2005): “Environmental Economics”, Vrinda Publications, Pvt. Ltd., New Delhi.

Semester – IV

II MA

Indian Public Finance (Core Elective)

Code: E1041A

Objective:

- To enable the students to have an overview of the working of Indian public finance.

Unit – I: Federal Finance in India

Introduction – Stages of growth – Allocation of revenue resources between Centre and State under constitution – Finance Commission: Functions and Implementation of the recommendation – Recent finance commission and its recommendations.

Unit – II: Central, State and Local Finance

Central and state source of income – Expenditure of the central and state govt. Local Finance: Introduction – Functions – Finance of local bodies – Financial problems of local bodies – Theory, Principles and problems of fiscal federalism – Problems of Central and State financial relations in India.

Unit – III: Indian Tax System

Introduction – Salient features – Shortcomings – Central government taxes: Income tax, corporation tax, expenditure tax, death duty, estate duty, gift tax, wealth tax, capital tax, commodity tax, export and import duty – Taxes of State government: Land revenue, agriculture income tax, state excise duties – stamp duties – court fees and registration – taxes on immovable property – taxes on trade, profession and employment – entertainment tax – electricity duties and sales tax. Different approaches to the division of tax burden, incidence and effects of taxation – Elasticity and buoyancy – Taxable capacity – GST.

Unit – IV: Public Expenditure and Debt in India

Public Expenditure: Meaning – Classification – control of public expenditure – Public expenditure in UDCs – Effects. Public Debt: Characteristics - classification – Effects - burden – Management of public debt - Problems of public debt – Role of public debt in UDCs – Deficit Financing: Meaning, Objectives – causes – uses – evils – limits of deficit financing.

Unit – V: Budgetary Policy in India

Introduction – Economic, Fiscal and Budgetary policy – Objectives of budgetary policy – Distinction between fiscal policy and budgetary policy – Neutral and compensatory and functional finance – balanced budget multiplier - Budgetary policy since 1991.

Text Book:

1.Lekhi. R.k., Public Finance, New Delhi, Kalyani Publications (P) Ltd., 2015.

References:

- 1.Richard A. Musgrave, Peggy B. Musgrave. Public Finance in Theory and Practice, New Delhi, Tata Mcgraw Hill Publishing Company Limited, 2010.
- 2.Mithani. D.M. Principles of Public Finance and Fiscal Policy. New Delhi, Himalaya Publishing House, 2015.
- 3.Sundharam.K.P.M and K.K.Andly. Public Finance in Theory and Practice. New Delhi, Chand.S. Company Limited, 2015.

Semester - IV

II MA Tamil Nadu Economic Development (Core Elective) Code: E1041B

Objective:

- To highlight the economic characteristics and development of Tamil Nadu

Unit - I: Introduction

Concept of a regional economy – the geographical features of Tamil Nadu – Natural Resources in Tamil Nadu: Land, Forest, Water (Fisheries) and Minerals.

Unit - II: Performance of Tamil Nadu Economy

Basic characteristics – Demographic trends – Resource endowment – Urbanization – Trends in state income (NSDP) – Structural growth after reforms (1991) – Dynamism of the economy.

Unit - III: Agriculture and Allied Sector

Triple contribution of agriculture to the economy – Green revolution – Productivity and Yield – Cropping pattern – Agriculture research and education – Agricultural marketing and finance – Regulated and Cooperative marketing system – Animal husbandry and poultry – Marine production.

Unit - IV: Industry and Service Sector

Industry: Trends and patterns in industrial growth – Large scale and small-scale industries – FDI's – Industrial estate: SIPCOT, SIDCO - KVIC, KVIB - DIC, TIDCO, ELCOT and TIIC.

Service: Financial sector – RRBs, NABARD and Cooperatives – Transport – Roadways, Railways and Waterways –Energy – Conventional and Non-Conventional energy.

Unit - V: Social Welfare and State Planning Commission

Some Economic Concerns: Education and Health – Unemployment – Antipoverty strategies – Women Development. State Planning Commission: Target and achievement – Financing of plans – revenue, expenditure and debt – Budget.

Text Book:

- 1.Rajalakshmi, "Economic Development of Tamil Nadu", S.Chand & Co, New Delhi, 2000.

References:

- 1.Leonard S.J., "Tamil Nadu Economy", Macmillan India Ltd., New Delhi, 2006.
- 2.Kurien, "Economic Change in Tamil Nadu" S.Chand and Co., New Delhi, 2003
- 3.Government of Tamil Nadu, Tamil Nadu: An Economic Appraisal, Evaluation and Applied Research Department, Chennai, Various Issues.
- 4.Madras Institute of Development Studies, 1988, Tamil Nadu Economy: Performance and Issues, Oxford and IBH Publishing Co., New Delhi.
- 5.Nagaraj MIDS 2014. Tamil Nadu Economy.

Semester - IV

II M.A Financial Institutions and Markets (Core Elective) Code No: E1041C

Objective:

- To gain knowledge on the structure and functioning of financial institutional and market system in India.

Unit - I: Nature and Role of Financial System

Money and finance - Money and near-money-Financial intermediation and financial intermediaries - The structure of the financial system - Functions of the financial sector -Indicators of financial development - Equilibrium in Financial Markets - Financial System and Economic Development

Unit - II: Structure of Interest Rates

Theories of interest rate determination - Level of interest rates - Long period and Short period rates - Term Structure of Interest rates - Spread between lending and deposit rates - Administered interest rates - Appropriate interest rate policy.

Unit - III: The Central Bank, Commercial Banks and Monetary Policy

Functions of Central Bank - The aims and objectives of the monetary policy in developed and developing countries -Instruments of monetary policy - Proliferation of banking and non-bank financial intermediaries - Effectiveness of monetary policy - Credit creation and its control; Profitability and efficiency of banks

Unit - IV: Non-bank Financial Intermediaries (NBFIs)

Definition and types of non-bank financial institutions: growth and impact on India's economic development, Measures taken to control their operations.

Unit - V: Financial Markets

Role and structure of money market and capital market - Call money market. Treasury bill market, Commercial bill market: commercial paper and certificate of deposits - Discount market - Government securities market: Primary and secondary market for securities - SEBI: its impact on the working of capital market in India; IRDA and its role in financial markets.

Text Book:

1.Smith, P.F., Money and Financial Intermediation: The Theory and Structure of Financial System, Prentice Hall, Englewood-Cliffs, New Jersey. (1978)

References:

- 1.Bhole, L.M., Financial Institutions and Markets, Tata McGraw Hill Company Ltd., New Delhi. (1999)
- 2.Bhole, L.M., Indian Financial System, Chugh Publications, Allahabad. (2000)
- 3.Edminster, R.O., Financial Institutions, Markets and Management, McGraw Hill, New York. (1986)
- 4.Goldsmith, R.W., Financial Structure and Development, Yale, London. (1969)
- 5.Hanson, J.A. and S. Kathuria (Eds.), India: A Financial Sector for the Twenty-first Century, Oxford University Press, New Delhi. (1999)
- 6.Harker, P.T. and S.A. Zenios (Ed.), Performance of Financial Institutions, Cambridge University Press, Cambridge. (2000)
- 7.Johnson, H.J., Financial Institutions and Markets, McGraw Hill, New York. (1993)
- 8.Khan, M.Y., Indian Financial System, Tata McGraw Hill, New Delhi. (1996)

- 9.Machiraju, M.R., Indian Financial Systems, Vikas Publishing House, New Delhi. (1999)
- 10.Ohlsion, J.A., The Theory of Financial Markets and Institution, North Holland, Amsterdam. (1987)
- 11.Prasad, K.N., Development of India's Financial System, Sarup & Sons, New Delhi. (2001)
- 12.Robinson, R.I. and D. Wrightman, Financial Markets, McGraw Hill, London. (1981)

Semester-IV

II MA Labour Economics and Industrial Relations(Elective Optional) Code: E1042A

Objective:

- To understand the role of labour and their relations in industries.

Unit - I: Introduction to Labour Economics

Scope, Importance, Nature and Problems of Labour, Labour Market and Analysis of Labour- Demand and Supply. Characteristics of Industrial Labour in India and its Migratory Nature. Labour Movement in India.

Unit - II: Labour Turnover and Labour Productivity

Problem of Absenteeism and Labour Turnover, working conditions and hours of work, Standard of Living and Efficiency of workers, Labour Productivity. Conditions of Child, Women and Bonded labour in India.

Unit - III: Wages and Industrial Disputes

Wages Act of 1936 and 1948, Living Wages and Minimum Wages, recent Wage Act. Profit Sharing and Co-partnership, the Bonus Problem and other recent amendments. Industrial Disputes, Prevention and Settlement of Industrial Disputes, Collective Bargaining and Trade Unions, Grievance Procedure.

Unit - IV: Social Security

Social Security in India-Labour Welfare in India, Industrial Housing, Labour and Co-operation, Employees State Insurance Act 1948, Employees Provident Funds Act 1952 and Public Provident Fund Act 1968 and its subsequent developments, Bonus Act of 1965 and other fringe benefits.

Unit - V: Industrial Relations in India

Scope of Industrial Relations, Labour legislation affecting industrial relations. Labour Administration, Labour Flexibility and Exit Policy. International Labour Organization (ILO) its policies, role, functions and impact on India.

Text Book:

- 1.Prasad, "Labour Economics: An Introductory Course", Serials Publications, New Delhi, 2016.

References:

- 1.Singh. S.D, "Labour Economics", Centrum Press, Anmol Publication, New Delhi, 2012.
- 2.Borjas, "Labour Economics", McGraw Hill Education, New Delhi, 2012.
- 3.Ali Esrafil, "Labour Economics", Everest Publishing House, Pune, 2013.
- 4.Chadda. R, "Labour Economics", Sumit Enterprises, New Delhi, 2011.
- 5.Ronald G. Ehrenberg and Robert S. Smith, "Modern Labour Economics", Pearson Education, New Delhi, 2014.

- 6.Sharma. A.M, “Industrial Relations”, Himalaya Publishing House, Mumbai, 2011.
- 7.Mamoria. C.B, “Dynamics of Industrial Relations”, Himalaya Publishing House, Mumbai, 2016.
- 8.Kavitha Krishnamurthi, “Industrial Relations”, Global Academic Publishers, New Delhi, 2015.
- 9.Srivatsava. S.C, “Industrial Relations and Labour Laws”, S. Chand and Company Ltd., New Delhi, 2012.
- 10.Piyali Ghosh and Shefali Nandan, “Industrial Relations and Labour Laws”, McGraw Hill Education, New Delhi, 2015.

Semester - IV

II MA Security Analysis and Portfolio Management (Elective Optional) Code: E1042B

Objective:

- To enable the students to know portfolio investment management and security analysis.

Unit - I: Financial Markets and Instruments:

Money and bond markets – equity markets – derivative markets – managed funds – exchange traded funds – exchange trading and Over-The-Counter trading – clearing – settlement – margin trading – short sales and contingent orders – regulation of financial markets.

Unit - II: Portfolio Theory

Portfolio Construction: Approaches to Portfolio Construction, Determination of Objectives- Selection of Portfolio - Reasons to hold a portfolio-Diversification Analysis-Markowitz’s Model- Markowitz efficient frontier - Capital Market theory-CAPM model - Capital Market Line-Security Market Line-Present Validity of CAPM-Arbitrage Pricing Theory (APT)

Unit - III: Risk and Return

Definition of investment – concept of risk and return – investment avenues – definition of portfolio management – functions of portfolio management – types of managed portfolios.

Unit - IV: Diversification

Expected portfolio return and variance - risk premium – risky or risk free capital allocation – minimum - variance portfolio frontier - market portfolio - expected return relationships.

Unit - V: Risk Management

Fundamental Analysis-Economic Environment analysis-Industry Analysis- Company analysis- Operating analysis- Management analysis-Financial Analysis- Approaches to valuation.

Text Book:

- 1.Fischer, D.E. and Jordan R.J., 2001, Security Analysis and Portfolio Management, Ed. 6, Prentice-Hall of India (P) Ltd., New Delhi

References:

- 1.Security Analysis and Portfolio Management- Donald E Fischer & Ronald J Jordan
- 2.Modern Portfolio Theory and Investment Analysis,7th Edition- Edwin J Elton, Martin J Gruber, Stephen J Brown, William N Goetzmann
- 3.Modern Investment Theory – Robert A. Haugen
- 4.Investments – William F Sharpe

5. Financial Management: Theory and Practice- Prasanna Chandra
6. Investment Analysis- Francis J C
7. Financial Management- Jonathan Berk, Peter DeMarzo, Ashok Thampy
8. Investments: Principles and Concepts- Charles P Jones.

Semester - IV

II M.A. Co – operation and Rural Development (Elective Optional) Code: E1042C

Objective:

- To make the students to understand the importance of Cooperative system and its role in rural development.

Unit – I: Introduction to Cooperation

Principles – Importance and Benefits of Co – operation and other forms of business enterprises – Co – operation and Economic Development- History and Growth of Co – operative Movement in India – Rural Co-operative Credit Structure – Primary Agricultural Credit Co-operative Bank and its working structure, problems – Urban Co-operative Societies and Agricultural Marketing – Consumer Co-operatives.

Unit – II: Co – operative Movements

Co-operative Movement in Selected Countries – History and Growth of Co – operative Movement in Asia and Europe. International Co – operative Alliance. Specialized co-operatives in various countries.

Unit – III: Rural Development

The role of agriculture in development – Agricultural policy: (a) Agricultural Taxation (b) Pricing Policy - Risk aversion and uncertainty in subsistence farming - Sharecropping and Interlocking factor markets – Rural – Urban Migration.

Unit – IV: Financial Institution in Rural Development

RBI and Agricultural Credit Department – Role of NABARD and RRBs – Nature and Structure of Rural Economy – V.M. Dandekar's Approach to Rural Development – Rural Poverty and Rural Unemployment – Nature, Causes and Remedies. Rural Indebtedness – Relief Measures – Role of SHGS and Micro Finance – Micro Finance in India and Bangladesh.

Unit – V: Rural Development Programme of Government of India

Food for Work Programme – Unorganized Rural Credit Institutions - Decentralized Planning and Rural Development - Rural Employment Guarantee Programme – Small Farmers Development Programme – National Rural Employment Guarantee Programme – Financial Liberalization and Rural Credit in India.

Text Book:

1. Desai Vasant, “Study of Rural Economics”, Himalaya Publishing Company, New Delhi (2000).

References:

1. Jalal. R. S – Rural Co-operatives in India, Anmol Publications Pvt. Ltd., New Delhi.

2. Shakuntala Devi – Rural Credit and Agricultural Development, Sarup & Sons, New Delhi - 1996.
3. Hough. E.M – Cooperative Movement in India, Oxford University Press, Bombay -1959.
4. Kulkarni. K.R., Theory and Practice of Cooperation in India and Abroad.
5. Tripathi. S.N. – Cooperatives Growth and New Dimensions, Discovery Publishing House, New Delhi 2000.
6. Jain S.P., Indian Rural Economics, Vikas Publishers, New Delhi
7. Reserve Bank of India, Statistics on Indian Economy - Various Issues
8. Ramachandran. V. K and Madhuva Sivammathan, Financial Liberalization and Rural Credit in India (Ed), Tulika Books, New Delhi.
9. Hajela. T. N, Co – operation, Konark Publications Pvt. Ltd, Delhi.
10. Bedi. R. D, Theory & History and Practice of Co-operation, R. Lall Book Depot, Meerut.

B. COM

SEMESTER - I PART III- MAJOR CORE

PRINCIPLES OF ACCOUNTANCY

| | | | |
|-------------------------------|---|---------------|---------------------------|
| Course Code | C116 | Credit | 5 |
| Contact Hours per Week | 5 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none">•To understand the conventions, rules and procedures of accepted Accounting Practices.•To impart skills for recording various kinds of business transactions in the books of accounts.•To equip the students to ascertain the business results.•To learn the techniques of accounting relating to Bills of Exchange•To learn the calculation procedures involved in Account Current and Average Due Date. | | |

UNIT – I – Fundamentals of Book Keeping

Accounting and Book keeping – Need – Objectives – Functions – Classifications of Accounting – Methods of Accounting – Persons Interested in Accounting - Accounting Concepts and Conventions –Accounting Procedure - Journal - Ledger - Subsidiary Books.

UNIT – II – Trial Balance and Rectification of Errors

Trial Balance - Objectives – Preparation of Trial Balance. Rectification of Errors – Classification of Errors – Stages in Rectification of Errors – Suspense Account - Practical Problems.

UNIT – III – Final Accounts

Preparation of Final Statement of Accounts – Manufacturing Account - Trading Account — Profit & Loss Account – Balance Sheet – Adjustments.

UNIT – IV – Bank Reconciliation Statement & Bills of Exchange

Bank Reconciliation Statement – Causes of Difference – Preparation of Bank Reconciliation Statement.

Bills of Exchange – Features – Elements – Advantages – Accounting procedures in the books of Drawer and Drawee – Accommodation Bills.

UNIT –V – Average due Date and Account Current

Average due date – Introductory Concept – Uses – Types – Practical Problems.

Account Current - Procedure for Preparation of Account Current (Product Method Only).

NOTE: Marks shall be distributed for theory 20% and for problems 80%.

Text Book:

- T.S.Reddy & Murthy “Financial Accounting” - 6th Revised Edition 2015, Margham Publications, Chennai.

Reference Books:

- S.P. Jain and K.L.Narang “Advanced Accountancy” - 18th Revised Edition, Reprint 2014, Kalyani publishers, New Delhi.
- M. A. Arulanandham and V.S.Raman “Advanced Accountancy” -Himalaya Publishing House, Delhi.
- RSN Pillai & Bagavathi, Advanced Accountancy, Sultan Chand & Sons.
- Hanif & Mukarjee, Modern Accountancy, Tata Mc Graw Hill, New Delhi.

SEMESTER - I
PART III- MAJOR CORE

ENVIRONMENTAL ASPECTS OF BUSINESS

| | | | |
|-----------------------------------|---|---------------|---------------------------|
| Course Code | C117 | Credit | 5 |
| Instruction Hours per Week | 5 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none">•To make the students to acquire basic knowledge about the business environment•To impart knowledge on the various environmental aspects in the midst of which a business has to be organized.•To enable the students to understand the difference between Money market and Capital Market•To expose students to Money Market, Capital Market, Stock Exchange and SEBI•To create awareness on various ethical issues in business and consumer rights. | | |

Unit – I : Nature and Objectives of Business:

Classification of Business, Industries – characteristics of business – Social and Economic objectives of business.

Unit – II: Business Environment:

Economic, Political, Government, Natural, Technological, Social / Cultural and Demographic Environments – their role in business.

Unit – III Money and Capital Markets:

Nature, constituents and its importance – Functions of money market, Indian money market - Indian Capital Market and its development.

Unit – IV Stock Exchange and its Regulation:

Importance and objectives – NSE – features and objectives - Listing and its advantages -Dematerialization and its advantages – SEBI – powers and functions. SENSEX and NIFTY (meaning and examples only)

Unit – V Business and Society:

Ethical principles – Social Responsibility of business to various segments – CSR practices in India. Consumerism – Consumer protection and consumer rights.

Text Book

- Francis Cherunilam, Business Environment, Himalaya Publishing House, New Delhi

Reference Books

- 1.Gupta C.B. Business Organization and Management, S Chand & Co. New Delhi.
- 2.Y.K. Bhushan, Fundamentals of Business Organization, Sultan Chand & Sons, New Delhi
- 3.Sharma R.K. & Gupta Shashi K., Business Organization and Management, Kalyani Publishers.
- 4.Mishra N., Fundamentals of Business Organization, Allied Publication.

SEMESTER - II
PART III- MAJOR CORE

FINANCIAL ACCOUNTING – I

| | | | |
|-----------------------------------|--|---------------|---------------------------|
| Course Code | C216 | Credit | 5 |
| Instruction Hours per Week | 5 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none">•To prepare the students to determine the amount of depreciation under various methods and its Accounting Procedures.•To enable the students to ascertain the profit or loss under single entry system and also to convert from single entry to double entry system of accounting.•To make the students to understand the techniques of preparing the Receipts & Payments Account and Income and Expenditure Account.•To make the students to learn the functional aspects Departmental Accounts.•To equip the students to determine the business results of the Branch under different methods. | | |

UNIT – I – Depreciation Accounting

Introduction – Causes of Depreciation – Purpose – Methods : Straight Line – Written Down Value – Annuity – Sinking Fund – Change in the method of depreciation.

UNIT – II – Single Entry System of Book Keeping

Statement of Affairs method – Conversion of Single Entry into Double Entry System of Book Keeping.

UNIT – III – Accounts of Non-Trading Concerns

Preparation of Receipts and Payments account - Income and Expenditure Account - Balance sheet.

UNIT – IV - Branch Accounting

Branch Accounts - Types of branches - Debtors System – Stock and Debtors System – Final Accounts System – Wholesale and Retail Profit at Branch. (Excluding Independent and Foreign Branches).

UNIT – V – Departmental Accounting

Departmental Accounting - Features – Advantages – Differences between Departmental and Branch Accounting - Apportionment of expenses - Interdepartmental transfers at cost and invoice price.

NOTE: Marks shall be distributed for theory 20 % and for problems 80%.

Text Book:

•T.S.Reddy & Murthy “Financial Accounting” - 6th Revised Edition 2015, Margham Publications, Chennai.

Reference Books:

- S.P. Jain and K.L.Narang “Advanced Accountancy” - 18th Revised Edition, Reprint 2014, Kalyani publishers, New Delhi.
- M. A. Arulanandham and V.S.Raman “Advanced Accountancy” -.Himalaya Publishing House, Delhi
- RSN Pillai & Bagavathi, Advanced Accountancy, Sultan Chand & Sons.
- Hanif & Mukarjee, Modern Accountancy, Tata Mc Graw Hill, New Delhi.

**SEMESTER - II
PART III- MAJOR CORE**

BANKING AND INSURANCE

| | | | |
|-----------------------------------|--|---------------|---------------------------|
| Course Code | C217 | Credit | 5 |
| Instruction Hours per Week | 5 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none"> •To enable the students to acquire knowledge about basics of Banking and Insurance. •To familiarize the students with the modern trends in banking. | | |

Unit- I - Introduction to Banking

Origin and development of banking – Types of Banks: Commercial Banks, Scheduled Banks, Non-Scheduled Banks, Co-operative Banks, and Regional Rural Banks - Role of Banks in Economic Development.

Unit-II - Commercial Banks and Central Banking

Origin and growth of commercial banks in India - Functions - Changing role - Central Bank: Role, Functions - Credit Creation - Limitations.

Unit-III - Negotiable Instruments

Negotiable Instruments : Definition - Characteristics – Types – Parties to negotiable instruments – Cheques – Types – Crossing – Drafts - Cheque vs. Draft - Endorsement – Significance and types.

Unit- IV - Recent Trends in Banking

Emerging Trends in Banking: E-Banking – Centralised Online Real time Electronic Banking (CORE) – Electronic Clearing Service (ECS) – Electronic Fund Transfer (EFT) – Real Time Gross Settlement (RTGS) – National Electronic Fund Transfer (NEFT) – Society for Worldwide Interbank Financial Telecommunication (SWIFT) – E-

cheque – Immediate Payment Service (IMPS) – ATMs – Credit card – Debit card – Smart card – Digital Cash - Internet banking – Mobile banking – Tele-banking.

Unit-V - Basics of Insurance

Introduction to Insurance: Concept - Need of insurance - Insurance as a social security tool - Insurance and economic development – Life Assurance – Principles – Bancassurance - IRDA – Powers - Functions. Life insurance Vs. General insurance.

Text Book:

- Maheshwari. S.N. : Banking Law and Practice, Kalyani Publication, Ludhiana.

Reference Books:

- Shekar. K.C : Banking Theory Law and Practice, Vikas Publication, Noida.
- Radhaswamy & Vasudevan: Text Book of Banking, S.Chand Publication, New Delhi.
- Mishra M.N: Insurance Principles and Practice, S. Chand & Company Ltd, Delhi.

SEMESTER - III

PART III- MAJOR CORE

FINANCIAL ACCOUNTING – II

| | | | |
|-----------------------------------|---|---------------|---------------------------|
| Course Code | C325 | Credit | 5 |
| Instruction Hours per Week | 5 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none"> •To provide knowledge on the general insurance policies available for risk mitigation in businesses and preparation of a statement of claim. •To acquaint the students with the concepts of Hire Purchase and Instalment Purchase System. •To impart knowledge on the accounting procedures involved in admission of a partner in a partnership firm. •To develop expertise knowledge on the accounting procedures involved in retirement and death of a partner in a partnership firm. •To inculcate knowledge on the concept of dissolution of a firm and the accounting procedure involved in closing the books of a partnership firm. | | |

Unit - I: Fire Insurance Claims

Insurance policies for covering risks in business – Claim for loss of stock – Average clause – Poor selling line and effect of abnormal events – Claim for loss of profit/consequential loss.

Unit - II: Hire Purchase & Installment System

Hire Purchase Vs Installment System. Entries in the books of hire purchaser and hire vendor – Default and Repossession – Accounting Treatment.

Unit - III: Admission of a Partner

Adjustments required in the books at the time of admission of a partner - Calculation of new profit sharing ratio – Calculation of sacrificing ratio – Revaluation of assets and liabilities – Calculation and treatment of goodwill – Adjustment regarding capital – Preparation of balance sheet of the firm after admission.

Unit - IV: Retirement and Death of a Partner

Adjustments required in the books at the time of retirement or death of a partner - Calculation of gaining ratio – Revaluation of assets and liabilities – Treatment of goodwill – Adjustment regarding capital – Joint life policy - Disposal of amount due to outgoing partner - Preparation of new balance sheet of the firm.

Unit - V: Dissolution of the Partnership firm

Preparation of Realization account – Difference between Revaluation and Realization account – Closing the books of accounts - Insolvency of one or more partners – Garner vs. Murray rule. Insolvency of all partners.

Text book:

- T.S.Reddy & A.Murthy: Financial Accounting—Margham publications, Chennai.

Reference Books:

- S.P.Jain & K.L.Narang: Financial Accounting –Kalyani, Ludniana.
- M.A.Arulanatham & K.S.Raman, Advanced Accounts, Himalaya Publishing house.
- RSN Pillai & Bagavathi, Advanced Accountancy, Sultan Chand & Sons.
- Hanif & Mukarjee, Modern Accountancy, Tata Mc Graw Hill, New Delhi.

**SEMESTER - III
PART III- MAJOR CORE**

PRINCIPLES OF MARKETING

| | | | |
|-----------------------------------|--|---------------|---------------------------|
| Course Code | C326 | Credit | 5 |
| Instruction Hours per Week | 4 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none"> •To provide basic knowledge of concepts, principles, tools and techniques of Marketing. •To make the students to identify the process of developing new products and pricing them. •To impart knowledge on different types of promotion and different distribution channels. •To make them understand the importance of the concept of consumer | | |

| | |
|--|--|
| | behavior and apply it in marketing •To make them understand the concepts of social marketing, green marketing, and rural marketing. |
|--|--|

Unit I: Introduction

Nature, scope, functions and importance of marketing; Selling Vs Marketing; Marketing Mix, Marketing Environment: concept, importance and components (Economic, Demographic, Technological, Natural, Socio – Cultural and Legal).

Unit III: Product and pricing

Product: Concept and Importance, Product classification; concept of product mix – Product addition & deletion, Product life cycle, New product Development Process; Consumer adoption process.

Pricing: Significance, factors affecting price of a product. Pricing policies and strategies.

Unit IV: Promotion and Physical distribution

Promotion: Nature and importance of promotion; Types of Promotion: Advertising, personal selling and sales promotion and their distinctive features; factors affecting promotion mix decisions.

Physical distribution: Channels of distribution - Marketing intermediaries and physical distribution.

Unit IV: Consumer Behavior and Market Segmentation:

Consumer Behavior: Nature and Importance, Factors influencing consumer buying behavior. **Market Segmentation:** Concept, importance and bases, Product differentiation vs. Market segmentation.

Unit V: Recent developments in Marketing

Social Marketing, online marketing, direct marketing, services marketing, green marketing, rural marketing, viral marketing.

Text Book

•Kotler, Philip, Gary Armstrong, Prafulla Agnihotri and Ehsanul Haque, *Principles of Marketing*, 13th edition, Pearson Education.

Reference Books

- Michael, J.Etzel, Bruce J. Walker, William J Stanton and Ajay Pandit, *Marketing: Concepts and Cases*. (Special Indian Edition)., McGraw Hill Education
- Majaro, Simon. *The Essence of Marketing*, Pearson Education, New Delhi.
- Neeru Kapoor, *Principles of Marketing*, PHI Learning
- Rajendra Maheshwari, *Principles of Marketing*, International Book House

SEMESTER - III
PART III- MAJOR CORE
MERCANTILE LAW

| | | | |
|-----------------------------------|---|---------------|---------------------------|
| Course Code | C327 | Credit | 4 |
| Instruction Hours per Week | 4 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none"> •To provide the students an understanding on the fundamental tenets of The Indian Contract Act 1872. •To provide knowledge on the essential elements of a valid contract, its performance and discharge. •To inculcate awareness on the special contracts namely indemnity, bailment and pledge •To provide them knowledge on the legal procedures involved in formation of a company. •To help them understand how companies are managed and the roles of a company secretary and directors. | | |

Unit – I: Introduction to Indian Contracts Act

Mercantile law – Sources of law - legal rights – Rights in rem and rights in personem – Nature of Contract – classification of contracts - Offer and acceptance – Consideration – Capacity to Contract

Unit – II: Elements and Performance of contract

Free consent - Flaw in consent – Coercion - Undue influence – Misrepresentation - Mistake and Fraud - Legality of object and consideration - Actual Performance – Attempt to Performance - Discharge of contracts – Performance Tender – Discharge of Contract – Discharge by breach – Remedies for breach of contract

Unit – III: Special Contract

Contract of indemnity – Essentials – Rights of indemnity holder and indemnifier – Contract of Guarantee – features – kinds – right and liabilities of surety – discharge of surety – Bailment – rights and duties of bailor and bailee - termination of bailment – Pledge – rights and duties of pawner and pawnee

Unit – IV: Formation and Legal Constitution of a Company

Characteristics of a Company – Kinds – Promotion – Rights, duties and liabilities of Promoters - Memorandum of Association – Doctrine of Ultra vires - Articles of Association - Doctrine of Indoor Management - Doctrine of Constructive notice - Incorporation of companies – Commencement of Business.

Unit – V: Company Management

Directors – Appointment – Qualifications and Disqualifications – Removal – Powers, Rights, Duties and Liabilities of directors. Company secretary – Appointment – Duties.

Text book

- N.D. Kapoor, Mercantile Law, Sultan Chand & sons.

Reference Books

- Pillai & Bagavathi - Business Law, S. Chand & Co, New Delhi
- M.C.Shukla & S.S.Gulshan, Principles of Company Law, Sultan Chand & Sons.
- Dr.M.R.Srinivasan – Company law & Secretarial practice.
- P.P.S.Goana – Sultan Chand, New Delhi, 2008 – “Company law (Mercantile Law).
- B.K.Acharya, Company law & Secretarial practice, Himalya Publishing House.

Note: Latest Edition of Text Books may be used.

**SEMESTER - IV
PART III- MAJOR CORE**

CORPORATE ACCOUNTING

| | | | |
|-----------------------------------|--|---------------|---------------------------|
| Course Code | C424 | Credit | 5 |
| Instruction Hours per Week | 5 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none"> •To provide knowledge on accounting for various types of shares and debentures issued by joint stock companies. •To acquaint the students on the concept of redemption of preference shares and debentures. •To develop an expertise knowledge on the preparation of final accounts of companies, as per the Indian Companies Act, 2013. •To prepare the students to understand the accounting treatment for different forms of mergers. •To inculcate understanding on the concept of internal reconstruction and the legal procedures on the reduction of capital. | | |

Unit – I Accounting for capital

Issue of shares and debentures – Types of shares and debentures – Types of issue – Issue at par, at premium and at discount- Forfeiture and reissue of shares.

Unit – II Accounting for redemption

Redemption of preference shares – Creation of capital redemption reserve - Redemption of debentures - Sinking fund and own debentures methods only.

Unit – III Final Accounts of Companies

Preparation of company final accounts according to Schedule VI of Indian Companies Act 2013- Treatment of special items - Managerial remuneration, Taxation reserve, Dividend - Profit Prior to Incorporation – Calculation and accounting treatment.

Unit – IV Merger and External Reconstruction of Companies

Meaning and Different types of mergers – Amalgamation, absorption and external reconstruction of companies – Procedure - Computation of purchase consideration – Accounting treatment.

Unit – V Internal Reconstruction of Companies

Difference between Internal and External reconstruction - Reduction of Share Capital - Internal Reconstruction of a company – Accounting treatment.

Text Book

- S.P. Jain and K.L.Narang, Advanced Accounting, Kalyani Publications.

Reference Books

- T.S.Reddy and Murthy, Corporate Accounting, Margham Publications.
- R.L.Gupta and Radhasamy, Corporate Accounting, Sultan Chand & Sons.
- M.A.Arulanatham & K.S.Raman, Advanced Accounts, Himalaya Publishing house.
- RSN Pillai & Bagavathi, Advanced Accountancy, Sultan Chand & Sons.
- Hanif & Mukarjee, Modern Accountancy, Tata Mc Graw Hill, New Delhi.

SEMESTER - IV
PART III- MAJOR CORE
COST ACCOUNTING

| | | | |
|-----------------------------------|---|---------------|---------------------------|
| Course Code | C425 | Credit | 5 |
| Instruction Hours per Week | 5 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none"> •To provide an understanding of the concepts involved in cost accounting, and to enable students to prepare a cost sheet and tender. •To equip the students with knowledge on calculating and using different stock levels to maintain inventory. •To provide knowledge on the various methods of maintaining the stores ledger •To provide knowledge on different methods of remunerating labour •To provide an in-depth knowledge in overhead distribution among different departments. | | |

Unit – I: Introduction

Nature and Scope – Objectives and limitations – Financial Vs Cost accounting. Costing system: Types of Costing and cost Classification – Cost Sheet and Tenders – Cost unit – Cost centre and Profit centre.

Unit – II: Material Control

Purchase department and its Objectives – Purchase Procedure – Classification and codification of material. Material Control: level of Stock and EOQ – Perpetual Inventory System – ABC and VED analysis – Material losses.

Unit – III: Stores Ledger and Methods of Pricing Material Issues

Cost price Methods: FIFO – LIFO – Average price Methods: Simple and weighted Average, Notional price Methods: Standard, Inflated and Replacement Price methods.

Unit – IV: Labour Cost

Remuneration and Incentives: Time and Piece rate – Idle and Overtime –Labour turnover – Taylor’s, Merricks and Gantt’s Task Plans – Premium bonus system – Halsey, Rowan and Emerson’s Plans. Calculation of earnings of workers.

Unit – V: Overheads

Classification of Overhead costs – Distribution of Overheads – Allocation, Absorption and Apportionment of Overhead costs – Primary and Secondary distribution –Computation of machine hour and labour hour rate.

Text Book

- T.S. Reddy and Hari Prasad Reddy, Cost Accounting, Margham Publications.

Reference Books

- Jain, S.P and K.L.Narang Cost Accounting: Principles and Methods. Kalyani Publishers,
- Lal, Jawahar. Cost Accounting. Tata McGraw Hill Publishing Co.,
- Maheshwari, S.N. and S.N.Mittal. Cost Accounting: Theory and Problems. Shri Mahabir Book Depot,
- A.Murthy & S.Gurusamy, Cost Accounting, Vijay Nicolas
- R.S.N. Pillai and V.Bagavathi, Cost Accounting, S. Chand.

Note: Latest Edition of Text Books may be used.

SEMESTER - IV
PART III- MAJOR CORE
BUSINESS MANAGEMENT

| | | | |
|-----------------------------------|--|---------------|---------------------------|
| Course Code | C426 | Credit | 4 |
| Instruction Hours per Week | 4 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none"> •To introduce to the students the basic management concepts, principles and practices. •To provide knowledge on importance of planning and decision making in business organisation. •To provide insight on principles of organization and its importance. •To orient them on various leadership styles and the theories of motivation •To make them aware of the importance and different techniques of control | | |

Unit I: Introduction

Management, Need and Scope - Managerial functions – Management Vs Administration – Management as Art, Science or Profession – Principles of management by Henry Fayol – Management in Future.

Unit II: Planning

Nature and importance-Advantages and limitations – Process of Planning – Types of plans – MBO - Steps - Decision making – Steps in decision making.

Unit III: Organizing

Process and principles of organizing – Span of management, Authority and Responsibility – Decentralization and Delegation of authority.

Unit IV: Leadership and Motivation

Leadership: Importance, functions and Styles of Leadership

Motivation: Importance, Major motivation theories: Maslow’s Need Hierarchy Theory, Herzberg’s Two-factor Theory and McGregor’s Theory.

Unit V: Control

Control: Process, Limitations, Principles of effective control system. Major Techniques of control : Ratio analysis, ROI, Budgetary control, EVA, PERT/CPM (Theory only) - MBE.

Text Book

- Gupta, C.B. Business Management, Sultan Chand & Sons.

Reference Books

- Harold Koontz and Heinz Weihrich, *Essentials of Management: An International and Leadership Perspective*, McGraw Hill Education.
- B.P. Singh and A.K. Singh, *Essentials of Management*, Excel Books.
- Peter F Drucker, *Practice of Management*, Mercury Books, London.
- TN Chhabra, *Management Concepts and Practice*, Dhanpat Rai & Co. (Pvt. Ltd.), New Delhi

SEMESTER - III
II BA ECONOMICS - ALLIED
PRINCIPLES OF ACCOUNTANCY

| | | | |
|-----------------------------------|--|---------------|---------------------------|
| Course Code | AC308 | Credit | 4 |
| Instruction Hours per Week | 6 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none"> •To understand the Accounting concepts, conventions, rules and Procedures and to enable them to prepare Journal, Ledger and Trial balance. •To impart skills for recording various kinds of business transactions in subsidiary books. •To equip the students to reconcile the balances of pass book and cash book and to calculate depreciation for various fixed assets. •To make them to prepare Final Accounts to ascertain the business results and financial positions. •To learn to maintain the books of Non-profit organization and prepare the final accounts of such organisations. | | |

Unit –I: Introduction

Definition of Accounting - Book keeping Vs Accountancy - Groups interested in accounting information - Accounting concepts and convention - Double entry system - Rules for journalizing - Ledger posting balancing - Trial balance.

Unit-II: Subsidiary Books

Meaning – Benefits – Preparation of subsidiary books – Purchases book – Sales book – Purchases returns book – Sale returns book – Cash book – Simple, Double column and three columnar cash books – Petty cash book – Bills receivable book – Bills payable book and Journal proper.

Unit – III: Bank Reconciliation Statement and Depreciation

Bank reconciliation statement – Pass book - Causes for difference and adjustment- Depreciation - Straight line and written down value methods only.

Unit-IV: Final Accounts

Final accounts - Trading accounts, Profit and loss accounts and Balance sheet- Adjusting entries - Outstanding and prepaid expenses - Bad debts - Provision for doubtful debts - Provision for discount on debtors and creditors – Depreciation - Interest on capital and drawings – Manager’s commission.

Unit-V: Accounts of Non-profit organization

Capital expenditure, Revenue Expenditure and Deferred Revenue Expenditure - Receipts and Payments Accounts Vs Income and Expenditure Account - Preparation of Income and Expenditure Account and Balance Sheet.

Text Book

T.S.Reddy and Murthy, Financial Accounting, Margham Publications.

Reference Books

1. M.C.Shukla and T.S.Grewal, advance accounting, Sulthan&chand.
2. S.P.Jain and K.L.Narang, financial accounting, Kalyaniludhiara.+
3. R.L.Gupta and RadhaSamy, advanced accountancy, agra book stores.
- 4.N.Vinaygam,Mani and K.L.Nagarajan, principales of accountancy , Sultan Chand & Co

SEMESTER - IV
II BA ECONOMICS - ALLIED
ELEMENTS OF COST ACCOUNTING

| | | | |
|-----------------------------------|--|---------------|---------------------------|
| Course Code | AC408 | Credit | 4 |
| Instruction Hours per Week | 6 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none"> •To provide an understanding of the concepts involved in cost accounting, and to enable students to prepare a cost sheet and a tender. •To equip the students with various material control techniques and to prepare the stores ledger account using the different methods. •To understand and compute the labour cost using the different methods of remuneration and incentive systems. •To provide an in-depth knowledge in overhead distribution among different departments. •To make them learn the concept of marginal costing techniques and break-even analysis. | | |

Unit –I: Introduction

Definition of cost, costing and cost accounting – Objectives, Functions, Advantages and Limitations of cost accounting, Elements of cost - Classification of cost - Preparation of cost sheet and tender / quotations - Cost Centre - Profit Centre.

Unit – II: Materials

Stock levels – Maximum, Minimum, Reordering, Average and Danger; Pricing of issues - FIFO, LIFO -simple and weighted average and standard price – E.O.Q.

Unit – III: Labour

Methods of Remuneration - Time rate and Piece Rate System - Taylor’s differential Piece Rate. Bonus System - Halsey premium plan and Rowan system - Calculation of earnings of workers.

Unit – IV: Overheads

Meaning - Classification of overheads – Allocation, Apportionment and Absorption of overheads - Bases and Principles of Apportionment.Redistribution of overheads of service departments to production departments (Computation of MHR).

Unit – V: Marginal Costing and cost volume Profit Analysis

Meaning of Marginal Costing - Advantages and limitations - Break -Even Analysis (Simple problems only).

Text Book

T.S.Reddy & A.Murthy, Cost Accounting, Margham Publications.

Reference Books

1. S.P.Jain&K.L.Narang, Cost Accounting, Kalyani Publishers.
2. Pattanshetty & Palekar, Cost Accounting, S.Chand & Co,
3. R.S.N.Reddy & A.Murthy, Cost Accounting, S.Chand & company (pvt) Ltd.
4. Jawaharlal, Cost Accounting, Tata McGraw Hill.
5. Tulsian. T.C, Cost Accounting, Tata McGraw Hill.

SEMESTER - III
II BCA - ALLIED
FINANCIAL ACCOUNTING

| | | | |
|-----------------------------------|---|---------------|---------------------------|
| Course Code | | Credit | 4 |
| Instruction Hours per Week | 6 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none">•To impart knowledge on the basic concepts of financial accounting.•To provide awareness on ensuring the arithmetic accuracy of the books of accounts by preparing a trial balance and rectifying accounting errors.•To make the students to learn the process of summarizing the books of accounts and preparation of final accounts•To teach the students different methods of calculating depreciation and the accounting treatment of depreciation.•To help students to understand the single entry system and•preparation of proper financial statements from the incomplete records. | | |

Unit – I: Introduction

Meaning- Definition-Basic accounting concept and conversions – Groups interested in accounting – Accounting equation – Journal – Ledger - Subsidiary Books.

UNIT – II: Trial Balance and Rectification of Errors

Trial Balance - Objectives – Preparation of Trial Balance. Rectification of Errors – Classification of Errors – Stages in Rectification of Errors – Suspense Account - Practical Problems.

Unit – III: Final Accounts

Meaning – Preparation of Final Accounts – Trading Accounts, Profit and loss account, Manufacturing accounts, Balance Sheet – Distinction between Trail balance and Balance sheet – Adjustment entries.

Unit – III: Depreciation Accounting

Meaning of Depreciation – Methods of Providing Depreciation – Fixed Percentage on Original cost – Fixed Percentage diminishing balance (Including change in the method of Depreciation).

Unit – V: Single Entry System

Definition – Salient features – Limitations – Differences between single entry system and Double entry system – Net worth Method and Conversion method

Text Book

Reddy T.S & A. Murthy, Financial Accounting, Margham Publications.

Reference Books

1. Gupta. R.L. Advanced Accountancy S. Chand & Company.
2. S.P. Jain, and K.L. Narang, Financial Accounting, Kalyani Publishers.
3. MC. Shulka and T.S Grawel, Advanced Accounting, Sultan Chand & Sons.
4. JawaharLal Seema Srivastava, Financial Accounting principles and Practices, S. Chand & Company Ltd.
5. Gillespie Accounting systems, procedure and methods prentice Hall India Ltd.

SEMESTER - IV
II BCA - ALLIED
COST AND MANAGEMENT ACCOUNTING

| | | | |
|-----------------------------------|--|---------------|---------------------------|
| Course Code | | Credit | 4 |
| Instruction Hours per Week | 6 | Marks | CIA (50) / SE (50) |
| Course Objective | <ul style="list-style-type: none"> •To make the students to understand the basic concepts in Cost accounting and enable them to prepare cost sheet. •To equip the students with knowledge on calculating different stock levels, and maintenance of stores ledger. •To provide knowledge on different methods of remunerating labour. •To introduce the concept of management accounting and the methods of Financial Statement Analysis. •To familiarize the students in using different ratios to analyse the financial statements. | | |

Unit –I: Introduction

Definition of cost, costing and cost accounting – Objectives, Functions, Advantages and Limitations of cost accounting, Elements of cost - Classification of cost - Preparation of cost sheet and tender / quotations - Cost Centre - Profit Centre.

Unit – II: Materials

Stock levels – Maximum, Minimum, Reordering, Average and Danger; Pricing of issues - FIFO, LIFO -Simple and weighted average and standard price – E.O.Q.

Unit – III: Labour

Methods of Remuneration - Time rate and Piece Rate System - Taylor’s differential Piece Rate. Bonus System - Halsey premium plan and Rowan system - Calculation of earnings of workers.

Unit- IV: Management Accounting

Definition- Objectives- Functions-Limitations- Common size- Comparative and Trend Analysis.

Unit- V: Ratio Analysis

Profitability Ratios- Turnover Ratio- Solvency Ratio

Text Book

Y. Hari Prasad Reddy & T.S Reddy, Cost Accounting, Margham Publications.

Reference Books

1. S.P.Jain & K.L.Narang, Cost Accounting, Kalyani Publishers.
2. Pattanshetty & Palekar, Cost Accounting, S.Chand & Co,
3. R.S.N. Reddy & A. Murthy, Cost Accounting, S.Chand & company (pvt) Ltd.
4. S.P. Gupta, Management Accounting, Sultan Chand & Sons.
5. S.P.Jain & K.L. Narang, Cost and Management Accounting, Kalyani Publications.

Note: Latest Edition of Text Books may be used.

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Advanced Financial Accounting

Semester: I **6 Hours**

Sub Code: C722 **5 Credits**

Course Objectives

- 1.To discover knowledge on the admission and retirement of partners.
- 2.To differentiate the books of Old Firm and the New Firm on the basis of joint life policy.
- 3.To interpret the applications of Garner Vs Murray at that time of dissolution of firm.
- 4.To summarizing the accounting problems in relating to Amalgamation, absorption and reconstruction of companies
- 5.To construct and summarised the knowledge on liquidatators final statement.

Unit – I Partnership Accounts -I

Admission – Calculation of New Profit Sharing Ratio – calculation of sacrificing ratio - Revaluation of Assets and Liabilities – Memorandum Revaluation method – Factors affecting the value of Goodwill – Methods of valuation of Goodwill- Need for valuing the goodwill: When the profit sharing ratio is changed- When a new partner is admitted- When a partner retires or dies - Adjustment for Goodwill – Retirement of a Partner – Retirement and admission of a partner.

Unit – II Partnership Accounts -II

Death of partner- Calculation of Deceased partners' share of profit: Time basis and Sales Basis- Joint Life Policy – Treatment of Joint Life Policy. Amalgamation of partnership firms: In the books of Old Firm- Books of the New Firm

Unit–III: Dissolution of Partnership Firm

Meaning – Methods of Dissolution of firm - Accounting entries- Treatment of unrecorded Assets and Liabilities - Insolvency Partners – Application of Garner Vs Murray in India – one and all partners insolvent- Gradual Realization of Assets and Piecemeal Distribution: Proportionate Capital Method - Maximum Loss Method.

Unit - IV: Amalgamation, Absorption and Reconstruction of companies

Accounting problems relating to Amalgamation- Absorption and Reconstruction: Internal and external

Unit - V: Liquidation of Companies

Statement of Affairs – Deficiency Account or Surplus Accounts – Liquidator's Final Statement of Account.

Text Book

- 1.Jain S.P &Narang, “Advanced Accountancy” Kalyani Publications, New Delhi. 2013
- 2.Maheswari S.N “Advanced Corporate Accounting” Vikas Publication. New Delhi. 2004

Reference Books

- 1.Gupta, R.L “Advanced Accountancy”, Sultan Chand & Sons, New Delhi. 1982
- 2.Shukla M.C&Grewal, “Advanced Accountancy”, S.Chand& Co., New Delhi. 1990
- 3.Maheswari. S.N &R.P.Maheswari, “Advanced Accounting”, Vikas Publications, New Delhi. 2004
- 4.Reddy T.S & Murthy, “Advanced Accountancy”, Margham Publications, Chennai.2015
- 5.Jain And Narang, “Advanced Corporate Accounting ”, Kalyani Publishers, New Delhi, 2012

Strategic Human Resource Management

Semester: I Hours: 6

Sub Code: C723 Credits: 4

Course Objective

- 1.To demonstrate the Human Resource Outsourcing concept and the emerging issues in Human Resource Management.
- 2.To exhibit specialised knowledge on Business Strategy and Human Resource Planning.
- 3.To develop expertise in the field of new trends in Recruitment and different forms of Training in the Organisations.
- 4.To prepare themselves in understanding the techniques of Performance Appraisal and followed with its Reward System.
- 5.To inculcate the acquaintance on Mentoring programmes applied in the Organisations and also the concept of e-HRM.

Unit - I: Strategic Resource Environment

Changing Business Environment-Concepts of traditional and strategic Resource- Resourcing decision- Resourcing to fit the corporate strategy- selection of true assessment centre- Human Resource outsourcing- Human Resource Management in knowledge- Knowledge of HRM- Case Study – Emerging issues in HRM

Unit - II: Human Resource Planning

Business Strategy & HRP- Significance- Objectives- Dimension- Job Analysis- Competency based Job Analysis- HRP Process- Case Study.

Unit - III: Recruitment and Training

Sources- New Trends in Recruit- exact recruit- Diverse working- Alternative to permanent employee. Training: Need- Significance- Linkage between Strategy of Training and Specific form of Training: Technical training –

training for TQM – Training for Management Change – Training for productivity, Creativity, Problem solving – Training for Trainers - New Development- Case Study.

Unit - IV: Performance Appraisal & Rewards

Objectives- Development- Problems- Technology of Performance Appraisal- Reward: Determination- pay for performance- Trends in Executive compensation- Bus strategy and compensation- Case Study.

Unit - V: Recent Developments in SHRM

Mentoring: Development- outcomes- Barriers. E-HRM: Goal- Types- Human Resource Information System (HRIS)- HR issues in Memorandum of Association (MOA)- Cross culture and HR- Alternate work practices- Research in HRD- Case Study.

Text Book

1.Tanuja Agarwal, *Strategic Human Resource Management*, Oxford University Press New Delhi. 2007

Reference Books

1.Srinivas R. kandula, *Strategic Human Resource Development*, Prentice Hall of India Private Limited, New Delhi 2001.

2.Jon M. Werner Randy L. DeSimone, *Human Resource Development*, Cengage Learning India Private Limited, New Delhi- 1999.

3.Aswathappa, *Human Resource & Personnel management*, Tata McGraw Hill, New Delhi. 1999

4.Yuvaraj. S, *Human Resource Development*, Vrinda Publication (P) Ltd, Chennai 2003

Web Resources

1. <https://twitter.com/HRDMinistry>
2. <http://www.sajhrm.co.za/index.php/sajhrm>

Consumer Behavior

Semester: I Hours: 6

Code No: C724 Credit: 4

Objectives:

- 1.To make a students to understand the different dimation of consumer behavior,
- 2.To help students learn various models of consumer behavior.
- 3.To illustrate the various models of consumerisim.
- 4.To discover knowledge on group dynamics of consumer.
- 5.To analyse Consumerism and to measure the customer satisfaction.

Unit - I: Introduction to consumer behavior

Dimensions of consumer behavior – concepts and need for studying consumer behavior – factors influencing consumer buying behavior – consumer buying process.

Unit - II: Consumer Modeling

The Economic Model – Learning Model – Psychological Model - Sociological Model – The Howard Sheth Model of buying behavior – The Nicosia Model – the Engel - Kollat – Blackwell Model .

Unit - III: Consumerism

Introduction – Evolution of Consumerism – How did Consumerism originate? – Unique Problems of Indian Consumers – Consumer Orientation – Consumer Exploitation in India – Major Problems of Consumers Exploitation Enactments – Carlill Vs Carbolic Company – Consumer Protection Act 1986 – Rights of Consumers - Questions.

Unit- IV: Group Dynamics and consumer reference group

Definition and Meaning of group – types of groups relevant to consumer behavior – Family life cycle – Friendship group – Formal social clubs – Shopping friend's group – Work group – Rural consumer behavior.

Unit -V: Customerization

Working towards Customer Satisfaction – Sources of Customer Satisfaction – Consumerism – Consumer Protection Difficulties and Challenges in Predicting Consumer Behavior.

Text Book:

1. Suja and Nair, Consumer Behavior in India Perspective, Himalaya Publishing House. New Delhi 2013

Reference Books:

1. Philip Kotler, Kevin and Lane Keller, Marketing Management, Pearson Education. 2013
2. Pillai & Bagavathi R.S.N, Modern Marketing, S.Chand, New Delhi. 2013
3. Loudon and Della Bitta, Consumer Behavior Concept and Application, Tata Mcgraw Hill. 2000
4. Gupta and Sumitra Pal S. L, Consumer behavior in Indian Perspective, Sultan chand and Sons. 2010

Web Resources

1. www.consumer.tn.gov.in/
2. <http://www.consumer.tn.gov.in/>

Advanced Business Statistics

Semester– I Hours/Week: 6

Code: C725

Credits: 4

Course Objectives:

1. To Make the student understand the correlation between variables.

2.To Acquire knowledge in theory of probability

3.To Educate the student to learn procedure for selecting sample and to importing knowledge on the testing of hypothesis.

4.To test the goodness of fit and testing homogeneity of variables.

5.To Enhance practical applications of testing equality of population variances

Unit – I: Partial and Multiple Correlation

Partial correlation – Partial correlation coefficient – Partial correlation in case of four variables – Multiple correlation – Multiple regression analysis. (Volume – II: Chapter 9: Pages: 1109 to 1135)

Unit –II: Theory of Probability

Theory of probability – Probability rules – Bayes theorem – Probability distribution – Characteristics and application of Binomial and Poisson with simple problems. (Volume – II: Chapter 1: Pages: 751 to 788; Chapter 2: Pages: 806 to 879)

Unit – III: Sampling

Sampling – Sampling methods – Sampling error and Standard error – Relationship between sample size and standard error – Testing hypothesis – Testing of means and proportions – Large and small samples – t-test. (Volume – II: Chapter 3: Pages: 882 to 951)

Unit – IV: Chi square Test and Goodness of Fit

Chi square distribution – Characteristics and application – Test of goodness of fit and test of independence – Test of homogeneity. (Volume – II: Chapter 4: Pages: 953 to 1003)

Unit– V: F-Distribution and Analysis of Variance

F distribution – Testing equality of population variances – Analysis of variance – One way and two way classification. (Volume – II: Chapter 5: Pages: 1006 to 1038)

Book for Study

S.P. Gupta, Statistical Methods, Volume I & Volume II, Sultan Chand & Sons, New Delhi, 2009.

Books for Reference

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11-e, Sultan Chand & Sons, New Delhi, 2004.

2. S. P. Gupta & M. P. Gupta, Business Statistics, 14th enlarged edition, Sultan Chand & Sons, Educational publishers, New Delhi, reprint 2007.

3. Richard I Levin and David S. Rubit, Statistics for Management, Seventh edition, Pearson Education, New Delhi, 2002.

4. P.R. Vittal, Business Mathematics and Statistics, Margham Publications, Sixth revised edition, 2011.

E – Learning source: <http://mathworld.wolfram.com>

Main Elective – I Advanced Management Theory

Semester – I6 Hours

Sub Code: C726A4 Credits

Course Objectives

- 1.To enable students to understand the global business environment.
- 2.To enhance the knowledge in information technology and its impact on management.
- 3.To emphasis the students understand the trends in outsourcing.
- 4.To build knowledge on strategic management
- 5.To explore the contemporary issues and ideas on Leadership

Unit - I: Global Business Environment

Management in 21st Century – Global Business Environment – Cultural and Ethical Environment – Globalisation effect on business in India – Its effect on Management Practices – TQM – Concept – TQM in Indian Companies

Unit - II: Information Technology and its impact on Management

Global developments in Communication and Information Technology – Development, Storage and Retrieval of Information – Web based and Internet based Business Operation.

Unit - III:Outsourcing

Concept and Meaning – Economics of Outsourcing – Causes for Outsourcing – Methods of Outsourcing – Types of Business Processes Outsourced – Global trends in Outsourcing.

Unit-IV: Strategic Management

Need for Strategy – Process and types of Strategy – Measuring effectiveness of Strategy – Basic concepts on Learning organisations and Knowledge Management

Unit-V: Leadership Challenges

Contemporary issues and ideas on Leadership – Leadership for Global Business Operation – Women in Management – Gender equity in organisations – Social Responsibility of Business.

Text Book

1.S. Nakkiran and D.J. Franklin, Business Process Outsourcing, Deep and Deep Publications, New Delhi, 2004.

References

- 1.Gray Dressler Management, Prentice Hall (Pearson Education) 2001.
- 2.DoedeKeuning, Management A Contemporary Approach, Prentice Hall (Pearson Education) 1998.

Main Elective – II Security Analysis and Portfolio Management

Semester: I6 Hours

Sub Code: C726B 4 Credits

Course Objectives:

- 1.To understand about the securities market and its governing authorities.
- 2.To enhance the understanding of Securities Market
- 3.To develop the knowledge about fundamental analysis
- 4.To impart the knowledge on Risk and Return Analysis and Theories (Arbitrage and CAPM)
- 5.To inculcate the depth understanding about the derivative market

Unit - I: Securities Market- An Overview

Constituents of financial system –development and growth of financial and capital markets in India –regulatory authorities governing financial and capital markets – role of securities market –basis of differentiating market– Constituents of primary market — current status of Indian securities market – perspective on market growth and technology – powers of SEBI.

Unit - II: Secondary Market

Significance, functions and scope of secondary market - secondary market intermediaries and regulation–Stock exchanges, functions and significance of stock exchanges–listing of securities – On line trading –Bond market - Interface between Stock Market and Bond Market, Primary and Secondary Markets, Capital Market and Money Market – Insider Trading, Circular Trading, Price Rigging – Market indices

Unit - III: Fundamental Analysis

EIC Approach-Technical Analysis and market Efficiency- Valuation of Shares (Theory Only)

Unit - IV: Risk Return Analysis

Risk Return investment- Portfolio Selection and management- Capital assets pricing model- Arbitrage pricing Theory- Portfolio Evaluation.

Unit - V: Derivatives Market

Introduction to Derivatives - development of derivatives market in India - Forward Contracts – Future Contracts - Option Contracts - Types of Option Contracts - Option Trading Strategies - Option Valuation – ETFs.

Texts Books

- 1.*Indian Securities Market*; NSE Publication, 2012.
- 2.Bhalla V.K, *Investment Management*; S.Chand Publication New Delhi, 2011.

References

- 1.Shashi K. Gupta &NishaAggarwal, *Financial Services*, Kalyani Publishers, New Delhi 2014

2. Varshney P.N & Mittal S.K, *Indian Financial System*, Sultan Chand Publications, 2011.
3. Rustagi R.P, *Investment Analysis & Portfolio Management*, Sultan Chand Publications, 2011. John C. Hull, *Options, Futures, and Other Derivatives*, Prentice Hall; 5th edition, 2002.

Web Resources

1. www.sebi.gov.in/
2. www.bseindia.com/

Elective III - Business Ethics

Semester: I6 Hours

Sub Code: C726C 4 Credits

Objectives

- To introduce the meaning of personal ethics, business ethics, concepts of business ethics, benefits of business ethics, characteristics of business ethics and relationship between law and Moral standard.
- To discuss the meaning, growth, scope and emerging challenges in human resource management and ethical issues in human resource management.
- To understand the ethical issues in marketing strategy, marketing mix, consumerism and protection of consumers related welfares.
- To learn ethical issues in financial marketing, financial service industries, frauds in banks, insurance sectors and non life insurance sector.
- To teach meaning, importance and advantages of Corporate Social Responsibility and steps to attainment of CSR.

Unit - I: Introduction to Business Ethics

Introduction to Business Ethics Concepts, and theories of Business Ethics- Meaning Definition and Principles of Personal Ethics- Professional ethics- Business Ethics, Management and Ethics-Ethical theories in Relation to Business- Ethical decision making -Benefits from managing Ethics in Organisation - Characteristics of an Ethical Organisation- Recognizing Ethical Organization- Relationship between law and Moral standards.

Unit - II: Human resources management and Ethics

Ethical Issues in Human resources management- Definition- Growth of Human Resource Management – Scope of Human Resources Management- Emerging challenges of HRM-Ethical issues-Discriminations- Suppression of Democratation in work place- Privacy issues- Recruitment and selection – Performance tracking.

Unit - III: Marketing and Ethics

Ethics in Marketing – Definition, Ethical issues in Marketing Strategy – Ethical Issues in Marketing Mix – Product – Price – Promotion – Place – Process – People -Physical evidence – Ethical issues and consumerism- Consumer Protection – Consumer Welfare – Consumer delight – Consumer Rights - Ethics in market research.

Unit - IV: Finance and Ethics

Ethical Issues in Finance – Introduction –Significance of Financial Management – Role of Finance Manager – Ethical Issues in financial Market - Ethical Issues in Financial Services Industry – Frauds in Banks – Measures against Bank Frauds – Frauds in the Insurance Sector – Frauds in Non Life Insurance Sector – Ethics in auditing - Money laundering .

Unit - V: Corporate Social Responsibility

Corporate Social Responsibility – Introduction, Importance of Social responsibility of Business- Definitions of CSR –Models of implementation of CSR – CSR as a business Strategy – Advantages of CSR 1- Scope of CSR – Steps to Attain CSR – External Standards on CSR – Ethics and Social responsibility of Business – Environmental Ethics –Environmental Issues in India – Green Initiative – Waste Management .

Text Book:

1.AC Fernando, ‘Business Ethics - An Indian Perspective’, Pearson Education, New Delhi. 2009

Books for References:

1.Business Ethics and Corporate Governance, ICFAI Center for Management Research, Hyderabad. 2003

2.John R Boatright Ethics and the conduct of Business, Pearson Education (Singapore) Pvt. Ltd, Indian Branch, Delhi. 2009

3.Cyriac K, 2000, “Managerial Ethics and Social Issues — Readings and Cases”, Reading material for Business Ethics, XLRI Jamshedpur.

4.Fr. McGrath,SJ Basic Managerial skills for all, Prentice Hall of India, New Delhi. 2008

5.Davis Keith and Blomstorm,Business, Society and Environment, Tata McGraw – Hill Ltd., New Delhi.1987

Accounting for Managerial Decision Making

Semester: II 6 Hours

Sub Code: C823 5 Credits

Course Objectives:

- 1.To enable students to acquire sound knowledge of concepts, methods and techniques of management accounting and to develop competence with their usage in managerial decision making control.
- 2.To analyse the operational efficiency by comparison of present ratio with those of the past working and also with those of other firms in the industry.
- 3.To ascertain various sources from where the funds were raised and the specific manner in which they were utilised between the dates of the two Balance Sheet.
- 4.To defend the importance of linking an organisations budget with its strategic plan.
- 5.To determine profitability at different level of production and sales.

Unit - I: Accounting For Managerial Decision Making

Meaning- Scope- importance -Working capital management-Estimation of working capital requirements-Capital Budgeting: pay-back period method- ARR method- Discounted Cash flow methods- N.P.V method - profitability index method.

Unit - II: Ratio Analysis

Steps in Ratio analysis- advantages – classification of Ratios – profitability Ratio – Turnover Ratios or Activity Ratio- Solvency Ratio or Financial Ratio.

Unit - III: Fund flow and Cash Flow Statement

Meaning- Importance or uses of Fund flow statement- Limitations of funds flow statement- Working capital statement or Schedule of changes in working capital - preparation of fund flow statement- Cash flow statement: - meaning of cash and cash equivalent – Preparation of cash flow statement (AS3).

Unit - IV: Budget and Budgetary Control

Meaning – Definition- Classification of Budget- Sales Budget- Production Budget- Materials Budget- labour Budget- Overhead Budget- Cash Budget – Flexible budget.

Unit - V: Marginal Costing

Meaning – definition – features – advantages – limitations – Marginal costing and absorption costing- cost volume profit analysis - Decision making problems

Text Book

- 1.Jain &Narang, Advanced Cost & Management accounting, Kalyani publishers, Ludhiyana. 2011

Reference Books

1. Maheswari S.N. Advanced Management accounting, Sultan Chand & sons, New Delhi. 2012
2. Hingorani & Ramanathan, Management Accounting, Sultan Chand & sons, New Delhi. 2000
3. Anthony, Robert, Management Accounting, Richard Irwin Home Wood, Illinois. 1998
4. Batty. J. Advanced Management Accounting, McDonald & Evans, London 2000
5. Jain. S.P, Narang K.L & Simmi Agrawal, Accounting For Managers, Kalyani Publishers Chennai 2015

Advanced Cost Accounting

Semester: II 6 Hours

Sub Code: C8245 Credits

Course Objectives

1. To provide knowledge of Operation costing.
2. To make students to understand the Process Costing.
3. To enrich the various methods relating to job, service, batch and contract costing
4. To make clear about Reconciliation of cost and Financial Accounting.
5. To equip knowledge on Standard Costing and Variance Analysis.

Unit - I: Operation Costing

Service costing – Meaning- types of services-Transport costing-Hospital costing-Power generation costing- Hotel costing- Ascertainment of various services cost

Unit - II: Process Costing

Normal loss and abnormal loss or gain – Inter process profit – equivalent production method – FIFO method and average cost methods only.

Unit - III: Joint Products and By Products

Joint products and By- products: methods of cost allocation to joint products – average unit cost method – direct allocation to products – physical units method – relative market value method – standard cost method – marginal cost method. Valuation of By-products – miscellaneous / other income method – market value – market value like material – standard cost – joint cost proportion.

Unit - IV: Reconciliation of Cost and Financial Accounts

Introduction – Need for reconciliation – Reasons for reconciliation – Reasons for variation in profit – Procedure of reconciliation – Memorandum reconciliation statement account.

Unit - V: Standard Costing and Variance Analysis

Basic concept of standard costing – Estimated cost vs. standard – Historical costs vs. standard cost – Standard cost vs. Budgetary control – Advantages of standard cost – Limitations of standard cost – Material cost variances – Labour variances – Overhead variances – Sales variances.

Text Book

1.Jain &Narang, Advanced Cost Accounting, Kalyani Publishers, Ludhiyana 2010

Reference Books

1.MaheswariS.N, Advanced *Cost Accounting*, Sultan Chand & Sons, New Delhi. 2010

2.Ravi M. Kishore, *Cost Management*, Taxmann's Publication. New Delhi 2008

3.Agarwal,*Cost Accounting*,SahityaBhawan, Agra.2000

4.Iyengar S.P, *Advanced Cost Accounting*: Sultan Chand & Sons, New Delhi.2002

5.Shukla M.C, Grewal T.S & Gupta M.P Cost Accounting, S. Chand & Company New Delhi 2014.

Research Methodology

Semester – II 6 Hours

Sub Code: C8254 Credits

Course Objectives

1. To develop an idea about various research designs and techniques
2. To understand sampling techniques of research and its applications
3. To emphasize the learners in the usage of appropriate tools of data collection in research
4. To make the learners understand the applications of SPSS
5. To lay a foundation to become familiar in style of preparing research report

Unit –I: Introduction

Definition of Research, Characteristics, Nature, and Scope- Qualities of Researcher-Components of Research Problem- Various Steps in Scientific Research-Types of Social Science Research- Formation of Research Proposal- Review of Literature-Hypothesis- Research Design.

Unit –II: Sampling

Meaning, Definition, Need – Population – Types of Sampling- Sampling Errors- Merits and Demerits of Sampling

Unit –III: Data Collection

Sources of Data- Primary and Secondary Data- Procedure for data collection- Tools of data collection- Interview Schedule-Questionnaires - Validity and Reliability- pilot study and pre-testing.

Unit –IV: Processing of Data

Introduction to SPSS- Editing, Coding and Tabulation- Problems- Analysis of Data Collection- Statistical Analysis- Diagrammatic, Picture and Graphic Representation- Interpretation of results.

Unit-V: Research Reports

Report writing – types of reports; planning report writing; research report format, contents of reports - styles and conventions in reporting - steps in drafting a report - footnotes and bibliography.

Text Book

1.Kothari C.R, Research Methodology, New Age International Publication, Third Edition, New Delhi. 2014

Reference Books

1.Pannerselvam, R, Research Methodology, Prentice Hall of India, New Delhi.2014

2.Ravilochanan. P, Research Methodology, Margham Publication, Chennai. 2010

3.Wilkinson T S &Bhandarkar P L “Methodology and Techniques of Social Research”, Himalaya Publishing House, 2000, Mumbai.

Web Resources

www.tiss.edu/

scholar.google.com/

Quantitative Techniques for Business Decisions

Semester – II Hours/Week: 6

Code: C826 Credits: 4

Course Objective:

- 1.To demonstrate the Linear Programming Problem with Mathematical Formulation, Graphical Method and Simplex Method.
- 2.To exhibit specialised knowledge on Transportation Problem with North West Corner, Least Cost and Vogel's Approximation Methods.
- 3.To develop expertise in the field of Assignment Problem by using Hungarian Method and also by using Traveling Salesman concept.
- 4.To prepare themselves in understanding the techniques of Inventory Control with various cost concepts.
- 5.To inculcate students, the awareness on Network Scheduling problems by using PERT and CPM Techniques.

Unit – I: Linear Programming

Introduction – Linear programming – Mathematical formulation of LPP – Graphical method – Simplex method. (Chapter 3: Sections: 3.1 to 3.4 and Chapter 4: Sections: 4.1 to 4.3)

Unit –II: Transportation Problem

Transportation problem – Definitions – Formulation and solution of transportation problems – North West Corner method, Least Cost method and Vogel's Approximation method – Test for optimality. (Chapter 10: Sections: 10.1 to 10.13)

Unit – III: Assignment Problem

Assignment problem – Definitions – Formulation and solution of assignment problems – Unbalanced assignment problem – Travelling salesman problem – Solution by Hungarian method. (Chapter 11: Sections: 11.1 to 11.4, 11.7)

Unit – IV: Inventory Control

Inventory models – General concepts and definitions – Various cost concepts – The technique of inventory control – Deterministic Inventory problem with no shortages. (Chapter 19: Sections: 19.1 to 19.10)

Unit – V: Network scheduling by PERT and CPM

Introduction – Network and basic components – Rules of network construction – Time calculation in network – Critical path method – PERT calculation. (Chapter 25)

Book for Study

Kanti Swarup, P.K. Gupta, Man Mohan, Operations Research, Sultan Chand & Sons, New Delhi, 2008.

Books for Reference

1. P.K. Gupta, Operations Research, 8-e, Krishna Prakasam Mandir, Meerut, 1993.
2. P.K. Gupta and D.S. Hira, Operations Research, S. Chand & Company, New Delhi, 2000.
3. J.K. Sharma, Operations Research Theory and Applications, 2-e, Macmillian Business Books, 2003.
4. Hamdy A. Taha, Operations Research, Pearson Education, New Delhi, 2002.

E– Learning source: <http://mathworld.wolfram.com>

Main Elective- IV Entrepreneurial Development

Semester – II 6 Hours

Sub Code: C827A 4 Credits

Course Objectives

- To enable the students to understand the concept of entrepreneurship and to learn the professional behaviour on entrepreneurship
- To create the awareness about women entrepreneurs and of their empowerment
- To identify, develop and incubating successful business ideas
- To analyse and create project formulation.
- To identify the various financial institutions and promotional institutions to entrepreneurs at National and State level.

Unit - I: Entrepreneurship

Introduction on Entrepreneur – Meaning of Entrepreneurship – Types of Entrepreneurs – Traits of Entrepreneur - Factor influencing Entrepreneurship - Function of Entrepreneurs -Theories of Entrepreneurs – Role of Entrepreneurs in Economic Development

Unit – II: Entrepreneurial Development and Role of Women Entrepreneur

Entrepreneurial growth- Role of Government and Non - Government agencies promoting entrepreneurship in India – barriers to entrepreneurship

Women entrepreneurship: concepts – functions and problems – role and recent trends in women entrepreneurship – Women entrepreneur in economic growth- Strategic approaches in the changing Economic scenario for small scale Entrepreneurs.

Unit - III: Developing Successful Business Ideas

Business ideas generation techniques – Identification of Business opportunities- Feasibility study- Marketing, Finance, technology & Legal Formalities - Tools of Appraisal

Unit - IV: Establishing an Enterprise

Project formulation - Important steps and documents for starting a business – Initial problems of setting up of enterprises – preparing a model project report for starting a new venture – content of project report- Incubations- MSMEs

Unit - V: Funding Opportunities

Sources of finance: venture capital, nature, venture capital process, business angels, commercial banks – government grants – SIDBI – PIP - DIC – IDBI – IFCI – ETC – SSIC – SIDO – SIPCOT – SIDCS – TECOS – SFC.

Text Book

1.Gupta C.B and Srinivasan N.P, Entrepreneurship Development in India, Sultan Chand and Sons. New Delhi 2010

Reference Books

1.RenuArora and Sood S. K, Entrepreneurial Development, Kalyani Publication New Delhi 2009

2.Vasanth Desai, Entrepreneurial Development, Himalaya Publications Mumbai 2000

3.Khanka S.S, *Entrepreneurial Development*, S. Chand Publications New Delhi 2012

4.Jayashreesuresh - Entrepreneurial Development, Margham publication, Chennai.2013

Web Resources

1.<http://www.cidc.in/new/>

2.<http://www.cosidici.com/>

Main Elective - V Indirect Taxation

Semester: II 6 Hours

Sub Code: C827B 4 Credits

Course objectives

- To acquire knowledge on indirect tax system
- To gain knowledge on GST and procedures.
- To Provide a practical perspective of GST Returns.
- To identify and analyze online filling GST
- To Understand the Customs Act

Unit – I: Introduction to Indirect Tax

Canons of Taxation – Objectives of Taxation - Indian Tax System – Reforms of Tax system in India - Indirect Taxes Merit and Demerit – Direct Vs Indirect Taxes.

Unit – II: Basic of Goods And Service Tax

Goods and Service Tax - Important Definitions - Taxable Persons – Time of Supply of Goods and Services – Administrative set up – Classes of officers under Central and State goods and services Tax Act - Appointment of Officers – Powers of officers – Levy and collection of GST – Powers to grant exemption from tax.

Unit – III: GST- Registration

Registration – Procedure for registration under Schedule III – Special provisions relating to casual taxable person and non-resident taxable person – Amendment of registration – Cancellation of registration – Revocation of cancellation of registration.

Unit – IV: GST-Filing of Returns

GST- Tax rate-e filing-GST portal – GSTR Forms - return producer-e way bill-composition scheme- Assessment of Non-filers of Returns – Assessment of Unregistered Persons – Assessment in certain Special Cases – Tax Invoice – Credit and Debit Notes – Payment of Tax – Tax Deducted at Source –Definitions - Collection of Tax at Source

Unit – V: Overview of Customs Duty

Customs Act 1962 – Important Definitions – Basics – Importance of Customs Duty – Constitutional authority for levy of Customs Duty – Types of Customs Duty – Prohibition of Importation and Exportation of goods – Valuation

of Goods for Customs Duty – Transaction Value – Assessable Value – Computation of Assessable Value and Customs

Text Book

- 1.Mehrotra& Goyal, Indirect Taxes, Sahitya Bhavan Publications, Agra,
- 2.V. Balachandran, “Indirect Taxation”, Sultan Chand & Sons and Kalyani Publishers, 2014

Reference Books

- 1.Dr. P. Radhakrishnan, “Indirect Taxation”, Kalyani Publishers, 2016.
- 2.Dr.Parameshwaran& Viswanathan Indirect Tax- GST- Custom Law- Kavin Publishers, 2018
- 3.Jayakumar A, Indirect Tax, Learntech Press, Trichy. 2007

Elective VI E- Commerce and Computerised Accounting

Semester - II 6 Hours

Sub Code: C827C

4 Credits

Objectives:

- 1.To establish the knowledge on E-Commerce and E-Business alongwith its process, potentials, driving forces and regulatory aspects.
- 2.To exhibit specialised knowledge on Electronic Data Interchange and Internet Trading Relationships for the betterment of Supply Chain Management.
- 3.To develop expertise in the field special features required for the Electronic Payment System and different forms of e-payment.
- 4.To make the students to appreciate the differences between Manual Accounting vs. Computerised Accounting.
- 5.To enable the students to prepare the statements of accounting and cash flow statements in the computerised format.

Unit - I: Introduction

E-Commerce - E-Business - Potential Benefits of E-commerce – Driving Forces of E-Commerce – Business Process Re-Engineering –E-Commerce Applications –Regulatory Environment for E-Commerce – Competitive intelligence on the Internet – Future of E-Commerce.

Unit - II: Electronic Data Interchange (EDI), E-Commerce & Internet

Introduction - Traditional EDI systems - Benefits and Drawbacks - Data transfer and standards. Financial EDI-EDI systems and the Internet - Legal security and private concerns - Authentication Methods – Firewalls – Factors considered in securing the firewalls - Internet trading relationships: Business to Consumers (B2C), Business (B2B),

Consumer to Business (C2B), Government to Consumer (G2C), Features and benefits-Portal Vs Website - Supply Chain Management.

Unit - III: Electronic Payment Mechanisms

Electronic Payment System: Special features required in payment systems for e-commerce, Types of e-payment systems; E-cash and currency servers, e-cheques Digital token based credit cards, smart cards, electronic purses and debit cards; Business issues and economic implications; Operational, credit and legal risk of e-payment System; Risk management options in e-payment system; Components of an effective electronic payment system.

Unit - IV: Computerized Accounting

Computerized Accounting: Meaning, Features, Advantages and disadvantages – Computerized vs Manual Accounting – Creation of Company – Grouping of accounts – Creation of Accounts: Cash Book, Bank Book, Sales Register, Purchase Register, Journal Register, Debit Note Register, Credit Note Register, Opening and Closing Stock – Creation of Inventory – Creation of Stock Groups, Stock Categories, Godowns, Stock Items and Units of Measure – Detailed Stock Valuation. Entering Transactions: Voucher Entry – Different vouchers

Unit -V: Computerised Statements

Day Books – Financial Statements: Trial Balance, Trading & Profit and Loss Account, Balance Sheet – Ratio Analysis - Cash Flow statement – Funds Flow Statement - Inventory Report of a Sole Trader and a Company – Outstanding: Receivables and Payables – Editing and Deleting Ledgers and Groups – Budget Control – Creating, Editing and Deleting Budgets – GST Assessment.

Text Books:

- 1.KalakafaWhinston Pearson - Frontiers of electronic Commerce 1996
- 2.P.T. Joseph S.J., E-Commerce, second edition PHI Pvt. Ltd., New Delhi 2007

Reference Books:

- 1.Agarwal, K.N and DeekshaArarwalar; Business on the Net; What's and How's of E-Commerce; Macmillan, New Delhi. 2006.
- 2.Agarwal, K.N and DeekshaArarwala: Business on the Net; Bridge to the Online Storefront; Macmillan, New Delhi. 2008
- 3.Cady, GlccHarrab and McGregor Pat: mastering the Internet, BPB Publication, and New Delhi. 1996
- 4.Diwan, Prag and Sunil Sharma: Electronic Commerce – A Manager's Guide to E – Business , Vanity Books International, Delhi. (out of published) 2002

Self-Study Paper I Services Marketing

Semester – II No Contact Hours Sub Code: C828X 2 Credits

Course Objectives

- To understand the conceptual framework of service marketing.
- To examine the concept of physical evidence and capacity planning.
- To analyse and identify the various factors affecting the pricing decision.
- To reflect and enumerate the dimensions of quality
- To enhance the marketing skills of students on various services.

Unit -I: Introduction

Meaning, Definitions - Components and Types - Service Vs Goods - Service Marketing mix Characteristics - Advertising - Objectives - Advertising Message and Media selection - Merits - Personal Selling - Process - Advantages.

Unit – II: Physical Evidence

Essential and Peripheral Evidence - Guidelines for Physical Evidence - Managing demand and supply Capacity constraints - Demand patterns – Capacity planning and Types - Managing capacity to match demand - Managing demand to match capacity.

Unit - III: Pricing in Services

Objectives - Types of Pricing - Characteristics and factors affecting pricing decisions - Customer Relationship Marketing - Objectives and Requisites - Benefits.

Unit - IV: Quality of Service

Five Dimensions of Quality - Gap analysis and causes for Customer Gap - Key Factors Leading to Customer Gap - Provider Gaps.

Unit –V: Marketing of Services

By Insurance Business - Banks - Education - Tourism - Transport.

Text Book

- Natarajan L, Services Marketing Margahm Publications, Chennai 2010

Reference Books

- 1.Rampal, Services Marketing S.L.Gupta - Galgotta Pub. House 2010
- 2.Jha, Services Marketing, Himalaya Publications, New Delhi 2008
- 3.Baly Services Marketing, S.Chand& Co., New Delhi 2010

4.VasanthiVenugopal& Raghu V.N. - Services Marketing -Himalaya Publications, New Delhi 2000

Advanced Corporate Accounting

Semester – III 6 Hours

Sub Code: C927

5 Credits

Course Objectives:

- 1.To enable students to acquire sound knowledge on Holding Company Accounts,
- 2.To accumulate knowledge on legal provision related to Banking Company Accounts and to learn the advantages of schedule system for the preparation of final accounts.
- 3.To ascertain various forms of insurance and insurance business and also it brings the knowledge on IRDA regulation in related to Final accounts.
- 4.To analyse the importance inflation accounting and price level accounting. Accumulating the gaining knowledge on Methods or Techniques of Price Level Accounting.
- 5.To identify the significance of corporate social responsibility through human resource accounting and its responsibility towards staff and to the society.

Unit – I: Holding Company Accounts

Consolidated Financial Statements – Consolidation of Balance Sheets and Profit and Loss Accounts

Unit- II: Accounting of Banking Companies

Legal Provisions –Rebate of Bills Discounted – NPA – Assets Classification – Preparation of Final Accounts.

Unit- III: Insurance Company Accounts

Nature of Insurance Business – Accounts of Life Assurance Business – Accounts of General Insurance Business – IRDA Regulation – Preparation of Final Accounts

Unit - IV: Inflation Accounting or Price Level Accounting

Meaning- Limitation of Historical Cost Accounting- Methods or Techniques of Price Level Accounting: Current purchasing power Accounting Technique (CPP)- Replacement Cost Accounting Technique(RCA) – Current Value Accounting Technique (CVA) - Current Cost Accounting (CCA)-

Unit - V: Human Resource and Social Responsibility Accounting

Meaning – Need- Objectives – Advantages – Methods Limitation of Human Resource Accounting- Social Accounting: Need- Approaches- Preparation of social Income statement- Preparation of Social Balance Sheet.

Text Book:

- Shukla M and T.S. Grewal “Advanced Corporate Accounts. S Chand & Co., New Delhi. 2014
- Mohan Juneja and Rajes Bagga “Accounting for Management” Kalyani Publishers. Chennai 2013

Reference Books:

- 1.Reddy T.S. And Murthy A., Corporate Accounting, Margham Publications, Chennai Reprint 2012
- 2.Jain And Narang, “Advanced Corporate Accounting ”, Kalyani Publishers, New Delhi, 2006
- 3.Maheswari S.N “Advanced Corporate Accounting” Vikas Publication. New Delhi 2009

Organizational Behaviour

Semester - III 6 Hours

Sub Code: C928

4 Credits

Learning Objectives

- 1.To understand the concept of Organisational behaviour and make use of various approaches of Organisational behaviour
- 2.To identify biographical and learned characteristics in the formation of individual behaviour
- 3.To discover how perception, values and attitudes affects individual behaviour
- 4.To learn the classifications of group and to develop group performance also study about stress and conflict management
- 5.To evaluate the impact of organisational climate and organisational culture

Unit - I: Basics of Organisational Behaviour

Definition - Importance and Applications of Organizational Behaviour – Approaches to OB - Organizational Behaviour in a global context – Hofstede’s findings – (FOUR Models)

Unit - II: Individual Behaviour

Biographical characteristics – Ability – Personality – Learning

Unit - III: Perception and Values

Perception – factors influencing perception– values – types of values – sources of attitudes – cognitive dissonance theory.

Unit - IV: Group Behaviour

Group behaviour and group decision making – Classification of groups – stages of group development –group decision making. Organizational Stress and Conflicts: Stress – meaning – types – stress management Strategies – Conflicts – meaning – types of Conflict – conflict management strategies

Unit - V: Organisational Climate and Culture

Basic Concepts – Dimensions and Impact of Organizational Climate – Measurement and Determinants of Climate – Developing Sound Climate. Organizational Culture: Basic Concepts – Types – Impact of Culture on Work.

Text Book

- 1.Prasad L M, Organizational *Behavior*, Sultan Chand & sons, New Delhi. 2015

Reference Books

1. Robbins Stephen P , *Organizational behaviour*, Pearson Education, 14th Edition, 2011
2. Sekaran Uma , *Organizational behaviour text and cases*, Tata McGraw Hill Education private limited 2009
3. Aswathappa K , *Organizational behaviour*: Himalaya publishing house, Mumbai
4. Khanka S S, *Organizational behavior*: S.Chand & sons, New Delhi. 2013
5. Shashi K. Gupta & Rosy Joshi, *Organisational Behaviour*, Kalyani Publishers, New Delhi, 2009.

Income Tax and Tax Planning – I

Semester-III

6 Credits

Subject Code: C929

5 Hours

Course Objectives

- To provide the basic knowledge of Income Tax Law.
- To understand the Income tax authorities, TDS and e-filing procedures.
- To apply the provisions of Income Tax Act in the computation of taxable income from salary.
- To impart knowledge in computing taxable income under the head house property.
- To enable the students to compute the taxable income from business and profession.
- To make the students to understand the importance of tax planning.

Unit – I: Basics of Income Tax

Introduction to Income Tax Act – Definitions – Residential Status – Incidence of Taxation – Exempted Income - Income Tax Authorities – Assessing Officer – General Powers and Duties of Income Tax Authorities (Both Theory and Problem)

Unit – II: Assessment and Advance Tax

Procedure for Assessment – Filing of return – Defective Return – Due date – Prescribed Forms – Basics of Advance Tax and Tax Deducted at source on Salary (Theory Only)

Unit -III: Income from Salaries

Income from Salaries – Definitions – Allowances – Perquisites – Profits in lieu of salary – Provident Fund – Deductions U/S 16. (Both Theory and Problem) - Gratuity – Commuted Pension – Earned Leave Salary (Both Theory and Problem)- Tax planning under the head salary

Unit – IV: Income from House Property

Meaning – Exempted income from House Property – Annual value – Let Out House Property – Self Occupied Property – Part of the House self-occupied and Let Out - Deductions u/s 24.(Both Theory and Problem)- Tax planning under the head house property

Unit – V: Income from Business or Profession

Meaning – Rules for adjustment – Maintenance of Accounts – Compulsory Audit of Accounts - Allowable expenses – Disallowed expenses - Depreciation – Investment Allowance - Computation of Income from Business or Profession (Both Theory and Problem) - Tax planning under the head Business or Profession

Text Book

•Mehrotra H.C, Income Tax Law and Practice with Tax Planning, Sahitya Bhawan Publications, New Delhi

Reference Books

- 1.Singhania, Vinod.K.Singhania, Direct Taxes Law and Practice, Taxmann Publications, New Delhi.
- 2.Gaur. V.P and D.B. Narang, Income Tax Law and Practice, Kalyani Publications, New Delhi.
- 3.Murthy. A, Income Tax Law and Practice, Vijay Nicole Imprints Private Ltd, New Delhi.
- 4.Hari Prasad Reddy and Reddy T.S, Income Tax Law and Practice, Margham Publications, Chennai. (Relevant Editions)

Main Elective- VII Logistics and Supply Chain Management

Semester: III

6 Hours

Sub Code: C930A

4 Credits

Objectives

- To enable the students to understand the importance and aims of logistics and its current trends.
- To make aware of the various stages of planning and strategies involved in the logistics process.
- To evaluate the methods of measuring various activities of logistics adopted in the organisations.
- To appreciate the concepts of supply chain management and application of IT on the same.
- To analyse the techniques involved in e-financial supply chain management in the bank's perspective.

Unit - I: Introduction to Logistics

Fundamentals of Logistics - Definition and Activities - Aims and importance - Progress in Logistics and Current trends - Organization and achieving integration.

Unit - II: Planning the Supply Chain

Logistics Strategy - Implementing the Strategy - Locating Facilities - Planning Resources – Controlling Material Flow.

Unit - III: Measuring and Improving Performance of Supply Chain

Procurement - Inventory Management - Warehousing and Material Handling – Transport – Global Logistics

Unit - IV: Supply Chain Management

Basic Concepts of Supply Chain Management - Planning and Sourcing - Making and Delivering – Returns - IT and Supply Chain Management

Unit - V: Financial Supply Chain Management

Financial Supply Chain - Elements of Financial Supply Chain Management - The Evolution of e-Financial Supply Chain - E-Financial Supply Chain' (Banks Perspective) - Legal Aspects of e-Financial Supply Chain

Text Book

1. Waters Donald, Logistics: Introduction to Supply Chain Management, Palgrave Macmillan. 2010

Reference Books

1. Christopher Martin, Logistic and Supply Chain Management: Creating Value- Adding Networks, PT Prentice Hall. 2009

2. Dalmia Sanjay, Financial Supply Chain Management, McGraw Hill Publishing Co Pvt.Ltd. 2005

3. Bhattacharya Logistic Supply Chain Management, S.Chand Publications New Delhi 2011

Web Resources

1. www.dhl.co.in/en/express/tracking.html

2. <https://www.bluedart.com/>

3. <https://www.tnt.com/>

4. www.allcargologistics.com/

Main Elective VIII- Executive Skills Development

Semester – III

6 Hours

Sub Code: C930B

4 Credits

Course Objectives

- To enable the student to know himself and to develop Executive personality
- To equip the students with some basic communication skills
- To train students to understand themselves and develop better personality traits.
- To enable students understand the different types of complexes, inter personal relationships and develop a positive attitude towards Life.
- To train and enable students to develop their executive personality skills for better employment opportunities.
- To train students to develop their interview skills, and develop team skills.
- To impart communicative skills such as reading, listening and speaking.

Unit - I: Self-Discovery - self-meaning –Types-Johari Window- Self-knowledge-Self Acceptance-Self Appreciation –Self-esteem- personality- Difference between self and Personality –Factors - affecting personality – Types.

Unit - II: Complexes –Meaning-Nature-Types-Interpersonal-Relationship-Transactional Analysis- Life positions – Developing positive attitudes-Sources-Formation-Types –Attitudes and their results.

Unit - III: Development: Nature – Inputs – in Development – Development as a source of Competitive Advantage – Executive Development Program (EDP's).

Unit - IV: Communication-Meaning –features –kind-Body Language-Interview Skills-group Discussion-group Dynamics-Team Work.

Unit - V: Time Management-Reading Skills-Listening Skills-taking Notes- Art of public Speaking –Writing skills-Emotional Intelligence.

Text Book

1.Rajiv K Mishra, Personality Development, Rupa Publication, New Delhi.2008

Reference Books

1.Prem Bhalla, The portrait of a complete man, Pusthak Mahal, New Delhi.2008

2.Charled C Manz, The power of failure, B K Publication New Delhi.2008

3.Jyotsna Cadafy, Understanding Emotional IQ, Pusthak Mahal, New Delhi.2008

Elective IX Strategic Management

Semester – III

6 Hours

Sub Code: C930C

4 Credits

Course Objectives:

- 1.To inculcate the basics of strategic management.
- 2.To know about Industry Analysis.
- 3.To understand how to analyse the company and the components involved in the process.
- 4.To summarize the strategies practised by the management.
- 5.To impart Change Management

Unit - I: Introduction to Strategic Management

Strategic Management - Meaning and definition, Strategic Management Process - Forming Vision, Setting objectives, Crafting a Strategy, Implementation and Evaluation, Characteristics, Benefits of strategic management, Dysfunctions of strategic management.

Unit - II: Industry Analysis

Industry analysis and competitive environment. The macro environment –Demographic, political, social, cultural, technological and global environment - Assessing the impact of general environment. The Micro environment – The competitive environment - The five forces of competition, new entrants, direct competition, buyers, suppliers and substitutes - Rivalry in the industry.

Unit - III: Company Analysis

Evaluating company resources - Competitive capabilities – Identifying company’s strengths and resource capabilities - Identifying company’s weaknesses and resource deficiencies, identifying company’s competencies and capabilities, identifying a company’s market opportunities, identifying threat to a company’s future profitability (SWOT Analysis). Strategic options for achieving cost competitiveness. The value chain - Primary and support activities.

Unit - IV: Strategy and its types

Strategy and competitive advantage - Low Cost Leadership strategies, differentiation Strategies and Focus strategies. Merger and acquisition -Vertical integration strategies. First- Mover advantages and disadvantages. Strategy and competitive advantage over the Life Cycle.

Unit - V: Change Management

Responding to shifts in competitive advantages - New developments affecting competitive advantage - New technology - New distribution channel, Economic shifts - Change in the neighbouring industries and change in

government regulations. Response options - Prospecting, Defending, and Harvesting. Uncertainty - Impact of environmental development, ability to adjust.

Text Book:

1. Robert A. Pitts and David Lei, Strategic Management- Building and Sustaining Competitive Advantage, Published by South - Western, Thomas Learning Inc. New Delhi. 2007

Books for References:

1. Arthur A. Thompson, Jr. and A.J Strickland 111, Strategic Management - Concepts and cases, Tata Mcgraw Hill Co., New Delhi. 2003

2. John A. Pearce 11 and Richard B. Robinson, Jr, Strategic Management-Strategy Formulation and implementation, Tata Mcgraw Hill Co., New Delhi. 2008

3. Varahan & Rinky Strategic Management Himalaya publication house, New Delhi 2014

Advanced Financial Management

Semester – IV

6 Hours

Sub Code: C1022

5 Credits

Learning Objectives:

1. To enable students to acquire knowledge on concept of Financial Management and identify the sources of finance.

2. To understand the factors affecting financial planning, over and under capitalization and to ascertain the leverage of the firm.

3. To examine the factors affecting capital structure by applying various theories of capital structure.

4. To calculate cost of capital on debt, preference share capital, equity share capital and retained earnings.

5. To evaluate the concepts of dividend policies adopted by the corporates in the process of pay-out and retention.

Unit – I: Basics of Financial Management and Sources of Finance:

Financial Management – Meaning, Significance and Objectives of Financial management – Functions of Financial management – Risk Return Trade off-Sources of Finance – Meaning, Purpose and Sources of Short term finance - Meaning, Purpose and Sources of Long term finance- Value Added Analysis- Estimation of Working capital Management (Both Theory & Problem)

Unit – II: Financial Planning and Leverages

Meaning and Objectives – factors affecting Financial Planning; Over and Under Capitalization – Meaning, Causes, effect and Remedies. (Theory Only); Leverage – meaning and types – Operating, Financial and Combined Leverage. (Both Problem and Theory)

Unit – III: Capital Structure

Meaning – Factors affecting Capital Structure – EBIT-EPS Analysis – Capital Structure Theories – NI Approach - NOI Approach – Traditional Approach – MM Approach. (Both Problem and Theory)

Unit – IV: Cost of Capital

Meaning and Significance – Calculation of Debt, Preference Share Capital, Equity Share Capital and Retained Earnings – Weighted Average Cost of Capital. (Both Problem and Theory)

Unit – V: Dividend Policy

Meaning and types of Dividend – Meaning and Type of dividend Policy – Dividend theories – Theory of Relevance – Walter and Gordon’s Model – Theory of Irrelevance – M.M. Model.(Both Problem and Theory)

Text Book

1.Maheswari S.N, *Financial Management Principle and Practises*, Sultan Chand Publication, New Delhi 2011

Reference Books

- 1.Chandra, Prasanna, *Financial Management*, Tata Mc Graw Hill, New Delhi. 2008
- 2.Pandey I.M, *Financial Management*, Vikas Publishing House, Delhi. 2105
- 3.Murthy. A, *Financial Management*, Margham Publications, Chennai.2015
- 4.Khan M.Y and P K Jain, *Financial Management*, Tata Mc Graw Hill Edu Pvt Ltd, New Delhi. 2014
- 5.Bhalla V. K *Finacial Management*, S. Chand & Company New Delhi, 2014

Legal Aspects of Business

Semester – IV

5 Hours

Sub Code: C1023

4 Credits

Objectives

- To help the students to get acquainted with IT, Intellectual Property Rights, Patent Act and Copyrights Act.
- To help to understand FEMA Act and various provisions of the Act.
- To analyse various problems of environment and taking prevention and controlling measures of environment
- To Illustrate various rights and provision of Consumer Protection Act
- To determine various provisions of Competition Act

Unit - I: Information Technology Act - 2000

Definition – Digital Signature - Electronic Governance – Attribution, Acknowledgement and Despatch of Electronic Records – Secure Electronic Records and Secure Digital Signature – Regulation of Certifying

Authorities – Digital Signature Certificates – Duties of Subscribers – Penalties and Adjudication – Cyber Regulation Appellate Tribunal – Offences. Intellectual Property Rights – Patent Act – Copyrights Act.

Unit - II: Foreign Exchange Management Act-1999 (FEMA)

Objectives – Definition – Regulation and Management of Foreign Exchange – Authorised Person – Contravention and Penalties – Adjudication and Appeal – Directorate of Enforcement – Miscellaneous.

Unit - III: Environment Protection Act - 1986

Provisions – Powers of Government – Air (Prevention and Control of Pollution) Act,1981- Constitution - Functions of Central and State Board – Water (Prevention and Control of Pollution) Act,1974 – Constitution - Function of the Central and State Board.

Unit - IV: Consumer Protection Act - 1986

Objectives – Definition - Consumer Protection Councils– Consumer Disputes Redressal Agencies – Establishment - Procedure on admission of complaint - MRTP Act,1969 – Provisions relating to Restrictive Trade Practices and Unfair Trade Practices – Causes of concentration of economic power in fewer hands.

Unit - V: Competition Act, 2002

Objectives – Definition – Competition commission of India – Duties, Powers and Functions of Commission – Duties of director general – Penalties –Contravention by Companies – Finance , Accounts and Audit – Miscellaneous - Right to Information Act – Audit Committee.

Text Book

1.Kapoor N.D – Elements of Company Law – Sultan Chand & Sons, New Delhi,2005.

Reference Books

- 1.Shukia,M.C - Mercantile Law – Sultan Chand & Co., New Delhi,2007
- 2.Gulshal.S.S – A Handbook of Corporate Laws - Sultan Chand & Co., New Delhi,2008
- 3.Pillai.R.S.N and Bhagawathi – Business Laws - Sultan Chand & Co., New Delhi,2011

Income Tax and Tax Planning – II

Semester-IV

6 Hours

Subject Code: C1024

5 Credits

Course Objectives:

- To impart knowledge on provisions related to assessing the taxable capital gain.
- To understand the rules on taxability of other incomes and minimise the taxable income through set-off and carry forward of losses.

- To develop ideal model of investments and savings based on the concepts of deductions, and to minimise the taxable income of individual.
- To acquire knowledge on taxability of income of companies and minimum alternate tax.
- To minimise the tax liability without tax evasion and through in-depth knowledge on deductions and tax planning

Unit – I: Capital Gains

Meaning – Type – Transfer of Assets - Cost of Acquisition – Cost of Improvement – Exempted Capital gain – Computation of taxable capital gain. (Both Theory and Problem)

Unit – II: Income from other Source

Chargeable incomes – Deductions from other source Income – Computation of Income from other Source - Set off of Losses – Intra Head and Inter Head Adjustments - Carry forward of Losses (Both Theory and Problem)

Unit – III: Computation of Total Income

Deductions from Gross total Income of Individual u/s 80 – Deductions in special case u/s 80-IA to 80LA - Tax Holidays - Computation of Total Income of Individual (Both Theory and Problem)

Unit – IV: Assessment of Individual and Tax Planning

Computation of Tax Liability of Individual - Rate of Income Tax – Rebate and Relief - Tax Planning – Meaning – Objectives – Tax Planning for Individual under the head capital gain and other sources (Both Theory and Problem)

Unit – V Assessment of Companies

Company – Types of Company – Computation of Total Income – Computation of Tax on Companies – Tax on Income of certain domestic companies – Minimum Alternative Tax – Computation of income under Tonnage Tax Scheme (Theory and Simple Problem)

Text Book

1.Mehrotra H.C, Income Tax Law and Practice with Tax Planning, Sahitya Bhawan Publications, New Delhi

Reference Books

- 1.Vinod.K.Singhania, Direct Taxes Law and Practice, Taxmann Publications, New Delhi.
- 2.Gaur. V.P and D.B. Narang, Income Tax Law and Practice, Kalyani Publications, New Delhi.
- 3.Murthy. A, Income Tax Law and Practice, Vijay Nicole Imprints Private Ltd, New Delhi.
- 4.Hari Prasad Reddy and Reddy T.S, Income Tax Law and Practice, Margham Publications, Chennai. (Relevant Editions)

International Business

Semester: IV

6 Hours

Sub Code: C1025

4 Credits

Course Objectives:

- 1.To demonstrate the classifications of international business and the important factors influencing the international business.
- 2.To exhibit the specialised knowledge on the export and import documentation methods and procedures along with the policies of India.
- 3.To develop expertise in the field of international trading organisations (like IMF, WTO, UNCTAD, etc) and its roles and functions on international trade.
- 4.To prepare themselves in understanding the concept, strategies and technologies of Multi-National Companies and its management in international marketing.
- 5.To inculcate the knowledge on the association between foreign collaborations (including joint ventures) and international trade.

Unit - I: International Business Environment

International business – An overview – concept of international business – Classification of international business – Factors influencing international business – Economic and policy environment – Regulation of international business

Unit - II: Export and Import documentation

Export Documentation - Framework - Standardized Pre-shipment. Export Commercial and Regulatory Documents - Export credit instruments and procedure - Letters of credit and types. Import Procedures and Documentation - Cargo insurance - Marine insurance. Services of Export Credit and Guarantee Corporation- Current import and export policy of India

Unit – III: Functions of Trade Organizations

Functions and role of IMF- UNCTAD - GATT- WTO - International Finance Corporation -Asian development bank- European Payment union. Trade among countries like ASEAN, SAARC/ SAPTA, NAFTA, EC – their procedure and impact on the trading activities of the member states

Unit - II: Multi-National Corporations (MNCs)

Concept, strategy and organization – Technology and MNCs – UN Code of conduct of MNCs-Marketing management -Contemporary issues in International marketing – Future prospects in International marketing

Unit – IV: Foreign Collaborations and Joint Ventures

Industrial policy and foreign direct investment – kinds of collaboration and joint ventures – Negotiating foreign collaboration/joint venture – Drafting of agreement – Restrictive clauses in the foreign collaboration/ joint venture – UN Code of conduct in transfer of technology – Indian joint ventures abroad.

Text Book

1.Avadhani, V.A. Global Business, Himalaya Publishing House Pvt Ltd, Chennai 2015

Reference Books

1.SubbaRao P. International Business, Himalaya Publishing House Pvt. Ltd, New Delhi 2014

2.Cherunilam, Francis, International Business Environment, Himalaya Publishing House Pvt Ltd, Mumbai. 2010

3.Bhalla International Business S. Chand Publications New Delhi 2013

4.Arthur Stonehill et al.: International Finance, Pearson Education Asia, Delhi. 2010

5.Maurice D Levi: “International Finance”, Tata McGraw Hill, New Delhi. 2010

Web Resources

1.www.saarc-sec.org

2.www.imf.org

Main Elective- International Marketing

Semester - IV

5 Hours

Subject Code:C1026A

4 Credits

Course Objectives:

- 1.To study and gain the knowledge on international marketing
- 2.To make the students to understand the international marketing environment
- 3.To develop International marketing strategies
- 4.To evaluate the various international marketing channels and physical distribution management
- 5.To acquire knowledge on branding, pricing policies and their promotion in the international markets.

Unit - I: International Marketing

Marketing in the 21st century Marketing concepts and tools - Scope and Significance of International Marketing- Strategic importance of international marketing- Differences between international and domestic marketing - Need for international trade - trends in foreign trade.

Unit - II: International market environment

International environment- International Social & culture Environment – Political, Legal and regulatory environment of international marketing - Technological Environment - Business Customs in International Market.

Unit - III: International Market Entry Strategies

Indirect Exporting - Domestic Purchasing - Direct Exporting - Entry Strategies of Indian Firms - International product management - International product positioning - Product saturation Levels in global Market, International product life cycle - Geographic Expansion - Strategic Alternatives - New products in Intentional Marketing.

Unit - IV: International Marketing Channels

Channels - Distribution Structures - Distribution Patterns - Factors effecting Choice of Channels - Challenges in Managing an international Distribution Strategy - Selecting Foreign Country Market intermediaries - Management of physical distribution of goods.

Unit - V: Pricing and Promotion for international Markets

Environmental influences on Pricing Decisions - Transfer pricing - Global Pricing - Policy Alternatives - Global Advertising and brandy - Selecting an advertising agency - Personal selling - Sales Promotion - Public Relations and Publicity - Export Marketing - Export Policy Decisions of a firm - EXIM policy of India - Export assistance and incentives in India.

Text Book

•Philip R. Cateora, John L. Graham, International Marketing 11/e, Tata McGraw-Hill Co. Ltd., New Delhi 2002.

References

- 1.Sak Onkvisit, John J. Shaw, International Marketing Analysis and Strategy, 3/e, Prentice-Hall of India Pvt. Ltd., 2000.
- 2.Isobel Doole and Robin Lowe, International Marketing Strategy, 2/e, Thomson Learning, 2003.
- 3.Subhash C. Jain, International Marketing, 6/e, South-Western, 2001.
- 4.Vern Terpstra, Ravi Sarathy, International Marketing, 8/e, Harcourt Asia Pvt. Ltd., 2001.
- 5.Keegan: Global marketing Management 7/e Pearson Education, Delhi, 2003.

Main Elective - XI Banking and Financial Services

Semester-IV

5 Hours

Subject Code: C1026B

4 Credits

Course Objectives:

- 1.To have the comprehensive knowledge of modern functions rendered by the banks.
- 2.To make the students to familiar with Retail Banking, Provisions of Non-performing Assets and Capital Adequacy Norms.
- 3.To explore in Merchant Banking, its services, SEBI guidelines to Merchant Banking and Depository Receipts
- 4.To inculcate the in-depth understanding on Leasing and Factoring
- 5.To evaluate and analyse the various modes of Mutual Fund and Venture Capital.

Unit – I: Modern Functions of Banking

Banking – meaning – origin – traditional banking – modern banking function – ATM – debit card – credit card – Online banking – mobile banking – EFT – ECS – RTGS - NIFT

Unit - II: Retail Banking

Banking Sector reforms in India – Recent trends in Banking – Traditional banking functions vis-à-vis modern Banking functions – Provisioning norms relating to Non -Performing Assets – Capital Adequacy Norms

Unit - III: Merchant Banking

Public issue management – underwriting – portfolio management – services – corporate advisory services – SEBI guidelines on merchant bankers – pricing of public issues – raising capital in foreign markets – ADR and GDR (American Deposit receipts and Global deposit receipts)

Unit - IV: Leasing and factoring

Introduction to leasing – legal aspects – tax aspects – types of lease – structuring lease agreement – hire purchase and lease – legal aspects of hire purchase agreement – rights and duties of hire vendor and hire purchasers. Factoring – factoring types – features of factoring agreement – services of factor – factoring Vs bill discounting

Unit - V: Mutual funds and Venture Capital Funds

SEBI guideline – management structure – schemes – performance evaluation – growth and trends – Venture capital funds – characteristics criteria for assistance – schemes and guidelines.

Text Book

●Shekhar “Banking Theory and Practice”, S. Chand and Co. New Delhi. 2013

Reference

- 1.S. Singh, performance budgeting for commercial Bank, MacMillan Company India.
- 2.M.Y. Khan Financial Services”, Tata McGraw Hill, 2001.
- 3.Machiraji, “Indian Financial system”, Vikas Publishers, New Delhi, 1998.
- 4.Mark Grinblatt, Sheridan Titman, :financial markets and corporate strategy”, Tata McGraw Hill, New Delhi, 2003.
- 5.Shashi K. Gupta & Nisha Aggarwal, Financial Services, Kalyani Publishers, New Delhi 2014

Web Resources

- 1.www.finmin.nic.in/
- 2.<https://twitter.com/FinMinIndia>
- 3.<https://www.rbi.org.in/>

Semester-IV

5 Hours

Subject Code: C1026C

4 Credits

Course Objectives

1. To study on the concept of project management and role of project manager
2. To identify investment opportunities and to formulate project
3. To evaluate various appraisals of project
4. To prepare project plan, its schedule and estimation of the cost of project
5. To manage and execute project and learn to apply control techniques

Unit- I: Concepts of Project -Management: Project – Meaning – Nature- Types of project; project life cycle; Project management – nature and scope of project management ; Project management as a profession; Role of project manager.

Unit - II: Project identification and formula: Project environment – identification of investment opportunities – project screening – prefeasibility study – project selection; project formulation – stages in project formulation – stages in project formulation; project report preparation; planning Commission’s guidelines for project formulation.

Unit – III: Project Appraisal: Objectives, essential of a project methodology – Market appraisal – Technical appraisal – Financial appraisal –Commercial appraisal- Managerial appraisal-Social Cost Benefit Analysis.

Unit – IV: Project planning and Scheduling: objectives – process of planning - components of good planning – project designing and project scheduling and time estimate – Estimation of cost of project and means of financing.

Unit –V: Project Execution and Administration: Project contracting: Contract pricing, Types – Project organisation: Forms of organisation; Project direction; Project communication; Project coordination; Factors influencing effective project management – project over runs: Causes, Types and effects of over runs - Project Control: Control techniques – PERT, CPM: – Project review – Project audit.

Text Books

- 1.Prasanna Chandra, : Project Preparation, Appraisal and Implementation“ Tata McGraw Hill Delhi. 1987

Reference Books

- 1.Chaudhary, S: Project Management, Tata McGraw Hill, New Delhi. 1998
- 2.N.P. Agarwal, B.K. Mishra Project Management, Ramesh Book Depot, Jaipur 2006
- 3.Pitale, R.L: Project Appraisal Techniques, Oxford and IBH. Publishing Pvt. Ltd., New Delhi 1982.
- 4.Timothy, D.R. and W.R. Sewell: Project Appraisal and Review, Macmillan, New Delhi 2000

5. Little I.M.D. and Mirrless JA: Project Appraisal and Planning for Developing Countries, London Heinemann Education Books. 1974.

PROJECT

Semester: III

5 Credits

Subject Code: C931J

6 Hours

Course Objectives:

1. To demonstrate the objectives, hypothesis, scope, problems and limitations of the research work carried on the project.
2. To exhibit specialised knowledge on the review of literature of a research work based on the project.
3. To develop an expertise on the research methodology and on the source of collection of information.
4. To make them understand the techniques of data analysis and interpretation using relevant statistical tools.
5. To enumerate the findings, suggestions and conclusions based on the objectives and hypothesis relevant to the subject of the research work.

Additional Courses

Self-Study Paper II Business Process Management

Semester – III

No Contact Hours

Sub Code:

2 Credits

Learning Objectives

1. To understand Organizations, Community and Organizational Structure.
2. To identify Organizational Structure Organizational Design
3. To discover Power and Power Outcomes of Leadership
4. To learn Elements of Business Intelligence Applications
5. To evaluate Process of Measurement for Learning and Improvement.

Unit - I: Nature of Organizations

Definition – Organizations and Individuals – Categories of Individuals – Organizations and the Community – Societal Outcomes – Organizations and Social Change – Multinational Organizations – Voluntary Organizations.

Unit - II: Organizational Structure

Defining Organizational Structure – Complexity – Variance of Complexity Elements – Formalization – Centralization – Contextual Explanations – Organizational Design – Explaining Organizational Structure.

Unit - III: Organizational Process

Power and Power Outcomes – Leadership – Decision Making – Communication – Change.

Unit- IV: Business Intelligence

Evolution of Knowledge Management Applications – Elements of Business Intelligence Applications – BIA in the Real World – Technical Elements of the BIF.

Unit- V: Mobilizing the Organization

Tactical Execution – Roadmap to Tactical Execution – e-Business Tactical Execution – Tactical e-Project Management – Process Overview – e-development Process – Measurement for Learning and Improvement.

Text Book

- 1.Richard H Hall and Pamela S. Tolbert, “Organization Structures, Processes and Outcomes”, Pearson Education, 2006.
- 2.Ravi Kalakota and Marcia Robinson, “e-Business 2.0 Roadmap for Success”, Pearson Education, 2005.

References

- 1.Gareth Jones, “Organizational Theory, Design and Change”, 4th Edition, Pearson Education, 2004.
- 2.Dave Chaffey, “E-Business and E-Commerce”, 2nd Edition, Pearson Education, 2003.

Certificate Course (Non-Commerce Students)

Certificate Course I- Income Tax planning

Semester - IV 2 Credits

Learning objectives:

- To provide the basic knowledge of Income Tax Law.
- To understand the Income from salary.
- To impart knowledge in perquisites.
- To enable the students to understand Gratuity and Commuted pension.
- To make the students to gain knowledge on Tax planning and TDS.

Unit - I: Basics of Income Tax

Introduction to Income Tax Act 1961 – Basic Concepts- Definitions – Residential Status – Incidence of Taxation – Exempted Incomes

Unit -II: Income from Salaries

Income from Salaries – Definitions – Allowances

Unit - III

Perquisites – Profits in lieu of salary – Provident Fund – Deductions u/s 16

Unit - IV: Income from Salaries (Retirement)

Income from Salaries (Retirement) – Gratuity – Commuted Pension

Unit - V: Tax Planning and TDS

Tax Deducted at source and Advance Tax-Tax Planning: Meaning – Objectives – Tax Planning for Individual under five heads of Income – Tax avoidance and Tax evasion.

Text Book (Current Year Publication)

1.V.P.Gaur and D.B.Narang - Income Tax Law and Practice – Kalyani Publications, New Delhi.

Books for Reference

1.H.C.Mehrotra – Income Tax Law and Practice with Tax Planning – Sahitya Bhawan Publications, New Delhi

2.Dr. Vinod.K.Singhania – Direct Taxes Law and Practice – Taxmann Publications, New Delhi.

3.N.Hariharan - Income Tax Law and Practice – Vijay Nicole Imprints Private Ltd, New Delhi.

4.T.S.Reddy – Income Tax Law and Practice – Margham Publications, Chennai.

5.Murthy, Income Tax Law and Practice, Vijay Nichole Publications. (Relevant Editions)

Certificate Course (Commerce & Non- Commerce Students)

Certificate Course II Export and Import Management

Semester - IV 2 Credits

Learning Objectives

- To understand the basic concepts of international trade environment.
- To acquired knowledge on export - import procedures and transactions.
- To Learn the Day to Day Accounting for exports and imports
- To understand the needs EXIM policy and EXIM Bank.
- To import knowledge on Special Economic Zone.

Unit - I: International Trade Environments

Introduction of International Trade Environments - What is Globalisation - Issues in Globalisation - GATT agreements - Foreign Trade policy in India - Category of export

Unit - II: Processing and documentation of Export orders

Choice of enterprise – registration for export/import/export pricing/costing – contacting prospective buyer/seller (importer) – processing of an export order – pre-shipment documentation for import and export

Unit - III: Tariffs and Tax on Export

Guidance to use Customs tariff – income tax applicability on exporting firms/companies – sales tax applicability on exporting firms/companies – general banking & Day to Day Accounting for exports and imports

Unit - IV Export and Import policy and Financial Assistance

Export and Import Policy of India – Objectives – highlights of Central EXIM Policy – Export credit and Guarantee Corporations – Export Financial Assistance – EXIM Bank.

Unit - V: Free Trade Zones

Export oriented Units, Special Economic Zones – Export Import Manager – Roles – Qualities of EXIM Manager.

Text Book:

1.Ajay Pataki “Export Import Management (Practical Workbook)” , Educreation Publishing, New Delhi. 2015

Book for References:

1.Usha Kiran Rai, Export – Import and Logistics Management, PHI learning Pvt Ltd, New Delhi. 2010

2.Export - Import Policy: Ministry of Commerce, Government of India. (Latest)

3.Hand book of Export Import Procedures: Ministry of Commerce, Government of India Vols. I&II. (latest)

B. Sc MATHEMATICS

Year/Semester: I Yr/ I SEM
Credits: 5

Code: M116
Hours/Week: 5

Differential Calculus

Objective: To develop problem solving skills in Calculus and provide base for higher mathematics.

Unit – I: Successive Differentiation

Successive differentiation – Leibnitz’s Formula – Maxima and Minima (Problems Only).

(Chapter III: Sections 1.1 to 1.6, 2.1, 2.2; Chapter V: Sections 1.1 to 1.3)

Unit – II: Rolle’s and Mean Value Theorems

Rolle’s Theorem (Problems Only) – Mean Value Theorem (Problems Only) – Indeterminate forms.

(Chapter VI: Sections 1, 2.1, 4.1 to 4.6)

Unit – III: Partial Differentiations

Taylor’s theorem – Cauchy’s form of Remainder – Taylor’s and Maclaurin’s series – Partial differentiation – Euler’s theorem on homogenous functions.

(Chapter VII: Sections 1.2 to 1.4; Chapter VIII: Sections 1.1, 1.2, 1.6)

Unit – IV: Curvature and Evolutes

Curvature – Radius of curvature – Centre of curvature – Evolutes and Involutives – $p-r$ equation.

(Chapter X: Sections 2.1 to 2.7)

Unit – V: Envelopes and Asymptotes

Envelopes – Asymptotes Parallel to the axis – Another method for finding asymptotes – Asymptotes by inspection – Intersections of a curve with its asymptotes.

(Chapter X: Sections 1.1 to 1.4, Chapter XI: Sections 1 to 7)

Book for Study

1.S. Narayanan and T. K. Manicavachagom Pillay, Calculus, Volume I, Publishers), PVT Ltd, Chennai, 2011.

S. Viswanathan (Printers and

Books for Reference

1.H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc, 2002.

2.Dennis, D. Berkley, Calculus, Saunders College Publishing, New york, 1984.

3.Hilde Brand, Francis. B, Advanced Calculus for Applications, Prentice Hall Pvt. Ltd, New Delhi, 1977.

4.John. M. H, Ohm Steel, Advanced Calculus, Eurasia Publishing House, New Delhi, 1970.

5.P. Kandasamy and K. Thilagavathi, Mathematics for B. Sc Volume I & II, S. Chand & Co, New Delhi, 2004.

6.A. K. Sharma, Differential Calculus, Discovery Publishing House, New Delhi, 2004.

7.G. B. Thomas and R. L. Finney, Calculus, Pearson Education, 2007.

E-learning source: <http://www.learnerstv.com/Free-maths-Video-lectures-ltv295-Page1.htm>,
<https://online.math.uh.edu/HoustonACT/videocalculus/>

Year/Semester: I Yr /I SEM
Credits: 5

Code: M117
Hours/Week: 5

Algebra and Trigonometry

Objective: To solve various types of algebraic equations, derive trigonometric identities and find real imaginary parts of complex trigonometric expression.

Unit - I: Summation of Series

Summation of Binomial Series, Exponential Series, Logarithmic Series and approximation problems (without proof of Theorems).

(Chapters 2, 3, and 4: Pages 2.1-2.16, 3.1-3.15, 4.1- 4.16).

Unit - II: Theory of Equations

Formation of an equation - Fundamental Theorem in the theory of equations- Relation between the roots and coefficients of an equation – Imaginary roots and irrational roots – Reciprocal equation.

(Chapter 6: Pages 6.1 - 6.37).

Unit – III: Theory of equations (contd...)

Transformation of Equation – Multiplication of roots by m – Diminishing the roots of an equation – Removal of a term – Descartes's Rule of signs – Descartes's rule of signs for negative roots of an equation – Horner's Method – Newton's Method. (Chapter 6: Pages 6.38 - 6.67).

Unit - IV: Trigonometry

Expansions for $\sin n\theta, \cos n\theta$ and $\tan n\theta$ – Expansions for $\cos^n \theta, \sin^n \theta$ and $\cos^m \theta \sin^n \theta$ in terms of sines and cosines of multiple of θ – Expansions of $\sin \theta, \cos \theta, \tan \theta$ in ascending powers of θ .

(Chapter 7: Pages 7.1 – 7.30).

Unit - V: Trigonometry (contd...)

Hyperbolic functions – Relations between circular and hyperbolic functions – Inverse hyperbolic functions.

(Chapter 7: Pages 7.31 – 7.60).

Book for Study

1.P.R. Vital and V. Malini, Algebra and Trigonometry – I, Margham Publications – Reprint 2015.

Books for Reference

- 1.S. Arumugam and A. Thangapandi Issac, Algebra and Trigonometry, New Gamma Publishing House, July 2011.
- 2.G. Britto Antony Xavier, V. Balaji, S.U. Vasantha Kumar, B. Govindan, Mathematical Sciences, Jayalakshmi publications, second Edition 2015.
- 3.W.S. Burnside and A.W. Panton, The Theory of Equations, Dublin University Press, 1954.
- 4.P. Duraipandiyar, S. Udayabaskaran Allied Maths, Vol.1, Muhil publishers, First Edition, 1997.
- 5.P. Kandasamy, K. Thilagavathy, Mathematics for B.Sc., First semester, volume – I, S. Chand and company Ltd, First Edition, 2004.

E –Learning source: <http://www.sosmath.com/trig/hyper/hyper03/hyper03.html>

Year/Semester: I Yr/II SEM
Credits: 5

Code: M214
Hours/Week: 5

Integral Calculus

Objective: To develop problem solving skills in Calculus and provide base for higher mathematics.

Unit – I: Integration of Rational Functions

Integration by partial fractions – Integration of rational algebraic functions.

(Chapter 1, Sections 7.3 - 7.5)

Unit – II: Integration of Trigonometric Functions

Integration of Irrational functions – Integration of Trigonometric functions.

(Chapter 1: Sections 8 and 9)

Unit – III: Definite Integrals

Properties of definite integrals – Reduction Formulae – Bernoulli's Formula.

(Chapter 1: Sections 11, 13, 15.1)

Unit – IV: Double and Triple Integrals

Double and Triple integrals (Cartesian and Polar forms) – Changing the order of integration – Applications of double and triple integrals in finding area and volume.

(Chapter 5: Sections 2.1, 2.2, 3.1, 4, 5.1 - 5.4, 6.1 - 6.3 (Problems Only)).

Unit – V: Improper Integrals

Beta and Gamma functions– Applications of beta and gamma functions in evaluation of double and triple integrals.

(Chapter 7: Sections 2.1 - 2.3, 3 - 6 (Problems only))

Book for Study

1.S. Narayanan and T. K. Manicavachagom Pillay, Calculus, Volume II, Publishers), PVT Ltd, Chennai, 2012.

S. Viswanathan (Printers and

Books for Reference

1.H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons (Asia) Pvt. Ltd, 2002.

2.Dennis, D. Berkley, Calculus, Saunders College Publishing, New York, 1984.

3.John. M. H, Ohm Steel, Advanced Calculus, Eurasia Publishing House, New Delhi, 1970.

4.P. Kandasamy and K. Thilagavathi, Mathematics for B. Sc Volume I & II, S. Chand & Co, New Delhi, 2004.

5.A. K. Sharma, Differential Calculus, Discovery Publishing House, New Delhi, 2004.

6.G. B. Thomas and R. L. Finney, Calculus, 9th edition, Pearson Education, Delhi, 2005.

E-learning source: <http://www.learnerstv.com/Free-maths-Video-lectures-ltv295-Page1.htm>,
<https://online.math.uh.edu/HoustonACT/videocalculus/>

Year/Semester: I Yr / II SEM
Credits: 5

Code: M215
Hours / Week: 5

Differential Equations & Fourier Series

Objectives: To help the learners to solve standard types of ordinary and partial differential equations

Unit – I: Differential Equations of First Order

Exact differential equations– integrating factors–equations of first order but of higher degree – equations solvable for p, y and x – Clairaut equation.

(Book 1: Chapter 1, Sections 1.3, 1.4 and 1.7)

Unit – II: Linear Equations of Higher Order

Linear equations of higher degree with constant coefficients – homogeneous linear equations – variation of parameters – simultaneous linear differential equations. (Book 1: Chapter 2, Sections 2.1 – 2.4, Type D in 2.5, 2.6 and 2.7)

Unit – III: Partial Differential Equations

Partial differential equations – formation – solution – Lagrange’s method – standard forms – Charpit’s method.

(Book 1: Chapter 4, Sections 4.1–4.5)

Unit – IV: Applications of Differential Equations

Applications – orthogonal trajectories–growth and decay – dynamical problems with variable mass.

(Book 1: Chapter 6, Sections 6.1, 6.2 and 6.12)

Unit – V: Fourier Series

Definition - even and odd functions - half-range Fourier series - development in cosine series - development in sine series.

(Book 2: Chapter 6: Sections 6.1 – 6.5)

Books for Study

- 1.S. Arumugam, Issac, “Differential Equations and Applications”, New Gamma Publishing House, Palayamkottai, 2011.
- 2.S. Narayanan and T.K. Manickavachagam Pillay, Calculus (Volume III), S. Viswanathan Publishers Pvt., Ltd., Chennai, 2011.

Books for Reference

- 1.Gupta, Malik and Mittal Differential Equations–Pragati Prakashan, Fourth Edition, 1997.
- 2.S. Narayanan and T. K. Manicavachagom, Differential Equations and its Applications – S. Viswanathan (printers & publishers) Pvt. Ltd., 1996
- 3.Richard Bronson, Differential Equations – Schaum’s Outline Series, McGraw Hill, Second Edition, 1994

E – Learning source: <http://ovw.mit.edu/courses/mathematics/indexhtm>,

<http://tutorial.math.lamar.edu/Classes/DE/DE.aspx>,<https://ocw.mit.edu/courses/mathematics/18-03-differential-equations-spring-2010/>

Year/Semester: II Yr /III SEM

Code: M315

Credits: 5

Hours/Week: 5

Vector Calculus

Objective: To develop deep understanding of key concepts followed by problems of applied mathematics, which are essential tools of modern applied mathematics.

Unit – I: Vector Differentiation

Velocity of a particle – Examples – Scalar and Vector point functions - Level surfaces – Directional derivative of a scalar point function – Gradient of a scalar point function - Summation notation for gradient – Gradient of $f(r)$.
(Chapter 1: Sec 1.5 – 1.6 and Chapter 2: Sec 2.1 – 2.6, Chapter 2, Examples Section 2.13 – subsection 2.3 - 2.4).

Unit – II: Divergence and Curl

Divergence and curl of a vector point function – Scalar potential - Summation notation for divergence and curl – Divergence and curl of $f(r) \vec{r}$ - Laplacian differential operator – Other Differential operators - Divergence and curl of a gradient – Divergence and curl of a curl – Examples.

(Chapter 2: Sec 2.7 – 2.13, Chapter 2, Examples Section 2.13 – subsection 2.7 - 2.11).

Unit – III: Line, Surface and Volume Integrals

Line integrals – Line integral along an arc C – Surface integrals – Volume integrals – Examples.
(Chapter 3: Sec 3.1, 3.5, 3.6, 3.8, Omit Parabolic Cylinder type problems in Example 3.5).

Unit – IV: Integrals Theorems

Gauss divergence theorems without proof.

(Chapter 4: Sec 4.2, Examples 4.8).

Unit - V: Integrals Theorems (Contd...)

Green's theorems in plane without proof – Stoke's theorem without proof.

(Chapter 4: Sec 4.4, 4.5, Examples 4.8).

Book for Study

1.P. Duraipandian and Kayalal Pachaiyappa, Vector Analysis, S Chand and Company Limited, Ram Nagar, New Delhi, 2018.

Books for Reference

1.Abosos Ali Shaikh, Vector Analysis with Applications, Narosa publications, New Delhi, 2009.

2.M.L.Khanna, Vector Analysis, Jai PrakashNath and Co, 8th Edition, Meerut City, 1986.

3.Murray R. Spiegel, Seymour Lipschutz, Dennis Spellman, Vector Analysis, Tata McGraw Hill Education Private Limited, New Delhi, 2010.

4.M.D. Rajasinghania and others, Vector Algebra, S.Chand & Company Pvt.Ltd, Ram Nagar New Delhi, 1999.

5.P.R. Vittal, Vector Analysis, Margham publications, Chennai, 1997.

E- Learning source: http://www.math.hmoedu/calculus/tutorials/vector_analysis

Year/Semester: II Yr /III SEM

Code: M316

Credits: 5

Hours/Week: 5

Solid Geometry and Transforms

Objective: To make the students understand the basic concepts in two dimensional, three dimensional geometry, Laplace and Fourier transforms and to make them solve problems in these fields of study.

Unit – I: Plane

First degree equation - Determination of a plane – Plane perpendicular to a given direction - Planes parallel to given lines and through given points – Equation $P + \lambda P' = 0$ - Second degree homogeneous equation - Co planarity of the lines through a point - Perpendicular to a plane – positions of points with reference to a Plane – Sums .

(Book 1 : Chapter 3: Sections 3.1 to 3.9, 3.12)

Unit – II: Straight lines

Equation of a straight line – Conditions for various situations of a line - Angle between a plane and a line – Projection of a line – Perpendicular drawn to a line - Shortest distance between two skew lines.

(Book 1 : Chapter 4: Sections 4.1 to 4.6)

Unit – III: Straight lines (Continued)

Lines intersecting a given line – Lines of intersection of three planes – Equation of two given skew lines - Sums.

(Book 1 : Chapter 4: Sections 4.7 to 4.9, 4.11)

Unit - IV: Laplace Transforms

Laplace transforms – Inverse Laplace transforms – Solution of differential equations using Laplace transforms.

(Book 3 : Chapter 3, Sections 3.0–3.3)

Unit - V: Fourier Transforms

Infinite Fourier Transforms : Fourier sine transforms- Fourier cosine transforms-Linear property-Change of scale property-Shifting property-Modulation property-Convolution and Derivative theorems-Problems.

(Book-2 : Chapter 2 , Pages 158-185).

Books for Study

1. P. Duraipandian and KayalalPachaiyappa, Analytical Geometry 3D, Muhil Publishers, Revised Edition 2009..
2. J.K. Goyal and K.P.Gupta, Laplace and Fourier Transforms, PragatiPrakashan Publishers,1995.
3. S. Arumugam, Issac, “Differential Equations and Applications”, New Gamma Publishing House, Palayamkottai, 2011.

Books for Reference:

1. P.K. Jain and Khalil Ahmed, Analytical Geometry of three dimensions, Wiley Eastern limited, 1991.
2. M. Pillai & others, Analytical Geometry, part II 3D, S.Viswanathan & co, Chennai, 1984.

E-learning Source: <http://mathworld.wolfram.com>

Year/Semester: II Yr /IV SEM

Code: M415

Credits: 5

Hours/Week: 5

Numerical Methods

Objective: To introduce the scientific computation techniques to the students.

Unit – I: Transcendental and Polynomial Equations

Introduction – Bisection Method -Iteration methods based on first degree equation- Iteration methods based on second degree equation-Rate of convergence. (Without proof of formulae).

(Chapter 2: Sections 2.1 to 2.5)

Unit – II: System of linear Algebraic Equations

Introduction - Direct Methods - Error Analysis for Direct methods - Iteration Methods (Without proof of formulae).

(Chapter 3: Sections 3.1 to 3.4)

Unit – III: Interpolation and Approximation

Introduction - Lagrange and Newton interpolations – Finite difference operators-Interpolating polynomials using finite differences – Hermite interpolation – Piecewise and Spline interpolation – Bivariate interpolation (Without proof of formulae).

(Chapter 4: Sections 4.1 to 4.7)

Unit – IV: Numerical Differentiation

Introduction – Numerical Differentiation – Optimum choice for step-length – Extrapolation methods – Partial Differentiation (Without proof of formulae). (Chapter 5: Sections 5.1 to 5.5)

Unit – V: Numerical Integration

Numerical integration - Methods based on interpolation - Methods based on undetermined co-efficients – Composite integration methods – Romberg Integration – Double integration (Without proof of formulae).
(Chapter: Sections 5.6 to 5.11)

Book for Study

1.M.K Jain, S.R.K Iyengar, and R.K Jain, Numerical Methods for Scientific and Engineering Computation, New age International Publisher, India, 2012.

Books for Reference

1.E. Balagurusamy, Numerical Methods, Tata McGraw Hill Publishing Company, New Delhi, 2004.

2.P. Kandasamy, K. Thilagavathi, K. Gunavathi, Numerical Methods, S. Chand & Company Ltd, New Delhi, 1997.

3.S.S. Sastry, Introductory methods of Numerical Analysis, 3-e, Prentice Hall Pvt Ltd, New Delhi, 2000.

4.A. Singaravelu, Numerical Methods, Meenakshi Publications, Chennai, 2002.

E-learning source: <http://nptel.ac.in/courses/122102009/>,

<http://www.math.ust.hk/~machas/numerical-methods.pdf>

Year/Semester: II Yr /IV SEM

Code: M416

Credits: 5

Hours/Week: 5

Algebraic Structures – I

Objective: To acquire the knowledge of basic concept of some of the fundamental algebraic structures on Groups and Subgroups, Permutation Groups, Normal Subgroups and Factor Groups and Group Homomorphism's.

Unit – I: Groups, Finite Groups and Subgroups

Definition and Examples of Groups - Elementary Properties of Groups - Historical Note. Terminology and Notation - Subgroup Tests - Examples of Subgroups. (Chapters 2, 3)

Unit – II: Cyclic and Permutation Groups

Properties of Cyclic Groups - Classification of Subgroups of Cyclic Groups. Definition and Notation - Cycle Notation - Properties of Permutations - A Check Digit Scheme Based on D_5 .

(Chapters 4, 5)

Unit – III: Isomorphism's, Cosets and Lagrange's Theorem

Motivation - Definition and Examples - Cayley's Theorem - Properties of Isomorphism's – Automorphism's - Properties of Cosets - Lagrange's Theorem and Consequences - An Application of Cosets to Permutation Groups - The Rotation Group of a Cube and a Soccer Ball.

(Chapters 6, 7).

Unit – IV: External Direct Products, Normal Subgroups and Factor Groups

Definition and Examples - Properties of External Direct Products - The Group of Units Modulo n as an External Direct Product – Applications. Normal Subgroups- Factor Groups - Applications of Factor Groups - Internal Direct Products. (Chapters 8, 9).

Unit – V: Group Homomorphism's and Finite Abelian Groups

Definition and Examples - Properties of Homomorphism's - The First Isomorphism Theorem. The Fundamental Theorem - The Isomorphism Classes of Abelian Groups - Proof of the Fundamental Theorem.

(Chapters 10, 11).

Book for Study

1. Joseph A. Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa Publishing House, 1999.

Books for Reference

- 1.M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
- 2.S.Arumugam and A.Thandapani, Modern Algebra, SciTech Publications Pvt. Ltd.
- 3.George E Andrews, Number Theory, Hindustan Publishing Corporation, 1984.
- 4.N. Herstein, Topics in Algebra, John Wiley and sons, 2-e, New Delhi, 2006.
- 5.John B. Fraleigh, A First Course in Abstract Algebra, 7-e, Pearson Education Publication, New Delhi 2003.
6. Saunders MacLane and Garrett Birkhoff, Algebra, 2-e, Macmillan Publishing Co.inc, New York, 1979.
- 7.Serge Lang, Algebra, Addition Wesley Publishing Company, London 1965.
- 8.Surjeeth Singh and Quazi Zameeruddin, Modern Algebra 2-e, Vikas Publishing House Pvt. Ltd., New Delhi, 1975.

E – Learning source: <http://mathworld.wolfram.com>

Year/Semester: I Yr /I SEM

Code: AM114A

Credits: 4

Hours/Week: 6

Allied Mathematics – I (Physics)

Objective: To make the students become familiar with the tools in Mathematics to solve problems in different related fields.

Unit – I: Matrices

Eigen values and Eigen vectors – Cayley-Hamilton theorem (statement only) – Problems based on Cayley-Hamilton theorem – Eigen values of Symmetric Matrices – Diagonalization of a matrix.

(Book – I: Chapter 3: Pages: 151 to 164)

Unit – II: Theory of Equations

Nature of roots – Relation between roots and coefficients of an algebraic equation – Transformation of equations – Reciprocal equations – Horner's method – Newton's method.

(Book – I: Chapter 2: Pages: 59 – 84 and 89 – 99)

Unit – III: Trigonometry

Expansions of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$, $\sin^n\theta$, $\cos^n\theta$ – Expansions of $\sin\theta$, $\cos\theta$, $\tan\theta$ in ascending powers of θ – Hyperbolic functions – Relation between circular and hyperbolic functions – Inverse hyperbolic functions – Logarithm of complex numbers - Real and imaginary parts of $\sin(a+ib)$, $\cos(a+ib)$, $\tan(a+ib)$, $\tan^{-1}(a+ib)$ (Book – I: Chapter 5: Pages: 220 - 263)

Unit – IV: Differential Calculus

Leibnitz formula for the n^{th} derivative (without proof) – Jacobian – Curvature and radius of curvature in Cartesian and polar form – p - r equations (polar form only). (Book – I: Chapter 6: Pages: 277 - 285 and 296 - 305 and 310 - 317)

Unit – V: Integral calculus

Reduction formulae - Multiple integrals – Evaluation of double, triple integrals (Book – II: Chapter 1: Pages 73 - 94; Chapter 3: Pages: 162 - 175)

Books for Study

1.S. Narayanan, R. Hanumantha Rao and T.K. Manicavachagom Pillai, Ancillary Mathematics, Volume – I, S. Viswanathan printers, Chennai, 2011.

2.S. Narayanan, P. Kandhasamy, R. Hanumantha Rao and T.K. Manicavachagom Pillai, Ancillary Mathematics, Volume – II, S. Viswanathan printers, Chennai, 2010.

Books for Reference

- 1.P. Balasubramaniam, K. G. Subramanian, Ancillary Mathematics, Volume – I, Tata McGraw – Hill publishing company limited, New Delhi, 1996.
- 2.P. Durai Pandian, S. Udaya Baskaran, Allied Mathematics, Volume – I, Muhil publishers, 1st Edition, Chennai, 1997.
- 3.P. Kandasamy and K. Thilagavathy, Allied Mathematics volume – I, Volume – II, S. Chand & Company, New Delhi, 2004.
- 4.Shanti Narayan, P.K. Mittal, Differential Calculus, S. Chand & Co, New Delhi, 2005.
- 5.A. Singaravelu, Allied Mathematics, Meenakshi Agency, Chennai, 2001.
- 6.P.R. Vittal, Allied Mathematics, Margham Publications, Chennai, 1999.

E-Learning source: http://mathforum.org/library/drmath/sets/elem_2d

Year/Semester: I Yr /II SEM

Code: AM214A

Credits: 4

Hours/Week: 6

Allied Mathematics – II (Physics)

Objective: To make the students become familiar with the tools in Mathematics to solve problems in different related fields.

Unit – I: Differentiation of Vectors

Differentiation of vectors – Differential operators – Directional derivative – Gradient – Divergence and curl – Formula involving operator ∇ .

(Chapter 8: Pages: 329 - 363)

Unit – II: Integration of Vectors

Line integrals – Surface integrals – Volume integrals – Statements of Gauss divergence, Green's, Stoke's theorems and its applications – verifications.

(Chapter 8: Pages: 364 - 390, 395 - 418 excluding Green's theorem in space- problems)

Unit – III: Partial Differential Equations

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions – Solutions of standard types of first order equations: $f(p, q) = 0$, $f(x, p) = g(-, q)$, $f(x, p, q) = 0$, $f(y, p, q) = 0$, $f(z, p, q) = 0$; $z = px + qy + f(p, q)$ – Lagrange method of solving linear partial differential equations.

(Chapter 6: Pages: 252 - 274)

Unit – IV: Laplace Transforms

Definition – Laplace transforms of e^{at} , $\cos at$, $\sin at$, $\cosh at$, $\sinh at$, t^n , $e^{at}f(t)$, $t^n f(t)$, $f'(t)$, $f''(t)$ and inverse Laplace transforms – Solving differential equations of second order with constant coefficients using Laplace transform.
(Chapter 7: Pages: 289 - 317 excluding simultaneous equations - problems)

Unit – V: Fourier Series

Definition – Finding Fourier coefficients for a given periodic function with period 2π – Odd and even function – Half range Fourier series.
(Chapter 2: Pages: 123 - 150)

Book for Study

1.S. Narayanan, P. Kandhasamy, R. Hanumantha Rao and T.K. Manickavasagam Pillai, Ancillary Mathematics, Volume II, S. Viswanathan Printers, Chennai 2010.

Books for Reference

- 1.P. Balasubramaniam, K. G. Subramanian, Ancillary Mathematics, Volume – I, Tata McGraw – Hill publishing company limited, New Delhi, 1996.
- 2.P. Durai Pandian, S. Udaya Baskaran, Allied Mathematics, Volume – I, Muhil publishers, 1st Edition, Chennai, 1997.
- 3.P. Kandsamy and K. Thilagavathy, Allied Mathematics volume – I, Volume – II, S. Chand & Company, New Delhi, 2004.
- 4.Shanti Narayan, P.K. Mittal, Differential Calculus, S. Chand & Co, New Delhi, 2005.
- 5.A. Singaravelu, Allied Mathematics, Meenakshi Agency, Chennai, 2001.
- 6.P.R. Vittal, Allied Mathematics, Margham Publications, Chennai, 1999.

E-Learning source: http://mathforum.org/library/drmath/sets/elem_2d.html

Year/Semester: I Yr /I SEM

Code: AM114B

Credits: 4

Hours/Week: 6

Allied Mathematics – I (Chemistry)

Objective: To make the students become familiar with the tools in Mathematics to solve problems in different related fields.

Unit – I: Theory of Equations

Formation of equations – Relation between roots and coefficients – Diminishing the roots of equations – Removal of terms – Reciprocal equation – Descarte’s rule of signs – Horner’s method – Newton’s method.

(Chapter 2: Pages: 27 – 70)

Unit – II: Trigonometry

Expansion of sine and cosine – Powers of sine and cosine – Hyperbolic functions – Relation among hyperbolic functions – Inverse hyperbolic functions – Logarithm of complex numbers.

(Chapter 3: Pages 71 – 100).

Unit – III: Matrices

Determinant of a matrix – Characteristic equation of a matrix – Characteristic vectors of a matrix – Cayley-Hamilton theorem – Inverse of a matrix – Diagonalization of a matrix.

(Chapter 4: Pages: 106 - 166).

Unit – IV: Differential Calculus

Radius of curvature – Radius of curvature in polar coordinates – Radius of curvature in p-r equation – Co-ordinate of the centre of curvature.

(Chapter 5: Pages: 167 – 202)

Unit – V: Multiple Integrals

Double integrals – Double integral in polar coordinates – Triple integrals.

(Chapter 6: Pages 203 – 222)

Books for Study

1.G. Britto Antony Xavier, V. Balaji, S.U. Vasantha Kumar, B. Govindan, Mathematical Sciences , Jayalakshmi Publications, Second Edition, 2015

Books for Reference

1.S. Narayanan, R. Hanumantha Rao and T.K. Manicavachagom Pillai, Ancillary Mathematics, Volume – I, S. Viswanathan printers, Chennai, 2011.

2.S. Narayanan, P. Kandhasamy, R. Hanumantha Rao and T.K. Manicavachagom Pillai, Ancillary Mathematics, Volume– II, S. Viswanathan printers, Chennai, 2010.

3.P. Balasubramaniam, K. G. Subramanian, Ancillary Mathematics, Volume – I, Tata McGraw – Hill publishing company limited, New Delhi, 1996.

- 4.P. Durai Pandian, S. Udaya Baskaran, Allied Mathematics, Volume – I, Muhil publishers, 1st Edition, Chennai, 1997.
- 5.P. Kandsamy and K. Thilagavathy, Allied Mathematics Volume – I, Volume – II, S. Chand & Company, New Delhi, 2004.
- 6.Shanti Narayan, P.K. Mittal, Differential Calculus, S.Chand& Co, New Delhi, 2005.
- 7.A. Singaravelu, Allied Mathematics, Meenakshi Agency, Chennai, 2001.
- 8.P.R. Vittal, Allied Mathematics, Margham Publications, Chennai, 1999.

E-Learning source: http://mathforum.org/library/drmath/sets/elem_2d

Year/Semester: I Yr /II SEM

Code: AM214B

Credits: 4

Hours/Week: 6

Allied Mathematics – II (Chemistry)

Objective: To make the students become familiar with the tools in Mathematics to solve problems in different related fields.

Unit – I: Graphs

What is a graph? - Application of graphs – Finite and Infinite graphs – Incidence and degree – Isolated Vertex, Pendant Vertex and Null graph – Isomorphism – Sub graphs – Walks, Paths and Circuits – Connected graphs, disconnected graphs and components – Euler graphs – Operations on graphs – More on Euler graphs – Hamiltonian paths and circuits – The traveling salesman problem.

(Book 1: Chapter 1(Except 1.6), Chapter 2: 2.1 – 2.10 (Except 2.3))

Unit – II: Probability

Probability – Random experiment – Event – Sample space – Measurement of probability – Classical approach – Relative frequency theory of probability – conditional probability – Baye’s theorem.

(Book 2, Chapter 18: pages 737 – 759)

Unit – III: Partial Differential Equations

Elimination of arbitrary constants – Elimination of arbitrary functions – Standard forms – Lagrange’s equation.

(Book 3: Chapter 9: Pages: 275 – 302)

Unit – IV: Laplace Transforms

Properties of Laplace transform – Inverse Laplace transform – Partial fractions – Differential equations.

(Book 3: Chapter 10: Pages: 303 – 335).

Unit – V: Fourier Series

Properties of integration – Odd and even functions – Half range Fourier series. (Book 3: Chapter 11: Pages: 341 – 360)

Books for Study

- 1.Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science –Prentice–Hall of India, 2001.
- 2.R.S.N. Pillai and Bagavathi, Statistics, S.Chand & co Ltd., New Delhi, seventh revised edition, 2010.
- 3.G. Britto Antony Xavier, V. Balaji, S.U. Vasantha Kumar, B. Govindan, Mathematical Sciences , Jayalakshmi Publications, Second Edition, 2015.

Books for Reference

- 1.P. Balasubramaniam, K. G. Subramanian, Ancillary Mathematics, Volume – I, Tata McGraw – Hill publishing company limited, New Delhi, 1996.
- 2.P. Duraipandian, S. UdayaBaskaran, Allied Mathematics, Volume – I, Muhil publishers, 1st Edition, Chennai, 1997.
- 3.P. Kandsamy and K. Thilagavathy, Allied Mathematics Volume – I, Volume – II, S. Chand & Company, New Delhi, 2004.
- 4.Shanti Narayan, P.K. Mittal, Differential Calculus, S. Chand & Co, New Delhi, 2005.
- 5.A. Singaravelu, Allied Mathematics, Meenakshi Agency, Chennai, 2001.
- 6.P.R. Vittal, Allied Mathematics, Margham Publications, Chennai, 1999.

E-Learning source: http://mathforum.org/library/drmath/sets/elem_2d

Year/Semester: I Yr /I SEM

Code: AM114E

Credits: 4

Hours/Week: 6

Allied Business Mathematics (BBA)

Objective: To expose tools in Mathematics to solve problems related to business and to introduce the optimization techniques to solve problems arising in business.

Unit – I: Determinant

Determinant – Rank – Solving a system of linear equations – Cramer’s rule – Input and output analysis.

(Book 1: Part - I, Chapter 4, Page 164 - 210).

Unit – II: Differentiation

Differentiation of standard functions from first principles – First and second order derivatives – Maxima and minima – Application to business problems. (Book 1: Part - I, Chapters 6, Page: 247 – 281, Chapter 7 282 – 296)

Unit – III: Integration

Determining indefinite and definite integrals using definition – Integration by parts – Partial fraction method – Applications.

(Book 1: Part - I, Chapter 8, Page: 303 – 322)

Unit – IV: Linear Programming Problem

Scope and uses of operations research – Formulations of linear programming problems – Basic solution – Basic feasible solution – Optimal solution – Graphical solution-Simplex solution of linear programming problems (**only feasible region**). (Book 2: Chapter 17, Page: 698 – 736)

Unit – V: Transportation Problem

North West corner method – Least cost method – Vogel’s approximation method Initial Basic Feasible Solution (IBFS problems only) – Assignment problem (balanced problems only).

(Book 2: Chapters 18 and 19)

Books for Study

1.P.A. Navnitham, Business Mathematics and Statistics for B.B.A/B.B.M, Jai Publishers, Trichy, August 2018.

2.P.A. Navnitham, Business Statistics for B.Com and B.Com.(C.A.), Jai Publishers, Trichy, July 2011.

Books for Reference

1.S.S. Chadha, R.N. Agarwal, Business Mathematics, S. Chand & Company Ltd, Ram Nagar, New Delhi, 1996.

2.P.K. Gupta, D.S. Hira, Operations Research, S. Chand & Company Ltd, New Delhi, 2005.

3.S.C. Gupta and V.K. Kapoor, Fundamentals of Statistics, Sultan Chand & Sons, New Delhi, 2007.

4.S.P. Gupta, Elementary Statistical Methods, Sultan Chand & Sons, New Delhi, 2005.

5.J.K. Sharma, Operations Research, 2-e, Mcmillian India Ltd, 2003.

6.Sundaresan and Jayaseelan, An introduction to Business Mathematics, Sultan Chand and Company, New Delhi, 1988.

E – Learning source: [http://www.math.above.com/od/business math/](http://www.math.above.com/od/business%20math/)

Year/Semester: I Yr /II SEM

Code: AM214E

Credits: 4

Hours/Week: 6

Allied Business Statistics (BBA)

Objective: To use statistical tools in business and arrive at possible inferences relating to population under study.

Unit – I: Representation of Data and Measures of Central Tendency

Representation of data by diagram – Graphical representation – Frequency distribution. Averages: Simple and weighted – Median – Mode – Geometric mean and harmonic mean – Properties and uses.

(Part – II, Chapters 6: Page: 98-147, Chapter 7: Page: 159-285)

Unit – II: Measures of Dispersion

Measures of dispersion: Range – Quartile deviation – Standard deviation and co-efficient of variation.

(Part - II, Chapters 8, Page: 305-368)

Unit – III: Correlation and Regression

Correlation: Meaning and definition – Scatter diagram – Pearson’s co-efficient of correlation – Rank correlation – Regression: Meaning and linear prediction – Difference between correlation and regression – Regression in two variables – Uses.

(Part – II, Chapters 12: Page: 503-534, Chapter 13: 540-571)

Unit – IV: Index Numbers

Index Numbers: Meaning – Uses – Methods of construction – Aggregate and relative types – Tests for index numbers – Cost of living index.

(Part – II, Chapter 10, Page: 444-488)

Unit – V: Analysis of Time Series

Time Series: Meaning – Components – Methods of estimating trend – Graphic – Semi average – Moving average and least square method.

(Part – II, Chapter 14, Page: 579-601)

Book for Study

1.P.A. Navnitham, Business Mathematics and Statistics, Jai Publishers, Trichi, 2011.

Books for Reference

1.S.S.Chadha, R.N.Agarwal, Business Mathematics, S. Chand & Company Ltd, Ram Nagar, New Delhi, 1996.

- 2.S.C.Gupta and V.K.Kapoor, Fundamentals of Statistics, Sultan Chand & Sons, New Delhi, 2007.
- 3.S.P.Gupta, Elementary Statistical Methods, Sultan Chand & Sons, New Delhi, 2005.
- 4.Sundaresan and Jayseelan, An introduction to Business Mathematics, Sultan Chand & Company, New Delhi, 1988.
- 5.P.R.Vittal, Business Mathematics and Statistics, Margham Publication, Chennai, 2011.

E- Learning source: <http://www.college stats.org/>

Year/Semester: I Yr /I SEM

Code: AM114D

Credits: 4

Hours/Week: 6

Mathematical Foundations – I (BCA)

Objective: To make the students familiar in Mathematics which are essential for developing computer applications.

Unit - I: Symbolic Logic

Proposition – Logical operators – Conjunctions – Disjunction – Negation – Conditional and bi-conditional operators – Converse – Inverse – Contra positive – Logically equivalent – Tautology and contradiction – Arguments and validity of arguments.

(Pages 1.1 - 1.50)

Unit - II: Set Theory

Sets: Set operations – Venn diagrams – Properties of sets – Number of elements in a set – Cartesian product.

Relations: Equivalence relation – Equivalence class –Partially and totally ordered sets.

Functions: Types of functions – Composition of functions.

(Pages 2.1 - 2.38, 3.1 - 3.23, 4.1 - 4.35)

Unit - III: Binary Operations

Types of binary operations: Commutative – Associative – Distributive and identity –Permutations and combinations.

(Pages 6.1 - 6.10, 7.1 - 7.53)

Unit - IV: Applications of Differentiation

Tangent and normal – Angle between two curves – Maximum and minimum values (second derivative test) – Curvature and radius of curvature.

(Pages 14.1 - 14.53, 15.1 - 15.22)

Unit - V: Two Dimensional Geometry

Slope of a straight line – Concurrent lines – Angle between two lines – Condition for parallel and perpendicular lines – Pair of straight lines – Circles – Conics (parabola, ellipse and hyperbola) [simple problems only].
(Pages 25.25 - 26.31, 27.1 - 27.18, 28.1 - 28.17, 28.41 - 28.53, 28.98 - 28.114).

Book for Study

1. P.R.Vittal, Mathematical Foundations, Margham Publications, Chennai, 2011.

Books for Reference

- 1.P.Duraipandian and Laxmi Duraipandian, Analytical Geometry Two dimension, Emerald Publication 1992.
- 2.Manicavasagam Pillay & Natarajan, Analytical Geometry Part I - Two dimension, S. Viswanathan (printers & publication) Pvt Ltd., 1991.

E –Learning source: <http://www.mathfoundation.com>

Year/Semester: I Yr /II SEM

Code: AM214D

Credits: 4

Hours/Week: 6

Mathematical Foundations – II (BCA)

Objective: To make the students become familiar with the tools in Mathematics to solve problems in several relevant fields.

Unit - I: Matrices

Multiplication of matrices – Singular and non-singular matrices – Adjoint of a matrix, Inverse of a matrix – Symmetric and skew symmetric – Hermitian and skew-Hermitian – Orthogonal and unitary matrices – Rank of a matrix – Solution of simultaneous linear equations by (i) Cramer's rule (ii) Matrix inversion method. (Pages 8.1 to 8.84, 8.130 to 8.141)

Unit II: Matrices (Continued)

Characteristic equation of a Matrix – Cayley-Hamilton theorem – Matrix of linear transformation: Reflection about the x, y axes and the line $y = x$ – Rotation about the origin through an angle – Expansion or Compression – Shears – Translation. (Pages 8.97 to 8.122, 9.1 to 9.30)

Unit - III: Integration and its Applications

Reduction Formula for $\int x^n e^{ax} dx, \int \sin^n x dx, \int \cos^n x dx, \int x^m (1-x)^n dx$ – Definite integrals – Applications of integration: (i) Area under plane curves (ii) Volume of solid of revolution.

(Pages 18.1-18.32, 19.1-19.26, 21.1-21.12, 22.1-22.8)

Unit - IV: Analytical Geometry of Three Dimensions

Planes: General equations of a plane – plane passing through a point – Intercept form – Normal form – Angle between two planes – Perpendicular distance – Equation of the plane passing through three points.

(Pages 29.1 – 29.38)

Unit - V: Analytical Geometry of Three Dimensions (Continued)

Spheres: Equation of Sphere – Section of a sphere by a plane – Equation of circle – Intersection of two spheres – Orthogonality of two spheres (excluding radical plane and coaxial systems)– Cones (simple problems only).

(Pages 31.1 – 31.47, 32.1 – 32.11)

Book for Study:

1.P.R. Vittal, Mathematical Foundations, Margham Publications, Chennai, 2011.

Books for Reference:

1.P. Duraipandian & Others, Analytical Geometry Three dimension, Emerald Publication, Reprint 1992.

2.T.K. Manicavachagam Pillay and Natarajan, Analytical Geometry Part II, Three dimensions, S. Viswanathan (printers & publication) Pvt. Ltd., 1991.

E - Learning source: <http://www.mathfoundation.com/>

Year/Semester: I Yr /I SEM

Code: AM114C

Credits: 4

Hours/Week: 6

Allied Mathematics – I (Computer Science)

Objective: To understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving. Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.

Unit – I: Logic and Proofs

Logic – Propositional Equivalences – Methods of Proof.

(Chapter I: Sections: 1.1 to 1.15; Page no: 1-15, 20-26, 56-73, Problems only)

Unit – II: Mathematical Reasoning, Induction and Recursion

Sequences and Summations – Mathematical Induction – Recursive Definitions. (Chapter III: Sections: 3.1 to 3.4; Page: 225-233, 238-251, 256-266, Problems only)

Unit – III: Combinatorics

The Basics of Counting – The Pigeonhole Principle – Permutations and Combinations – Binomial Coefficients – Generalized Permutations and Combinations.

(Chapter IV: Sections: 4.1 to 4.5; Page: 301-310, 313-318, 320-324, 327-333, 335-341, Problems only, No Algorithms)

Unit – IV: Graphs

Introduction to Graphs – Graph Terminology – Representing Graphs and Graph Isomorphism –Connectivity – Euler and Hamilton Paths – Shortest Path Problems (Chapter VIII: Sections: 8.1 to 8.6; Page: 537-543, 545-554, 557-563, 567-575, 577-585,593-601.)

Unit – V: Modeling Computation

Languages and Grammars – Finite State Machines with output – Finite State Machines with no output – Language Recognition.

(Chapter XI: Sections: 11.1 - 11.4; Page: 739- 748,751-756, 758-764, 765-773, Problems only)

Book for Study

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill Pub. Co. Ltd., New York, Tenth reprint 2006.

Books for Reference

1. Ralph. P. Grimaldi, Discrete and Combinatorial Mathematics: An Applied Introduction, Pearson Education Asia, Delhi, 4th Edition, 2007.
2. Seymour Lipschutz and Mark Lipson, Discrete Mathematics, Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.
3. Sankar. K, Discrete Mathematics for Computer Scientists and Mathematicians, Indian Publishers, Chennai, First Revised Edition, 2004.
4. Tremblay J.P. and Manohar R, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
5. Thomas Koshy, Discrete Mathematics with Applications, Elsevier Publications, 2006.

E – Learning source: <http://mathword.wolfram.com>

Year/Semester: I Yr /II SEM

Code: AM214C

Credits: 4

Hours/Week: 6

Allied Mathematics – II (Computer Science)

Objective: To train the students in mastering the techniques of various branches of Mathematics and to motivate the students to apply the techniques in their respective major subjects.

Unit – I: Algebraic and Transcendental equations

Solving algebraic and transcendental equations – Bisection – False position and Newton-Raphson method – Solving simultaneous equations – Introduction- Gauss elimination – Finding inverse of a matrix using Gauss elimination methods – Iterative methods – Gauss-Jacobi and Gauss-Seidal methods (Problems only). (Book 1, Chapter III: Sec 2: pages 82 to 85, Sec 4,5: pages 91 to 106; Chapter IV: Sec 1,2,3: pages 113 to 126, Sec 6: pages 140 to 146)

Unit – II: Interpolation & Numerical Differentiation and Integration

Introduction – Linear Interpolation – Newton Gregory forward and backward interpolation formula – Lagrange's interpolation formula – Numerical integration – Trapezoidal rule and Simpson's 1/3 rule (Problems only). (Book 1, Chapter VI: Sec 1-4: pages 193 to 206; Chapter VIII: Sec 4: pages 253 to 262; Chapter IX: Sec 7,8: pages 280 to 284, Sec 10, pages 285 to 295)

Unit – III: Ordinary Differential Equations

Solving differential equations (First order differential equation only) – Solutions by Taylor’s series – Euler’s method – Runge-Kutta 2nd and 4th order method – Milne’s predictor correct method (Problems only).

(Book 1, Chapter XI: Sec 6,7: pages 336 to 340, Sec 10-15, pages 350 to 365, Sec 20, pages 371 to 380)

Unit – IV: Probability

Probability – Conditional probability – Baye’s theorem – Applications of Binomial, Poisson, Normal distributions (Problems only).

(Book 2, Chapter 18: pages 737 to 759; Chapter 19: pages 769 to 801)

Unit – V: Correlation & Curve Fitting

Correlation coefficient – Rank correlation (Problems only).

(Book2, Chapter 12: pages396 to 443)

Curve fitting by least square methods – Fitting a straight line, parabola, power curve and exponential curves. (No derivation, Numerical problems only). (Book 1, Chapter 1: Sec 1.6-1.9, pages 24 to 44)

Books for Study

1.M.K. Venkataraman, Numerical Methods in Science and Engineering, The National publishing co., Madras, 1987.

2.R.S.N. Pillai and Bagavathi, Statistics, S.Chand& co Ltd., New Delhi, seventh revised edition, 2010.

Books for Reference

1.Arumugam Issac, Numerical Analysis with programming in C, new Gamma publication house, Palayamkottai, 2011.

2.A. Singaravelu, Numerical Methods, Meenakshi Agency, Chennai, New revised edition 2007.

3.K. Sankara Rao, Numerical Methods for Science and Engineering, third edition, 2011.

E – Learning source: <http://mathword.wolfram.com>

Year/Semester: IIYr / III SEM

Credits: 4

Code: AM310A

Hours/Week: 6

Allied Business Mathematics (B.Com)

Objective: To expose tools in Mathematics to solve problems related to business and to introduce the optimization techniques to solve problems arising in business.

Unit – I: Determinant

Determinant – Rank – Solving a system of linear equations – Cramer’s rule – Input and output analysis.

(Book 1: Part - I, Chapter 4, Page 164 - 210).

Unit – II: Differentiation

Differentiation of standard functions from first principles – First and second order derivatives – Maxima and minima – Application to business problems. (Book 1: Part - I, Chapters 6, Page: 247 – 281, Chapter 7 282 – 296)

Unit – III: Integration

Determining indefinite and definite integrals using definition – Integration by parts – Partial fraction method – Applications.

(Book 1: Part - I, Chapter 8, Page: 303 – 322)

Unit – IV: Linear Programming Problem

Scope and uses of operations research – Formulations of linear programming problems – Basic solution – Basic feasible solution – Optimal solution – Graphical solution-Simplex solution of linear programming problems (**only feasible region**). (Book 2: Chapter 17, Page: 698 – 736)

Unit – V: Transportation Problem

North West corner method – Least cost method – Vogel’s approximation method Initial Basic Feasible Solution (IBFS problems only) – Assignment problem (balanced problems only).

(Book 2: Chapters 18 and 19)

Books for Study

1.P.A. Navnitham, Business Mathematics and Statistics for B.B.A/B.B.M, Jai Publishers, Trichy, August 2018.

2.P.A. Navnitham, Business Statistics for B.Com and B.Com.(C.A.), Jai Publishers, Trichy, July 2011.

Books for Reference

1.S.S. Chadha, R.N. Agarwal, Business Mathematics, S. Chand & Company Ltd, Ram Nagar, New Delhi, 1996.

2.P.K. Gupta, D.S. Hira, Operations Research, S. Chand & Company Ltd, New Delhi, 2005.

3.S.C. Gupta and V.K. Kapoor, Fundamentals of Statistics, Sultan Chand & Sons, New Delhi, 2007.

4.S.P.Gupta, Elementary Statistical Methods, Sultan Chand & Sons, New Delhi, 2005.

5.J.K. Sharma, Operations Research, 2-e, Mcmillian India Ltd, 2003.

6.Sundaresan and Jayaseelan, An introduction to Business Mathematics, Sultan Chand and Company, New Delhi, 1988.

E – Learning source: [http://www.math.above.com/od/business math/](http://www.math.above.com/od/business%20math/)

Year/Semester: II Yr /III SEM
Credits: 4

Code: AM310B
Hours/Week: 6

Allied Business Mathematics (B.Com (CA))

Objective: To expose tools in Mathematics to solve problems related to business and to introduce the optimization techniques to solve problems arising in business.

Unit – I: Determinant

Determinant – Rank – Solving a system of linear equations – Cramer’s rule – Input and output analysis.

(Book 1: Part - I, Chapter 4, Page 164 - 210)

Unit – II: Differentiation

Differentiation (problems only) – Uses of derivatives – Maxima and minima – Application to business problems.

(Book 1: Part - I, Chapters 6, Page: 255 – 259, Chapter 7, Page: 282 – 294)

Unit – III: Integration

Determining indefinite and definite integrals using definition – Integration by parts – Partial fraction method – Applications.

(Book 1: Part - I, Chapter 8, Page: 303 – 322)

Unit – IV: Linear Programming Problem

Scope and uses of operations research – Formulations of linear programming problems – Basic solution – Basic feasible solution – Optimal solution – Graphical solution-Simplex solution of linear programming problems (**only feasible region**).

(Book 2: Chapter 17, Page: 698 – 736)

Unit – V: Transportation Problem

North West corner method – Least cost method – Vogel’s approximation method Initial Basic Feasible Solution (**IBFS problems only**).

(Book 2: Chapters 18)

Books for Study

- 1.P.A. Navnitham, Business Mathematics and Statistics for B.B.A/B.B.M, Jai Publishers, Trichy, August 2018.
- 2.P.A. Navnitham, Business Statistics for B.Com and B.Com. (C.A.), Jai Publishers, Trichy, July 2011.

Books for Reference

- 1.S.S. Chadha, R.N. Agarwal, Business Mathematics, S.Chand & Company Ltd, Ram Nagar, New Delhi, 1996.
- 2.P.K. Gupta, D.S.Hira, Operations Research, S. Chand & Company Ltd, New Delhi, 2005.
- 3.S.C. Gupta and V.K.Kapoor, Fundamentals of Statistics, Sultan Chand & Sons, New Delhi, 2007.
- 4.S.P. Gupta, Elementary Statistical Methods, Sultan Chand & Sons, New Delhi, 2005.
- 5.J.K. Sharma, Operations Research, 2-e, Mcmillian India Ltd, 2003.
- 6.Sundaresan and Jayaseelan, An introduction to Business Mathematics, Sultan Chand and Company, New Delhi, 1988.

E – Learning source: [http://www.math.above.com/od/business math/](http://www.math.above.com/od/business%20math/)

Year/Semester: II Yr /IV SEM
Credits: 4

Code: AM409A
Hours/Week: 6

Allied Business Statistics (B. Com)

Objective: To use statistical tools in business and arrive at possible inferences relating to population under study.

Unit – I: Representation of Data and Measures of Central Tendency

Representation of data by diagram – Graphical representation – Frequency distribution. Averages: Simple and weighted – Median – Mode – Geometric mean and harmonic mean – Properties and uses.

(Part – II, Chapters 6: Page: 98-147, Chapter 7: Page: 159-285)

Unit – II: Measures of Dispersion

Measures of dispersion: Range – Quartile deviation – Standard deviation and co-efficient of variation.

(Part - II, Chapters 8, Page: 305-368)

Unit – III: Correlation and Regression

Correlation: Meaning and definition – Scatter diagram – Pearson’s co-efficient of correlation – Rank correlation – Regression: Meaning and linear prediction – Difference between correlation and regression – Regression in two variables – Uses.

(Part – II, Chapters 12: Page: 503-534, Chapter 13: 540-571)

Unit – IV: Index Numbers

Index Numbers: Meaning – Uses – Methods of construction – Aggregate and relative types – Tests for index numbers – Cost of living index.

(Part – II, Chapter 10, Page: 444-488)

Unit – V: Analysis of Time Series

Time Series: Meaning – Components – Methods of estimating trend – Graphic – Semi average – Moving average and least square method.

(Part – II, Chapter 14, Page: 579-601)

Book for Study

1.P.A. Navnitham, Business Mathematics and Statistics, Jai Publishers, Trichi, 2011.

Books for Reference

- 1.S.S. Chadha, R.N. Agarwal, Business Mathematics, S. Chand & Company Ltd, Ram Nagar, New Delhi, 1996.
- 2.S.C.Gupta and V.K.Kapoor, Fundamentals of Statistics, Sultan Chand & Sons, New Delhi, 2007.
- 3.S.P.Gupta, Elementary Statistical Methods, Sultan Chand & Sons, New Delhi, 2005.
- 4.Sundaresan and Jayseelan, An introduction to Business Mathematics, Sultan Chand & Company, New Delhi, 1988.
- 5.P.R.Vittal, Business Mathematics and Statistics, Margham Publication, Chennai, 2011.

E- Learning source: <http://www.collegestats.org/>

Year/Semester: II Yr /IV SEM
Credits: 4

Code: AM409B
Hours/Week: 6

Allied Business Statistics (B.Com (CA))

Objective:

To use statistical tools in business and arrive at possible inferences relating to population under study.

Unit – I: Representation of Data

Meaning and Scope of Statistics – Collection of data – Methods of Collection of Primary data – Sources of Secondary data – Classification and Tabulation – Diagrams and Graphs.

(Part – II, Chapters 1,3,5,6)

Unit – II: Measures of Central Tendency

Averages: Simple and Weighted – Median – Mode – Geometric Mean – Harmonic Mean (Direct method only).

(Part – II, Chapter 7, Page: 159-268 [Problems only])

Unit – III: Measures of Dispersion

Measures of dispersion: Range – Quartile deviation – Standard deviation and co – efficient of Variation (Direct method only).

(Part – II, Chapter 8, Page: 305 - 368)

Unit – IV: Index Numbers

Index Numbers: Meaning – Uses – Methods of construction – Aggregate and relative types – Tests for index numbers – Cost of living index.

(Part – II, Chapter 10, Page: 444-488).

Unit – V: Time Series

Time Series: Meaning – Components – Methods of estimating trend – Graphic – Semi average – Moving average and least square method.

(Part – II, Chapter 14, Page: 579-601)

Book for Study:

1. P.A. Navnitham, Business Mathematics and Statistics for B.B.A/B.B.M, Jai Publishers, Trichy, July 2011.

Books for Reference:

- 1.S.S.Chadha, R.N.Agarwal, Business Mathematics, S.Chand & Company Ltd., Ram Nagar, New Delhi, 1996.
- 2.S.C.Gupta and V.K.Kapoor, Fundamentals of Statistics, Sultan Chand & Sons, New Delhi, 2007.
- 3.S.P.Gupta, Elementary Statistical Methods, Sultan Chand & Sons, New Delhi, 2005.
- 4.Sundaresan and Jayseelan, An introduction to Business Mathematics, Sultan Chand & Company, New Delhi, 1988.
- 5.P.R.Vittal, Business Mathematics and Statistics, Margham Publication, Chennai, 2011.

E- Learning source: <http://www.college stats.org/>

Year/Semester: II Yr /III SEM
Credits: 4

Code: AM310C
Hours/Week: 6

Bio Statistics – I (Bio Chemistry)

Objective: To develop the importance of Bio-Statistics in the scientific design of experiments and in the objective collection, processing, analysis and interpretation of scientific investigation in the life sciences

Unit- I: Collection, Classification and Presentation of Data

Collection of data – Data – Class intervals – Frequency – Frequency distribution Presentation of data – Tabular presentation – Graphic presentation – Diagrammatic presentation.

(Chapter 3 to 5)

Unit –II: Measures of Central Tendency

Mean – Median – Mode – Measures of average of position.

(Chapter 6)

Unit –III: Measures of Dispersion

Definition – Types of measures of dispersion – Range – Quartile deviation – Mean deviation – Standard deviation – Variance – Coefficient of Variance.

(Chapter 7)

Unit- IV: Correlation and Regression

Correlation – Scatter diagram – Karl Pearson’s correlation coefficient – Spearman’s rank correlation coefficient – Regression.

(Chapter 10)

Unit-V: Vital Statistics

Introduction – Uses of vital statistics – Systems for collection of vital statistics – Measures of vital statistics – Morality rate – Fertility rate.

(Chapter 17: Pages 340-349)

Book for Study

1.Veer Bala Rastogi, Fundamentals of Bio-Statistics, Ane Books Pvt. Ltd, Second Edition, New Delhi, Reprint 2011.

Books for Reference

- 1.P.N Arora and P.K Malhan, Bio-Statistics, Himalaya Publishing House, Mumbai, 1996.
- 2.S.P. Gupta, Statistical methods, Sultan Chand and Sons, New Delhi, 2004
- 3.N. Gurumani, An introduction to Bio-Statistics, 2-e, MJP Publishers, Chennai, 2005.
- 4.R.S.N. Pillai Bagavathi, Statistics, S.Chand and Company Ltd, 2007
- 5.Ronald N. Forthofer, Eun Sul Lee and Micheal Hernandez, Bio-Statistics, 2-e, Academic press, 2007.
- 6.P. Ramakrishnan, Bio-Statistics, Saras Publications, Nagercoil, 2007.

E-learning Source: <http://stat.fsu.edu/dpati/5172>

Year/Semester: II Yr /IV SEM
Credits: 4

Code: AM409C
Hours/Week: 6

Bio Statistics – II (Bio Chemistry)

Objective: To develop the skills needed for bio sciences.

Unit –I: Probability

Introduction – Definition of probability – Basic concepts of Probability – Problems - Probability Distribution – Binomial – Poisson – Normal distribution, Measures of Deviation from Normal Distribution. (Chapters 8 and 9)

Unit – II: Test of Hypothesis and Test of Significance

Statistical inference – Test of significance – Student’s ‘t’-test – Types of ‘t’ test. (Chapters 12 and 13)

Unit –III: Analysis of Variance (ANOVA)

Introduction – Test of ANOVA – One way analysis of variance – F – test.
(Chapter 11)

Unit – IV: Chi- Square Test

Introduction – Definition – Significance of chi-square test – Probability value from chi- square.
(Chapter 14)

Unit – V: Nonparametric or Distribution-Free Statistical Test

Introduction – Sign test – Wilcoxon signed rank test – Wilcoxon rank sum test – The Mann Whitney test – The Kolmogorov – Smirnov goodness of fit test – The Spearman’s Rank Correlation Coefficient.
(Chapter 15)

Book for Study

1.Veer Bala Rastogi, Fundamentals of Bio-Statistics, Ane Books Pvt. Ltd, Second Edition, New Delhi, Reprint 2011.

Books for Reference

- 1.P.N Arora and P.K Malhan, Bio-Statistics, Himalaya Publishing House, Mumbai, 1996.
- 2.S. P. Gupta, Statistical methods, Sultan Chand and Sons, New Delhi, 2004
- 3.N. Gurumani, An introduction to Bio-Statistics, 2-e, MJP Publishers, Chennai, 2005.
- 4.R.S.N. Pillai Bagavathi, Statistics, S.Chand and Company Ltd, 2007
- 5.Ronald N. Forthofer, Eun Sul Lee and Micheal Hernandez, Bio-Statistics, 2-e, Academic press, 2007.
- 6.P.Ramakrishnan, Bio-Statistics, Saras Publications, Nagercoil, 2007.

E – Learning source: <http://stat.fsu.edu/dpati/5172>

Year/Semester: II Yr /III SEM
Credits: 4

Code: AM310D
Hours/Week: 6

Statistical Methods for Psychology

UNIT I: Introduction to the Statistics

Meaning of statistics-Importance of Statistics in Psychology –Parameters and Estimates-Descriptive Statistics-Inferential Statistics-Variables and their types; **Levels of measurement:** Nominal Scale- Ordinal Scale- Interval Scale- Ratio Scale; **Frequency tables:** Making a Frequency Table -Frequency tables for Nominal Variables-Grouped Frequency Tables.

Frequency Graphs: Histogram, Frequency Polygon.

UNIT II: Central Tendency and Variability

Central Tendency: The Mean- from Frequency Distributions - Assumed Mean Method-Properties of Mean. Median – Calculation of Median from Ungrouped data- Calculation of Median from a Frequency Distribution. The Mode- Calculation of Mode in a Frequency Distribution. Comparison of Mean, Median and Mode- Guidelines for the Use of Central Tendencies.

Variability: the Range- Calculation of Range- the Average Deviation- Calculation of the Average Deviation. The Semi Interquartile Range- Calculation of Q1, Q3 and Quartile Deviation. The variance and the Standard Deviation- Methods of Calculating the Variance and the Standard Deviation from Ungrouped data- Calculation of Standard Deviation from Grouped data- Calculation of Standard Deviation from Assumed Mean.

UNIT III: The Normal Distribution and Correlation

The Normal Distribution: Properties of the Normal Curve- Areas under the Normal Curve- Importance of Normal Distribution- Skewness- Kurtosis- Importance of measures of Skewness and Kurtosis.

The Correlation: the Concept of Correlation- the Scatter Plot- the Product Moment Correlation- Calculation of Product Moment Correlation- Spearman's Rank- Difference Correlation Co-efficient- Properties of Correlation Co-efficient.

UNIT IV: THE Hypothesis Testing and the Inferential Statistics

Hypothesis Testing: the Core logic of Hypothesis Testing –the Hypothesis Testing Process- One Tailed and Two Tailed Hypothesis Tests. Decision Errors: Type I Error- Type II Error.

Inferential Statistics: t' Tests- the t' test for a Single Sample- the t' test for a Dependent Means- Assumptions of Single Sample and the t' Test for a Dependent Means. The t' test for Independent Means: the Distribution of Differences between Means- Hypothesis Testing with a ' t' ' test for Independent Means.

UNIT V: Non-Parametric Methods

The Chi-Square: Degrees of Freedom- Test of the Hypothesis of Normality- Calculation of the Chi-Square for 2x2 tables- Yates' Correction for Continuity- Assumptions of the Chi Square test.

The Non-parametric Methods: Sign test- Assumptions and Uses of Sign Test- the Median Test- Run Test- the Kolmogorov and Smirnov Two Sample test- Precautions of the use of the Non-parametric tests. 10

Book for Study:

Howell, D. (2012). *Statistical method for psychology* (8th ed.). Delhi, India: Cengage Learning.

Books for References:

1. Agresti, A., & Finlay, B. (2013). *Statistical methods for the social sciences*. Hoboken, NJ: Pearson Education
2. Aron, A., Aron, E. N., & Coups, E. J. (2006). *Statistics for psychology* (4th ed.). New Delhi, India: Pearson India Education Services Pvt Ltd.
3. Heiman, G. (2013). *Basic statistics for the behavioral sciences* (7th ed.). Belmont, CA: Cengage Learning.
4. Bear, G., King, B.M., & Minium, E. W. (2008). *Statistical reasoning in psychology and education*. Bengaluru, India: Wiley India Private Limited.
5. Gupta, S.P. (1999). *Statistical methods* (3rd ed.). New Delhi, India: Sultan Chand & Sons.
6. Garrett, H. E. (2006): *Statistics in psychology and education*. New Delhi, India: Paragon International Publishers.

M.Sc MATHEMATICS

M745 - ABSTRACT ALGEBRA

Objectives: To study the transformations, Extension Fields and algebraic extensions, Finite Fields and Sylow's theorems, Finite Simple groups, Symmetry groups and Cayley digraphs of groups and Galois Theory in Vector Space.

Unit – I: Extension Fields and Algebraic Extensions

The Fundamental Theorem of Field Theory - Splitting Fields - Zeros of an Irreducible Polynomial - Characterization of Extensions – Finite Extensions - Properties of Algebraic Extensions.

(Chapters 20, 21)

Unit – II: Finite Fields and Class Equation

Classification of Finite Fields - Structure of Finite Fields - Subfields of a Finite Field - Conjugacy Classes - The Class Equation - The Probability That Two Elements Commute.

(Chapter 22, Chapter 24 (pages 395-397 only))

Unit – III: Sylow's Theorems and Finite Simple Groups

The Sylow's Theorems - Applications of Sylow's Theorems - Historical Background - Non-Simplicity Tests - The Simplicity of A_5 .

(Chapter 24 (pages 398-407 only), Chapter 25)

Unit – IV: Generators and Relations and Cayley Digraphs of Groups

Definitions and Notation – Free Group - Generators and Relations - The Cayley Digraph of a Group - Hamiltonian Circuits and Paths - Some Applications.

(Chapter 26 (pages 434- 441 only), Chapter 30).

Unit – V: Galois Theory

Fundamental Theorem of Galois Theory - Solvability of Polynomials by Radicals - Insolvability of a Quintic.

(Chapter 32)

Book for Study

1. Joseph A. Gallian, *Contemporary Abstract Algebra*, 4th Ed., Narosa, 1999.

Books for Reference

1. George E Andrews, *Number Theory*, Hindustan Publishing Corporation, 1984.

2. I. N. Herstein, *Topics in Algebra*, John Wiley and sons, 2-e, New Delhi, 2006.

3. John B. Fraleigh, *A First Course in Abstract Algebra*, 7-e, Pearson Education Publication, New Delhi 2003.

4. M. Artin, *Abstract Algebra*, 2nd Ed., Pearson, 2011.

- 5.S. Arumugam and A. Thandapani, *Modern Algebra*, SciTech Publications Pvt. Ltd.
- 6.Saunders Maclane and Garrett Birkoff, *Algebra*, 2-e, Macmillan Publishing Co.inc, New York, 1979.
- 7.Serge Lang, *Algebra*, Addition Wesley Publishing Company, London 1965.
- 8.Surjeeth Singh and QuaziZameeruddin, *Modern Algebra*, 2-e, Vikas Publishing House Pvt. Ltd., New Delhi, 1975.

E-Learning source: <https://cosmolearning.org/courses/abstract-algebra/>

M746 - REAL ANALYSIS

Objective: To study the real number system, Functions of Bounded Variation and Rectifiable, Riemann–Stieltjes integral, Lebesgue Integral and Square Space.

Unit – I: Functions of Bounded Variation and Rectifiable Curves

Properties of monotonic functions – Functions of bounded variation – Total variation – Additive property of total variation – Total variation on $[a,b]$ as a function of x – Functions of bounded variation expressed as the difference of increasing functions – Continuous functions of bounded variation – Curves and paths – Rectifiable paths and arc length – Additive and continuity properties of arc length – Equivalence of paths. Change of parameter. (Chapter: 6 Sec 6.2 to 6.12)

Unit – II: Riemann–Stieltjes integral

The definition of the Riemann-Stieltjes integral – Linear properties – Integration by parts – Change of variable in a Riemann–Stieltjes integral – Reduction to a Riemann integral – Step functions as integrators – Reduction of a Riemann-Stieltjes integral to a finite sum – Euler's summation formula – Monotonically increasing integrators – Upper and lower integrals – Additive and linearity properties of upper and lower integrals – Riemann's condition – Comparison theorems.

(Chapter 7: Sec 7.3 to 7.14)

Unit – III: Riemann–Stieltjes integral (contd.)

Integrators of bounded variation – Sufficient conditions for existence of Riemann-Stieltjes integrals – Necessary conditions for existence of Riemann-Stieltjes integrals – Mean Value Theorems for Riemann–Stieltjes integrals – The integral as a function of the interval – Second fundamental theorem of integral calculus – Change of variable in a Riemann integral – Second Mean–Value Theorem for Riemann integrals – Riemann-Stieltjes integrals depending on a parameter – Differentiation under the integral sign – Interchanging the order of integration.

(Chapter: 7 Sec 7.15 to 7.25)

Unit – IV: Lebesgue Integral

The integral of a step function – Monotonic sequences of step functions – Upper functions and their integrals – Riemann-Integrable functions as examples of upper functions – The class of Lebesgue- Integrable functions on a general interval – Basic properties of the Lebesgue integral – Lebesgue integration and sets of measure zero – The Levi monotone convergence theorems. (Chapter: 10 Sec 10.2 to 10.9)

Unit – V: Lebesgue Square Space

Lebesgue integrals on unbounded intervals as limits of integrals on bounded intervals – Improper Riemann integrals – Measurable functions – Continuity of functions defined by Lebesgue integrals – Differentiation under the integral sign – Inner products and norms – The set $L^2(I)$ of square-integrable functions – The set $L^2(I)$ as a semi-metric space – A convergence theorem for series of functions in $L^2(I)$ – The Riesz-Fischer theorem.

(Chapter 10: Sec 10.12 to 10.16, 10.21 to 10.25)

Book for Study

1. Tom M. Apostol, *Mathematical Analysis*, Indian student second edition, Narosa Publishing House, Chennai, 20th reprint, 2002.

Books for Reference

1. E. Fischer, *Intermediate Real Analysis*, Springer Verlag, 1983.

2. P.N. Arora and Ranjit Singh, *First course in Real Analysis*, Third edition, Sultan Chand and Sons Publishers, New Delhi, 1981.

3. Richard R. Goldberg, *Methods of Real Analysis*, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi, 1970.

4. Robert G. Bartle and Donald R. Sherbert, *Introduction to Real Analysis*, by 2-e John Wiley and Sons, 2000.

5. S. Arumugam, *Modern Analysis*, New Gamma Publishers, Palayamkottai, 1993.

E-Learning source: <https://ocw.mit.edu/courses/mathematics/18-100a-introduction-to-analysis-fall-2012/>

M747 - ORDINARY DIFFERENTIAL EQUATIONS

Objective: To study the Differential equation of higher order, to find the power series solution of special type of Differential equations, to solve the system of linear Differential equations, to study existence and uniqueness of the solutions, boundary value problems.

Unit– I: Linear Differential Equations of Higher order

Linear Dependence and Wronskian– Basic Theory for Linear Equations – Method of Variation of Parameters – Two Useful Formulae– Homogeneous Linear Equations with Constant Co-efficients.

(Chapter 2, Sections: 2.2 to 2.6)

Unit – II: Solutions in Power Series

Introduction – Second Order Linear Equations with Ordinary Points – Legendre Equation and Legendre Polynomials – Second Order Equations with Regular Singular Points [up to example 3.9, Bessel function of first kind] – Bessel Equation.

(Chapter 3, Sections: 3.1 to 3.5)

Unit– III: Systems of Linear Differential Equations

Introduction – Systems of First Order Equations – Existence and Uniqueness Theorem –Fundamental Matrix – Non-homogeneous Linear Systems – Linear Systems with Constant Coefficients.

(Chapter4, Sections: 4.1 to 4.6)

Unit– IV: Existence and Uniqueness of Solutions

Preliminaries – Successive Approximations – Picard’s theorem – Non-uniqueness of Solutions – Continuation and Dependence on Initial Conditions.

(Chapter5, Sections: 5.2 to 5.6)

Unit–V: Boundary Value Problems

Introduction – Sturm– Liouville Problem – Green’s Functions.

(Chapter 7, Sections: 7.1 to 7.3)

Book for Study

1.S.G.Deoand V. Raghavendra, *Ordinary Differential Equations and Stability theory*, Tata McGraw Hill Publishing Company, New Delhi, 1980, Seventh Reprint 1993.

Books for Reference

- 1.D. Raj, D. P. Choudary and H. I. Freedan, *A Course in Ordinary Differential Equations*, Narosa Publishing House, Chennai, 2004.
- 2.D. Somasundaram, *Ordinary Differential Equations*, Narosa Publishing House, Chennai, 2002.
- 3.Ean A. Coddington, *An Introduction to ODE*, Prentice Hall of India Pvt., Ltd, New Delhi.1992
- 4.Delhi.1992
- 5.G. F. Simmons, *Differential Equations*, S. Chand and Company Ltd, New Delhi, 1974
- 6.M. D. Rasingania, *Advanced Differential Equations*, 4-e, Tata McGraw Hill Publishing Company, New Delhi, 1995.
- 7.M. Rana Mohan Rao, *Ordinary Differential Equations Theory and Applications*, Affiliate East – West Press Private Ltd, Chennai, 1935.

E–Learning source: <http://nptel.ac.in/courses/111104031/>

<https://ocw.mit.edu/courses/mathematics/18-03-differential-equations-spring-2010/>

M748 - MATHEMATICAL STATISTICS

Objective: To study and apply sampling theory, significance tests, estimation, testing of hypothesis and design of experiments.

Unit– I: Sampling and Sampling Distributions

Sampling – Sample mean – Sampling from the normal distributions.

(Book 1: Chapter 6, Sections: 6.2 to 6.4)

Unit– II: Parametric Point Estimation

Methods of finding Estimators – Properties of Point Estimators – Sufficiency – Unbiased estimation.

(Book 1: Chapter 7, Sections: 7.2 to 7.5)

Unit– III: Parametric Point and Interval Estimation

Baye’s estimators – Confidence intervals – Sampling from the normal distribution – Methods of finding confidence intervals–Large sample confidence intervals – Bayesian Interval Estimates. (Book 1: Chapter 7, Section: 7.7; Chapter8, Sections: 8.2 to 8.6)

Unit–IV: Tests of Hypotheses

Test of hypotheses – Sampling from the normal distribution – Chi-square Tests –Test of Hypotheses and Confidence Intervals.

(Book 1: Chapter 9,Sections: 9.4 to 9.6)

Unit– V: Design of Experiments

Aim of the Design of experiments - Basic Principles of Experimental Design - Some Basic Designs of Experiments
- Analysis of variance - Comparison of RBD and LSD - Examples. (Book 2: Chapter 10: pages 10.1 to 10.25)

Books for Study

1. Alexander M. Mood, Franklin, A. Graybill and Duane C. Boes, *Introduction to the Theory of Statistics*, John Wiley and Sons, 3-e, 1974.
2. Veerarajan T, *Probability, Statistics and Random Processes*, 3rd Edition – Tata McGraw-Hill, 2012.

Books for Reference

1. Ruma Falk, *Understanding Probability and Statistics: A Book of Problems*, A K Peters/CRC Press, 1997.
2. Marek Fisz, *Probability and Mathematical statistics*, Krieger Publishing Company; 3 edition, 1980.
3. Paul G. Hoel, *Introduction to Mathematical Statistics*, 5-e, Wiley, 1984.
4. Simmons and Schuster, *Probability Statistics and Random Process*, 1971.
5. S. P. Gupta & M. P. Gupta, *Business Statistics*, 14th enlarged edition, Sultan Chand and sons, educational publishers, New Delhi, reprint 2007.
6. S. S. Wilks, *Mathematical Statistics*, John Wiley and Sons, 1967.
7. Vijay K. Rohatgi, *An Introduction to Probability Theory and Mathematical Statistics* (Wiley Series in Probability and Statistics), Wiley-Blackwell, 1976.

E-Learning source: <https://ocw.mit.edu/courses/mathematics/18-655-mathematical-statistics-spring-2016/index.htm>

<http://www.math.uah.edu/stat/>

M749A - DIFFERENTIAL GEOMETRY

Objective: This course introduces space curves and their intrinsic properties of a surface and geodesics. Further the non – intrinsic properties of surfaces are explored.

Unit – I: Space curves

Introductory remarks about Space Curves, Definitions – Arc Length – tangent –normal and binormal – curvature and torsion of a curve given as the intersection of two surfaces – contact between curves and surfaces – tangent surface, involutes and Evolutes - Intrinsic equations – fundamental Existence Theorem for space curves- Helices.

(Chapter I, Sections: 1 to 9)

Unit – II: The metric: Local Intrinsic Properties of a Surface

Definition of a surface – curves on a surface– Surface of revolution – Helicoids – Metric – Direction coefficients – Families of curves – Isometric correspondence – Intrinsic Properties. (Chapter II, Sections: 1 to 9)

Unit – III: Geodesics

Geodesics – Canonical geodesic equations – Normal Property of geodesics – Existence Theorems – Geodesic parallels.

(Chapter II, Sections: 10 to 14)

Unit – IV: Geodesics (contd.)

Geodesics curvature – Gauss – Bonnet Theorem – Gaussian curvature – surface of constant curvature.

(Chapter II, Sections: 15 to 18)

Unit – V: The Second Fundamental form: Local non-intrinsic Properties of a Surface

The Second fundamental form – Principal Curvature – Lines of Curvature – Developables-Developables associated with space curves and with curves on surfaces – Minimal surfaces- Ruled surfaces.

(Chapter III, Sections: 1 to 8)

Book for Study

1.T.J. Wilmore, *An introduction to Differential Geometry*, Oxford University Press, (17th Impression) New Delhi 2002. (Indian Print).

Books for Reference

1.D. Somasundaram, *Differential Geometry*, Narosa Publication House, Chennai, 2005.

2.J. A. Thorpe, *Elementary topics in Differential Geometry*, Under-Graduate Texts in Mathematics, Springer Verlag 1979.

3.Kobayashi. S. and Nomizu. K., *Foundations of Differential Geometry*, Interscience Publishers, 1963.

4.K. P. Gupta, G. S. Malik, *Differential Geometry*, 3-e, Pragati Prakasam, Meerut, India, 2005.

5.Struik, D. T., *Lectures on Classical Differential Geometry*, Addison – Wesley, Mass.1950.

6. Wilhelm Klingenberg, *A course in Differential Geometry*, Graduate Texts in Mathematics, Springer Verlag 1978.

E-Learning source: <http://www.math.ku.dk/noter/filer/geom1.pdf>

M749B - SKILL ENHANCEMENT COURSE I – ALGEBRA

Objectives:

1. To develop broad and balanced knowledge and understanding of definitions, concepts, theorems and principles.
2. To enhance the ability of learners to apply the knowledge and skills acquired by them during the programme to solve specific theoretical and applied problem in Mathematics.
3. To empower students to crack competitive examinations such as NET, SET and TRB and to complement the theoretical content of the subject with exercise problems.

Unit-I: Finite Group

Introduction to groups – Groups - finite groups – subgroups.

(Chapters 1 to 3 – examples and exercise)

Unit-II: Cyclic and Permutation groups and Isomorphism

Cyclic groups - permutation groups – isomorphism.

(Chapters 4 to 6 – examples and exercise)

Unit-III: Cosets and Direct Products

Cosets and Lagrange's theorem – external direct products - normal subgroups and factor groups.

(Chapters 7 to 9 – examples and exercise)

Unit-IV: Rings and Ideals

Introduction to rings – integral domains – ideals and factor rings.

(Chapters 12 to 14 – examples and exercise)

Unit-V: Ring Homomorphism and Factorization

Ring homomorphism - polynomial rings – factorization of polynomials.

(Chapters 15 to 17 – examples and exercise)

Book for Study

1. Joseph A. Gallian, *Contemporary Abstract Algebra*, 4th Ed., Narosa, 1999.

Books for Reference

1. M. Artin, *Abstract Algebra*, 2nd Ed., Pearson, 2011.
2. S. Arumugam and A. Thandapani, *Modern Algebra*, SciTech Publications Pvt. Ltd.

3. George E Andrews, *Number Theory*, Hindustan Publishing Corporation, 1984.
4. I.N. Herstein, *Topics in Algebra*, John Wiley and Sons, 2-e, New Delhi, 2006.
5. John B. Fraleigh, *A First Course in Abstract Algebra*, 7-e, Pearson Education Publication, New Delhi 2003.
6. Saunders MacLane and Garrett Birkhoff, *Algebra*, 2-e, Macmillan Publishing Co. Inc, New York, 1979.
7. Serge Lang, *Algebra*, Addison Wesley Publishing Company, London, 1965.
8. Surjeeth Singh and Quazi Zameeruddin, *Modern Algebra*, 2-e, Vikas Publishing House Pvt. Ltd., New Delhi, 1975.

E –Learning source: <https://ocw.mit.edu/courses/mathematics/18-702-algebra-ii-spring-2011>

M749C - Coding Theory

Objectives: To provide students with elementary knowledge of theory of error correcting codes and readable introduction to mathematical aspect of coding.

Unit 1:

Introduction to linear codes and error correcting codes. Encoding and decoding of a linear code.

Unit 2:

Dual codes. Hamming codes and perfect codes.

Unit 3:

Cyclic codes. Codes with Latin Squares, Introduction to BCH codes.

Unit 4:

Weight enumerators and MDS codes.

Unit 5:

Linear coding theory problems and conclusions.

Books for Study

1. Raymond Hill, *A first course in Coding Theory*, Clarendon Press, Oxford (1986).
2. J.H. Van Lint, *Introduction to Coding Theory*, Springer (1998).

Books for Reference

1. W. Cary Huffman and Vera Pless, *Fundamentals of Error Correcting Codes*, Cambridge University Press (2003).
2. W.W. Peterson, *Error Correcting Codes*, Cambridge, MA MIT Press (1961).
3. V. Pless, W.C. Huffman and R.A. Brualdi, *An Introduction to Algebraic Codes*, in Hand book of coding theory, Eds. Amsterdam Elsevier (1998)

E-Learning Sources: <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-895-essential-coding-theory-fall-2004/>

M848 - ADVANCED LINEAR ALGEBRA

Objective: To give the students a thorough knowledge of the various aspects of Linear Algebra. To train the students in problem-solving as a preparatory for competitive exam.

Unit – I: Linear transformations

The algebra of linear transformations- Isomorphism – Representations of Transformations by Matrices – Linear Functionals.

(Book – 1, Chapter 3, Sections: 3.2 to 3.5)

Unit – II: Algebras of Polynomials

Algebras - The algebra of polynomials – Lagrange-Interpolation – Polynomial Ideals – The Prime factorization of a polynomial.

(Book – 1, Chapter 4, Sections: 4.1 to 4.5)

Unit – III: Inner Product Spaces

Inner Products and Norms – The Gram – Schmidt Orthogonalization Process and Orthogonal Complements – The Adjoint of a Linear Operator – Normal and Self – Adjoint Operators.

(Book – 2, Chapter 6, Sections: 6.1 to 6.4)

Unit – IV: Orthogonal System

Unitary and Orthogonal Operators and their Matrices - Orthogonal Projections and the Spectral Theorem – Bilinear and quadratic forms.

(Book – 2, Chapter 6, Sections: 6.5, 6.6, 6.8)

Unit – V: Canonical Forms

Jordan Canonical form I – Jordan Canonical form II-The minimal polynomial.

(Book – 2, Chapter 7, Sections: 7.1 to 7.3)

Books for Study

1.Kenneth Hoffman and Ray Alden Kunze, *Linear Algebra*, Second Edition, Prentice Hall of India Private Limited, New Delhi, 2010.

2.Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, *Linear Algebra*, Fourth Edition, Prentice Hall of India Private Limited, New Delhi, 2007.

Books for Reference

1.A. R. Rao, P. Bhimashankaram, *Linear Algebra*, Second Edition, Tata McGraw Hill, 2000.

2. Edgar G. Goodaire, *Linear Algebra-Pure & Applied World Scientific*, Cambridge University Press India Ltd, 2014.

3. I. N. Herstein, *Topics in Algebra*, 2-e, Vikas Publishing House Pvt., Ltd, Chennai-6, 2006.

4. P. P Gupta, S. K. Sharma, *Linear Algebra*, S.Chand and Company Ltd, New Delhi, 1982.

5. S. Kumaresan, *Linear Algebra: A Geometric Approach*, Prentice – Hall of India Ltd, 2004.

6. V. Krishnamurthy, V. P. Mainra, J. L. Arora, *Introduction to Linear Algebra*, East West Press Ltd, 1985.

E –Learning Source: <http://nptel.ac.in/courses/111106051/>

M849 - PARTIAL DIFFERENTIAL EQUATIONS

Objective: To develop skills in solving partial differential equations.

Unit – I: Partial Differential Equations of First Order

Introduction – Formation of Partial Differential Equation – Solution of Partial Differential Equations of First Order – Charpit’s Method.

(Chapter 0, Sections: 0.1, 0.4, 0.5, 0.11)

Unit – II: Fundamental Concepts

Introduction – Classification of second Order PDE – Canonical Forms

(Chapter 1, Sections: 1.1 to 1.3)

Unit – III: Elliptic Differential Equations

Occurrence of the Laplace and Poisson Equations – Boundary Value Problems – Separation of Variables – Dirichlet Problem for a Rectangle – The Neumann Problem for a Rectangle – Interior Dirichlet Problem for a Circle – Exterior Dirichlet Problem for a Circle – Interior Neumann Problem for a Circle.

(Chapter 2, Sections: 2.1, 2.2, 2.5 to 2.10)

Unit – IV: Parabolic Differential Equations

Occurrence of the Diffusion Equation – Boundary Conditions – Elementary Solutions of the Diffusion Equation – Dirac Delta Function – Separation of Variables Method.

(Chapter 3, Sections: 3.1 to 3.5, Omit Examples 3.2 and 3.3)

Unit – V: Hyperbolic Differential Equations

Occurrence of the Wave Equation – Derivation of One – dimensional Wave Equation – Solution of One – dimensional Wave equation by Canonical Reduction – The initial Value Problem; D’Alembert’s Solution – Vibrating string – Variables Separable Solution – Forced Vibrations – Solution of Non-homogeneous Equation.

(Chapter 4, Sections: 4.1 to 4.6).

Book for Study

1.K. Sankara Rao, *Introduction to Partial Differential Equations*, 2-e, New Delhi, 2006.

Books for Reference

1.Amarnath. T, *An Elementary Course in Partial Equations*, Narosa Publishing House, 1997.

2.M. D. Raisingania, *Advanced Differential Equations*, 4-e, Tata McGraw Hill Publishing Company, New Delhi, 2001.

3.L.C.Evans, *Partial Differential Equations*, Graduate Studies in Mathematics, Vol.19, AMS, 1998.

4.Erich Miersemann, *Partial Differential Equations*, Lecture Notes, Leipzig University Version October, 2012.

5.Snedon. I. N, *Elements of Partial Differential Equations*, Tata McGraw Hill, New Delhi, 1991.

6.P. Prasad and R. Ravindran, *Partial differential equations*, Wiley Eastern, 1985.

E-Learning source: https://ocw.mit.edu/courses/mathematics/18-156-differential-analysis-ii-partial-differential-equations-and-fourier-analysis-spring2016/index.htm?utm_source=OCWDept&utm_medium=CarouselSm&utm_campaign=FeaturedCourse

M850 - ADVANCED GRAPH THEORY

Objective: To understand the concept of graphs, sub graphs, trees, connectivity, Euler tour, Hamilton cycle, matching, colouring of graphs, independent set, cliques, vertex colouring and planar graphs.

Unit – I: Graphs and Sub graphs

Graphs and simple graphs – Graph isomorphism – The Incidence and Adjacency matrices – Sub graphs – Vertex degrees – Paths and connection – Cycles – The shortest path problem. (Chapter 1, Sections: 1.1 to 1.8)

Unit – II: Trees and Connectivity

Trees – Cut edges and Bonds – Cut vertices – Cayley’s formula – The connector problem – Connectivity – Blocks. (Chapter 2, Sections: 2.1 to 2.5 and Chapter 3, Sections: 3.1 to 3.2).

Unit – III: Euler Tours and Hamilton Cycles

Euler tour – Hamilton cycles – The Chinese postman problem – The traveling salesman problem. (Chapter 4, Sections: 4.1 to 4.4)

Unit – IV: Matching, Independent Sets and Cliques

Matchings – Matchings and coverings in bipartite graphs – Perfect matchings – The personal assignment problem – The optimal assignment problem – Independent sets.

(Chapter 5, Sections: 5.1 to 5.5 and Chapter 7, Section: 7.1)

Unit – V: Vertex Colouring and Planar Graphs

Chromatic number – Brook’s theorem – Chromatic polynomials – Plane and planar graphs – Dual graphs – Euler’s formula – The five colour theorem and the four colour conjecture. (Chapter 8, Sections: 8.1, 8.2, 8.4 and Chapter 9, Sections: 9.1 to 9.3, 9.6)

Book for Study

1.J.A. Bondy & U.S.R. Murty, *Graph theory with application*, Macmillan press, 2011.

Books for Reference

1.K. R. Parthasarthy, *Basic graph theory*, Tata McGraw Hill Company, New Delhi, 1994.

2.P. Harray, *Graph theory*, Narosa Publishing House, New Delhi, 1998.

3.S. Arumugam & S. Ramachandran, *Invitation to graph theory*, SciTech publishing company, 2004.

4.V. K. Balakrishnan, *Graph theory*, Tata McGraw Hill Company, New Delhi, 2004.

E – Learning source: <http://cs.bme.hu/fcs/graphtheory.pdf>

M851 - CLASSICAL DYNAMICS

Objective: To study mechanical systems under generalized coordinate, virtual work, energy and momentum, also to study the mechanics developed by Newton, Lagrange, Hamilton and Jacobi.

Unit – I: Mechanical Systems

The mechanical system – Generalized co-ordinates – Configuration space – Constraints – Virtual work – Principle of virtual work – D’Alembert’s Principle – Generalized force – Energy – Momentum.

(Chapter 1, Sections: 1.1 to 1.5)

Unit – II: Lagrange’s Equations

Derivation of Lagrange’s equations – Examples – Integrals of the motion – Ignorable co-ordinates – The Routhian function – Conservative systems – Natural systems.

(Chapter 2, Sections: 2.1 to 2.3)

Unit – III: Hamilton’s Equation

Hamilton’s principle – Derivation of Hamilton’s equations – The Legendre transformation– Modified Hamilton’s principle – Principle of least action.

(Chapter 4, Sections: 4.1 to 4.3)

Unit – IV: Hamilton Jacobi Theory

Hamilton’s principal function – Pfaffian differential forms – The Hamilton-Jacobi equation – Jacobi’s theorem – Separability.

(Chapter 5, Sections: 5.1 to 5.3)

Unit – V: Canonical Transformation

Differential forms and generating functions - Special Transformations - Lagrange and Poisson brackets.

(Chapter 6, Sections: 6.1 to 6.3)

Book for Study

1. Donald T. Greenwood, *Classical Dynamics*, Prentice Hall of India Pvt. Ltd., New Delhi, 1985.

Books for Reference

1. D. E. Rutherford, *Classical Mechanics*, Oliver Boyd, New York, 2000.

2. H. Goldstein, *Classical Mechanics*, Second edition, Narosa Publishing House, New Delhi, 1994.

3. J. L. Synge and B. A. Griffith, *Principles of Mechanics*, 3e, McGraw Hill Book Company, New York, 1959.

4. J. L. Synge and P. S. C. Joag, *Classical Mechanics*, Tata McGraw Hill, New Delhi, 1991.

5. P. G. Bergmann, *Introduction to Theory of Relativity*, Prentice Hall of India, Eddington, New Delhi, 1969.

E-Learningsource: <https://ocw.mit.edu/courses/physics/8-09-classical-mechanics-iii-fall-2014/>

M852A - MATHEMATICAL MODELS IN BIOLOGY

Objective: This Course aims to explore the potential of Mathematical Modeling among the Students and in emphasizing the role of Mathematical Models in Biology and Medicine.

Unit – I: Microbial Population Models

Importance of Microbial Kinetics – Microbial Growth in a Chemostat – Stability of Steady States for Chemostat – Growth of Microbial Populations – Product formation due to Microbial Action.

(Chapter 2, Sections: 2.1- 2.5)

Unit – II: Single-Species Non-Age Structured Population Models

Simple Logistic Models: The Logistic Equation – Physical Basis of Logistic Model – Smith's Model – Generalized Logistic Models – Difference Equation for Logistic Model – Logistic Model for a Non- isolated Population – Logistic Models with Time-Delay Effects: Derivation of the Logistic Equation with Time Delay – Biological Mechanisms Responsible for Time Lags – Solution of the Basic Equation in Two Special Cases.

(Chapter 3, Sections: 3.1, 3.2 (3.2.1 – 3.2.3))

Unit – III: Two-Species Population Models

A Simple Prey-predator Model: Basic Equations for a Simple Prey-Predator Model – The Trajectories – Stability of Equilibrium Positions – Time Averages over a Period – Numerical Illustrations – Some Other Prey-Predator Models: Secular Equation for Determining Stability – A General Prey-predator Model – Predator Not-dependent-on-prey-alone Model.

(Chapter 5, Sections: 5.1, 5.2 (5.2.1 – 5.2.3))

Unit – IV: Multi-Species Population Models

Volterra's Model for n Interacting Species: The Basic System of Equations – Existence of Constant of Motion – Stability of Equilibrium Position – Long-time Averages of Powers and Products of Species Populations – Particular Case of Two Species – Statistical Mechanical Treatment of Volterra's Equations: Liouville's Theorem – Time Averages and Ensemble Averages – Ensemble Averages of Population Sizes of Different Species.

(Chapter 6, Sections: 6.1 (6.1.1 – 6.1.5), 6.2 (6.2.1 – 6.2.3))

Unit – V: Mathematical Models in Pharmacokinetics

Basic Equations and Their Solutions: Compartments – Basic Equations for an n-Compartment System – Solution of the System for a Given Initial Injection – Solution of the system for Repeated Medication – Solution for constant rate of Infusion – Solution for Truncated Infusion – Solutions for Special Cases: Special Case of a Single Compartment – An Example of Two Compartments: Clinical Bromsulphalein Test – A Second Example of a Two-compartment System: Repeated Penicillin Application – Compartment Model for Diabetes Mellitus.

(Chapter 10, Sections: 10.1, 10.2)

Book for Study

1.J.N. Kapur, *Mathematical Models in Biology & Medicine*, East West Press, New Delhi, Reprint 2010.

Books for Reference

- 1.C. Dyson, Elvery, *Principles of Mathematical Modelling*, Academic Press, New York.
- 2.D. J. G. James and J. J. Macdonald, *Case studies in Mathematical Modelling*, Stanley Thames, Cheltenham.
- 3.J. D. Murray, *Mathematical Biology*, Springer International Edition, First Indian Reprint, 2004.
- 4.M. Cross and A. O. Moscardini, *The Art of Mathematical Modelling*, Ellis Harwood and John Wiley.
- 5.Nicholas F. Britton, *Essential Mathematical Biology*, Springer International Edition, First Indian Reprint, 2004.
- 6.Pundir - Pundir, *Bio Mathematics*, A Pragati Edition, 2006.

E-Learning sources: www.cimpa-icpam.org/ecoles-de.../ecoles.../

https://en.wikipedia.org/wiki/Modelling_biological_systemswww.math.nthu.edu.tw/~sbhsu/Biological%20Science.pdf

M852B - SKILL ENHANCEMENT COURSE II – LINEAR ALGEBRA

Objectives:

- 1.To develop broad and balanced knowledge and understanding of definitions, concepts, theorems and principles.
- 2.To enhance the ability of learners to apply the knowledge and skills acquired by them during the programme to solve specific theoretical and applied problem in Mathematics.

3.Toempower students to crack competitive examinations such as NET, SET and TRB and to complement the theoretical content of the subject with exercise problems.

Unit – I: Linear Transformations and Matrices

Linear transformations – null spaces – ranges – matrix representation of a linear transformation – composition of linear transformations – matrix multiplication – invertibility – isomorphism – change of coordinate matrix – dual spaces.

(Chapter 2; Sections 2.1 to 2.6 – examples and exercise)

Unit – II: Elementary Matrix Operations and Systems of Linear Equations

Elementary matrix operations – elementary matrices – rank of a matrix – matrix inverses – system of linear equations.

(Chapter 3; Sections 3.1 to 3.4 – examples and exercise)

Unit – III: Diagonalization

Eigen values and Eigen vectors – diagonalizability – invariant subspaces and the Cayley-Hamilton Theorem.

(Chapter 5; Sections 5.1, 5.2, 5.4 – examples and exercise)

Unit – IV: Inner Product Spaces

Inner products and norms – Gram-Schmidt orthogonalization process – orthogonal complements – adjoint of a linear operator.

(Chapter 6; Sections 6.1 to 6.3 – examples and exercise)

Unit – V: Linear Operator on Inner Product Spaces

Normal, self-adjoint operators - unitary and orthogonal operators – orthogonal projections – spectral theorem.

(Chapter 6; Sections 6.4 to 6.6 – examples and exercise)

Book for Study

1.Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, *Linear Algebra*, Fourth Edition, Prentice Hall of India, New Delhi, 2007.

Books for Reference

1.David C. Lay, *Linear Algebra and its Applications*, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.

2.S. Lang, *Introduction to Linear Algebra*, 2nd Ed., Springer, 2005.

3.Gilbert Strang, *Linear Algebra and its Applications*, Thomson, 2007.

4.I.N. Herstein, *Topics in Algebra*, John Wiley and sons, 2-e, New Delhi, 2006.

5.S. Arumugam and A.Thandapani, *Modern Algebra*, SciTech Publications Pvt. Ltd.

6.John B. Fraleigh, *A First Course in Abstract Algebra*, 7-e, Pearson Education Publication, New Delhi 2003.

- 7.Saunders MacLane and Garrett Birkhoff, *Algebra*, 2-e, Macmillan Publishing Co.inc, New York, 1979.
- 8.Santiago, *Modern Algebra*, Arul Publications, Madras, 1988.
- 9.Serge Lang, *Algebra*, Addition Wesley Publishing Company, London 1965.
- 10.Surjeeth Singh and Quazi Zameeruddin, *Modern Algebra* 2-e, Vikas Publishing House Pvt. Ltd., New Delhi, 1975.

E – Learning source: <https://www.math.ku.edu/~lerner/LAnotes/LAnotes.pdf>

M852C - Numerical Analysis

Objective: To provide the student an understanding of the basic principles of numerical methods and to apply them in solving algebraic equations and ordinary differential equations numerically; To introduce various difference operators to enable the students to apply them in interpolation and numerical differentiation and integration.

Unit – I: Transcendental and Polynomial Equations

Introduction - Bisection method - Iteration methods based on first degree equation - Iteration methods based on second degree equation – Polynomial equations - Methods for complex roots.

(Chapter 2: Sections 2.1 – 2.4, 2.8 - 2.9)

Unit – II: System of Linear Algebraic Equations and Eigenvalue Problems

Introduction - Direct methods - Iteration methods - Eigen values and Eigen vectors – Model problems.

(Chapter 3: Sections 3.1 – 3.2, 3.4 –3.6)

Unit – III: Interpolation and Approximation

Introduction - Lagrange and Newton Interpolations - Finite difference operators - Interpolating polynomials using finite differences - Hermite interpolation - Piecewise and spline interpolation.

(Chapter 4: Sections 4.1 – 4.6)

Unit – IV: Differentiation and Integration

Introduction - Numerical Differentiation - Extrapolation methods - Partial Differentiation - Numerical integration - Methods based on interpolation - Composite integration methods - Romberg Integration.

(Chapter 5: Sections 5.1, 5.2, 5.4 - 5.7, 5.9 - 5.10)

Unit – V: Ordinary Differential Equations

Introduction - Numerical methods - Single step methods, Multi step methods.

(Chapter 6: Sections 6.1 – 6.4)

Book for Study

1.M.K.Jain, S.R.K. Iyengar and R.K.Jain, *Numerical Methods for Scientific and Engineering Computation*, New Age International Publishers 2007, Fifth Edition.

Books for Reference

1.C.F. Gerald and P.O. Wheatley, *Applied Numerical Analysis*, Addison Wesley Hill Fifth Edition, 2008.

2.Samuel D Conte and Carl de Boor , *Elementary Numerical Analysis*, Tata MacGraw Hill Pvt. Ltd Stall, New Delhi Third Edition, 1980.

E–Learning source:

<https://ocw.mit.edu/courses/mathematics/18-330-introduction-to-numerical-analysis-spring-2012/download-course-materials/>

Certificate Course– Comprehensive Algebra

Objective: To empower students to crack competitive examinations such as NET, SET and TRB and to complement the theoretical content of the subjects with exercise problems.

Unit-I

Vector spaces – Extension fields.

(Chapter 19 and 20 – examples and exercise)

Unit-II

Algebraic extensions – Finite fields.

(Chapter 21 and 22 – examples and exercise)

Unit-III

Sylow theorems – Finite simple groups.

(Chapter 24 and 25 – examples and exercise)

Unit-IV

Generators – Relations.

(Chapter 26 – examples and exercise)

Unit-V

Symmetry groups – Introduction to Galois Theory.

(Chapter 27 and 32 – examples and exercise)

Book for Study

1. Joseph A. Gallian, *Contemporary Abstract Algebra*, 4th Ed., Narosa, 1999.

Books for Reference

1. M. Artin, *Abstract Algebra*, 2nd Ed., Pearson, 2011.

2. S. Arumugam and A. Thandapani, *Modern Algebra*, SciTech Publications Pvt. Ltd.

3. George E Andrews, *Number Theory*, Hindustan Publishing Corporation, 1984.

4. I. N. Herstein, *Topics in Algebra*, John Wiley and sons, 2-e, New Delhi, 2006.

5. John B. Fraleigh, *A First Course in Abstract Algebra*, 7-e, Pearson Education Publication, New Delhi 2003.

6. Saunders MacLane and Garrett Birkhoff, *Algebra*, 2-e, Macmillan Publishing Co. inc, New York, 1979.

7. Serge Lang, *Algebra*, Addition Wesley Publishing Company, London 1965.

8. Surjeeth Singh and Quazi Zameeruddin, *Modern Algebra*, 2-e, Vikas Publishing House Pvt., Ltd., New Delhi, 1975.

E –Learning source: <https://ocw.mit.edu/courses/mathematics/18-702-algebra-ii-spring-2011>

Certificate Course - R Language for Statistics

Objective: To introduce to the students the novel applications of R language and to give them a hands on experience of working with data.

Unit – I: Basic Concepts in R

Assignment of values, Character, Vector arithmetic, Understanding Data types, importing/exporting data - Computation of tables and graphical representation in R: plot, pie chart, box plot, generating graphs from imported data

Unit – II: Probability Distributions

Fitting and plotting of binomial, Poisson and Normal distributions

Unit – III: Correlation and Regression

Correlation and linear regression: Representation of bivariate data through scatter diagram, Karl Pearson's, Spearman's and Kendall's coefficients of correlation, Coefficient of determination, linear regression model, Multiple Linear Regression.

Unit – IV: Tests of Hypothesis

Student's t - test, One sample Z – test, Paired data t – test

Unit – V: Chi-square test and Design of Experiments

Chi-square test: Independence of attributes and goodness of fit – Design of Experiments: Completely randomized design (CRD), Randomized block design (RBD) and Latin square design (LSD).

Book for Study

1. Joseph Adler, *R in a Nutshell A Desktop Quick Reference*, O'reilly, 2010.

Book for Reference

1. Mark Gardener, *Beginning R the Statistical Programming Language*, John Wiley & Sons, Inc. 2012.

Course Learning Outcomes

E – Learning source: <https://www.r-project.org/>

<https://www.r-statistics.com/>

<http://www.r-tutor.com/elementary-statistics>

Self-Study Paper – Formal Languages and Automata

Objective: To obtain knowledge about finite automata, regular expressions and regular grammars, properties of context free languages

Unit – I

Phrase – Structure Languages.

(Chapter – 2)

Unit – II

Closure Operations.

(Chapter – 3)

Unit – III

Context – Free Languages.

(Chapter – 4)

Unit – IV

Finite State Automata.

(Chapter – 5)

Unit – V

Pushdown Automata.

(Chapter – 6)

Book for Study

1.Dr. Rani Siromoney, *Formal Languages and Automata*, The Christian Literature Society, Madras, 1984.

Books for Reference

1.D. Goswami and K. V. Krishna, *Formal Languages and Automata Theory*, November 5, 2010.

2.Shyamalendu Kandar, *Introduction to Automata Theory*, Formal Languages and Computation, Pearson Education India; First edition, 2013.

3.C.K. Nagpal, *Formal Languages and Automata Theory*, Oxford, 7 April 2011.

E-Learning source: <http://nptel.ac.in/courses/111103016/>

<https://www.iitg.ernet.in/dgoswami/Flat-Notes.pdf>

M953 - MATHEMATICAL ANALYSIS

Objective: To study and analyze the real number system, Fourier series, Fourier Integral, multivariable calculus, Cauchy Theorem and Residue Calculus.

Unit – I: Fourier series

Introduction - Orthogonal systems of functions – The theorem on best approximation – The Fourier series of a function relative to an orthonormal system – Properties of the Fourier coefficients – The Riesz-Fischer theorem – The convergence and representation problems for trigonometric series – The Riemann-Lebesgue lemma – The Dirichlet integrals – An integral representation for the partial sums of a Fourier series – Riemann's localization theorem – Sufficient conditions for convergence of a Fourier series at a particular point.

(Chapter 11, Sections: 11.1 - 11.12)

Unit – II: Fourier Integral

Cesaro summability of Fourier series – Consequences of Fejer's theorem – The Weierstrass approximation theorem – Other forms of Fourier series – The Fourier integral theorem – The exponential form of the Fourier integral theorem – Integral transforms – Convolutions – The convolution theorem for Fourier transforms – The Poisson summation formula.

(Chapter 11, Sections: 11.13 - 11.22)

Unit – III: Multivariable Differential Calculus

Introduction – The directional derivative – Directional derivatives and continuity – The total derivative - The total derivative expressed in terms of partial derivatives – An application to the complex valued functions – The matrix of a linear function – The Jacobian matrix – The chain rule – Matrix form of the chain rule – The Mean-Value theorem for differentiable functions – A sufficient condition for differentiability - A sufficient condition for equality of mixed partial derivatives – Taylor's formula for functions from \mathbb{R}^n to \mathbb{R}^1 .

(Chapter 12, Sections: 12.1 - 12.14)

Unit – IV: Cauchy Theorem

Analytic functions – Paths and curves in the complex plane – Contour integrals – The integral along a circular path as a function of the radius – Cauchy's integral theorem for a circle – Homotopic curves – Invariance of contour integrals under homotopy – General form of Cauchy's integral theorem – Cauchy's integral formula – The winding number of a circuit with respect to a point – The unboundedness of the set of points with winding number zero – Analytic functions defined by contour integrals – Power-series expansions for analytic functions – Cauchy's inequalities. Liouville's theorem – Isolation of the zeros of an analytic function.

(Chapter 16, Sections: 16.1 - 16.15)

Unit – V: Residue Calculus

The identity theorem for analytic functions – The maximum and minimum modulus of an analytic function – The open mapping theorem – Laurent expansions for functions analytic in an annulus – Isolated singularities – The residue of a function at an isolated singular point – The Cauchy residue theorem – Counting zeros and poles in a

region – Evaluation of real-valued integrals by means of residues – Evaluation of Gauss's sum by residue calculus
– Application of the residue theorem to the inversion formula for Laplace transforms – Conformal mappings.
(Chapter 16, Sections: 16.16 - 16.27)

Book for Study

1. Tom M. Apostol, *Mathematical Analysis*, Indian student second edition, Narosa Publishing House, Chennai, 20th reprint 2002.

Books for Reference

1. E. Fischer, *Intermediate Real Analysis*, Springer Verlag, 1983.

2. P. N. Arora and Ranjit Singh, *First course in Real Analysis*, Third edition, Sultan Chand and Sons Publishers, New Delhi, 1981.

3. Richard R. Goldberg, *Methods of Real Analysis*, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi, 1970.

4. Robert G. Bartle and Donald R. Sherbert, *Introduction to Real Analysis*, 2-e John Wiley and Sons, 2000.

5. S. Arumugam, *Modern Analysis*, New Gamma Publishers, Palayamkottai, 1993.

E-Learning source: <https://ocw.mit.edu/courses/mathematics/18-100b-analysis-i-fall-2010/>

M954 - TOPOLOGY

Objective: To develop student's topological and proof writing skills which are essential in the study of advanced mathematics, understand the concepts of topological spaces, analyze and synthesize proofs, understanding the concepts of connectedness and compactness.

Unit – I: Topological Spaces

Topological Spaces – Basis for a Topology – The Order Topology – The Product Topology on $X \times Y$ - The Subspace Topology – Closed Sets and Limit Points.

(Chapter 2, Sections: 12 - 17)

Unit – II: Continuous Functions and Metric Topology

Continuous Functions – The Product Topology – The Metric Topology.

(Chapter 2, Sections: 18 - 21)

Unit – III: Compactness

Compact Spaces – Compact Subspaces of the Real Line – Limit Point Compactness – Local Compactness.

(Chapter 3, Sections: 26 - 29)

Unit – IV: Countability and Separation Axioms

The Countability Axioms – The Separation Axioms – Normal Spaces – The Urysohn Lemma – The Urysohn Metrization Theorem – The Tietze Extension Theorem.

(Chapter 4, Sections: 30 - 35)

Unit – V: Metrization Theorems and Paracompactness

Local Finiteness – The Nagata-Smirnov Metrization Theorem – Paracompactness - The Smirnov Metrization Theorem.

(Chapter 6: Sections 39 - 42)

Book for Study

1. James R. Munkres, *Topology*, 2-e, Prentice Hall of India Private Limited, New Delhi, 2003.

Books for Reference

1. J. Dugundji, (1975), *Topology*, Prentice Hall of India, New Delhi.

2. George F. Simmons, (1963), *Introductions to Topology and Modern Analysis*, McGraw Hill.

3. J.L. Kelly, *General Topology*, Van Nostrand, Reinhold Co, New York.

4. L. Sten and J. Subash, Holt, Rinehart and Winston, *Counter Examples in Topology*.

5. S. Willard, (1970), *General Topology*, Addison Wesley Mass.

E-Learning Source: <https://ocw.mit.edu/courses/mathematics/18-901-introduction-to-topology-fall-2004/>

M955 - OPTIMIZATION TECHNIQUES

Objective: To obtain knowledge on linear programming problems, queuing models, inventory models, dynamic programming and nonlinear programming problems.

Unit – I: Advanced Topics in Linear Programming

The Revised Simplex Method – Duality Theory and its Applications – The Dual Simplex Method.

(Chapter 4, Sections: 4.1 to 4.3)

Unit – II: Queueing Models

Introduction – An Example – General Characteristics – Performance Measures – Relations among the Performance Measures – Markovian Queueing Models – The (M/M/1) Model – Limited Queue Capacity – Multiple Servers.

(Chapter 7, Sections: 7.1 to 7.9)

Unit – III: Inventory Models

Introduction – Deterministic Models – Probabilistic Models.

(Chapter 8, Sections: 8.1 to 8.11)

Unit – IV: Dynamic Programming

Basic concepts – The development of Dynamic Programming – Illustrative Examples – Continuous State Dynamic Programming.

(Chapter 10, Sections: 10.1 to 10.12 (Omit 10.6))

Unit – V: Non Linear Programming

Basic concepts – Unconstrained Optimization – Gradient projection – Constrained Optimization Problems: Equality constraints – Constrained optimization problems: Inequality Constraints.

(Chapter 11, Sections: 11.1 to 11.2 and 11.5 to 11.9)

Book for Study

1.Ravindran, Don. T. Philips, James J. Solberg, *Operations Research Principles and Practice*, 2-e, John Wiley & sons, New York, 2006.

Books for Reference

1.Frederic S. Hillier and Gerald J. Lieberman, *Operations Research*, 2-e, CBS Publishers Distributors, Delhi, 1999.

2.Hamdy A. Taha, *Operations Research*, 5-e, Prentice Hall of India, Pvt. Ltd, New Delhi, 2008.

3.Sasieni, Arthur Yaspan, Lawrence Friedman, *Operations Research Methods and Problems*, Wiley International Edition, 1959.

4.S. D. Sharma, *Operations Research*, 15-e, Kedarnath Ram Nath & Co Publishers, 2007.

E-Learning source: http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_qt.pdf

M956 - FLUID DYNAMICS

Objective: This course aims to provide basic knowledge in kinematics of fluids in motion, equations of motion of a fluid, three dimensional flows and viscous flows.

Unit – I: Kinematics of Fluids in Motion

Real fluids and Ideal fluids – Velocity of a Fluid at a Point – Streamlines and Pathlines; Steady and Unsteady flows – The Velocity Potential – The Vorticity Vector – Local and Particle Rates of Change – The Equation of Continuity – Worked Examples – Acceleration of a Fluid. (Chapter 2, Sections: 2.1 to 2.9)

Unit – II: Equations of Motion of a Fluid

Pressure at a Point in a Fluid at Rest – Pressure at a Point in a Moving Fluid – Conditions at a Boundary of Two Inviscid Immiscible Fluids – Euler's Equations of Motion – Bernoulli's Equation – Worked examples.

(Chapter 3, Sections: 3.1 to 3.6)

Unit – III: Some Three Dimensional Flows

Introduction – Sources, Sinks and Doublets – Axi-Symmetric Flows: Stokes's Stream Function. (Chapter 4, Sections: 4.1, 4.2, 4.5)

Unit – IV: Some Two Dimensional Flows

Meaning of Two-Dimensional Flow – Use of Cylindrical Polar Coordinates – The Stream Function – The Complex Potential for Two-Dimensional, Irrotational, Incompressible Flow – Complex Velocity Potentials for Standard Two-Dimensional Flows – Some Worked Examples. (Chapter 5, Sections: 5.1 to 5.6)

Unit – V: Viscous Flows

Stress Components in Real Fluid – Relations between Cartesian Components of Stress – Translation Motion of Fluid Element – The Rate of Strain Quadric and Principal Stresses – Some Further Properties of the Rate of Strain Quadric – Stress Analysis in Fluid Motion – Relations between Stress and Rate of Strain – The Coefficient of Viscosity and Laminar Flow – The Navier-Stokes Equations of Motion of a Viscous Fluid.

(Chapter 8, Sections: 8.1 to 8.9)

Book for Study

1.F. Chorlton, *Text book of Fluid Dynamics*, CBS Publishers & Distributors Pvt., Ltd., New Delhi, Reprint 2004.

Books for Reference

1.A.R.Paterson, *A First Course in Fluid Dynamics*, Cambridge University Press, New York, 1987.

2.G.K. Batchelor, *An Introduction of Fluid Mechanics*, Foundation Books, New Delhi, 1993.

3.R. K. Rathy, *An Introduction to Fluid Dynamics*, IBH Publishing Company, New Delhi, 1976.

4.R.Von Mises, O. Friedrichs, *Fluid Dynamics*, Springer International Student Edition, Narosa Publishing House, New Delhi, 1980.

E–Learning source: <http://web.mit.edu/1.63/www/lecnote.html>

M957A - NONLINEAR DYNAMICAL SYSTEMS

Objective: To learn and apply phase plane analysis and stability techniques to problems in Science and technology.

Unit – I: Plane Autonomous Systems and Linearization

The general phase plane - Some population models - Linear approximation at equilibrium points - The general solution of linear autonomous plane systems - The phase paths of linear autonomous plane systems - Scaling in the phase diagram for a linear autonomous system - Constructing a phase diagram.

(Chapter 2, Sections: 2.1 to 2.7)

Unit – II: Periodic Solutions and Averaging methods

An energy-balance method for limit cycles - Amplitude and frequency estimates: polar coordinates - An averaging method for spiral phase paths - Periodic solutions: harmonic balance - The equivalent linear equation by harmonic balance.

(Chapter 4, Sections: 4.1 to 4.5)

Unit – III: Perturbation Methods

Non-autonomous systems: forced oscillations - The direct perturbation method for the undamped Duffing's equation - Forced oscillations far from resonance - Forced oscillations near resonance with weak excitation - The amplitude equation for the undamped pendulum - The amplitude equation for a damped pendulum - Soft and hard springs - Amplitude–phase perturbation for the pendulum equation - Periodic solutions of autonomous equations (Lindstedt's method) - Forced oscillation of a self-excited equation - The perturbation method and Fourier series.

(Chapter 5, Sections: 5.1 to 5.11)

Unit – IV: Stability

Poincaré stability (stability of paths) - Paths and solution curves for general systems - Stability of time solutions: Lyapunov stability - Lyapunov stability of plane autonomous linear systems - Structure of the solutions of n-dimensional linear systems.

(Chapter 8, Sections: 8.1 to 8.5)

Unit – V: Stability (Continued)

Structure of n-dimensional inhomogeneous linear systems –Stability and boundedness for linear systems - Stability of linear systems with constant coefficients - Linear approximation at equilibrium points for first-order systems in n variables – Stability of a class of non-autonomous linear systems in n dimensions - Stability of the zero solutions of nearly linear systems.

(Chapter 8, Sections: 8.6 to 8.11)

Book for Study

1.D. W. Jordan and P. Smith, *Nonlinear Ordinary Differential Equations: An introduction for Scientists and Engineers*, Fourth Edition, Oxford University Press, 2007.

Books for Reference

1. D. A. Sanchez, Freeman, *Ordinary Differential Equations and Stability Theory*, Dover Publications, Inc. New York, 1968.

2.G. F. Simmons, *Differential Equations*, Tata McGraw Hill, New Delhi, 1979.

3.J. K. Agarwal, *Notes on Nonlinear Systems*, Van Nostrand, 1972.

4.M. D. Raisinghania, *Advanced Differential Equations*, S.Chand & Company Ltd., New Delhi, 2001.

E-Learning source: <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-243j-dynamics-of-nonlinear-systems-fall-2003/>

M957B - SKILL ENHANCEMENT COURSE III – REAL ANALYSIS

Objective: Empowering students to crack competitive examinations such as NET, SET and TRB. To complement the theoretical content of the subject with exercise problems.

Unit – I: Real number system and Infinite Series

Field Structures and Order Structure – Bounded and Unbounded sets: Supremum, Infimum – Completeness in the Set of Real Numbers – Absolute Value of a Real Number – Limit Points of a set – Closed Sets: Closure of a set – Countable and Uncountable Sets – Sequences - Limits Point of a Sequences – Limits Inferior and Superior – Convergent Sequences – Non-Convergent sequences – Cauchy General Principle of Convergence – Algebra of Sequences – Some Important Theorems – Monotonic Sequences – Positive Term series – Comparison tests for Positive term Series – Cauchy’s Root, D’Alembert’s Ratio, Raabe’s, Logarithmic, Integral and Gauss Tests – Series with Arbitrary terms – Rearrangement of Terms

(Chapters 1 to 4 – Examples and exercises)

Unit – II: Functions of a Single Variable

Limits – Continuous Functions – Functions Continuous on Closed Intervals – Uniform Continuity – Derivative – Continuous Functions – Increasing and Decreasing Functions – Darboux’s, Rolle’s, Lagrange’s Mean Value and Cauchy’s Mean Value Theorems - Higher Order Derivatives.

(Chapters 5, 6 – Examples and exercises).

Unit – III: Riemann and Improper Integrals

Definitions and Existence of the Integral – Refinement of Partitions – Darboux’s Theorem – Conditions of Integrability – Integrability of the sum and Difference of Integrable Functions – The Integral as a Limit of Sums – Some Integrable Functions – Integration and differentiation – The Fundamental Theorem of Calculus – Mean Value Theorems of Integral Calculus – Integration by Parts – Change of Variables in an Integral – Second Mean Value Theorem –Integration of Unbounded Functions with Finite Limits of Integration – Comparison Tests for Convergence at ‘a’ in $\int_a^b f(x) dx$ – Infinite Range of Integration – Integrand as a Product of Functions – Pointwise Convergence – Uniform Convergence on an Interval – Tests for Uniform Convergence – Properties of Uniformly Convergent Sequences and Series – The Weierstrass Approximation Theorem.

(Chapters 9, 11, 12 – Examples and exercises)

Unit – IV: Functions of Several Variables

Explicit and Implicit Functions – Continuity – Partial derivatives – Differentiability – Partial Derivatives of Higher Order – Differentials of Higher Order – Function of functions – Change of Variables – Taylor’s Theorem – Extreme Values: Maxima and Minima – Functions of Several Variables – Jacobians – Stationary Values under Subsidiary Conditions.

(Chapters 15, 16 – Examples and exercises)

Unit – V: Metric Spaces and Lebesgue Integral

Metric Spaces – Measurable Sets – Sets of Measure Zero – Borel Sets – Non-Measurable Sets – Measurable Functions – Measurability of the sum, difference, product and quotient Measurable functions – Lebesgue Integral – Properties of Lebesgue Integral for Bounded Measurable Functions - Lebesgue Integral for Bounded set of finite measure and unbounded Functions – The General Integral – Some Fundamental Theorems – Lebesgue Theorem on Bounded Convergence – Integrability and Measurability – Lebesgue Integral on unbounded sets or intervals – Comparison with Riemann Integral for Unbounded Sets

(Chapters 19,20 – Examples and exercises)

Book for Study

1. S.C. Malik, Savita Arora, *Mathematical Analysis*, New age International Publishers, New Delhi, 2011.

Books for Reference

1. E. Fischer, *Intermediate Real Analysis*, Springer Verlag, 1983.
2. P.N. Arora and Ranjit Singh, *First course in Real Analysis*, Third edition, Sultan Chand and Sons Publishers, New Delhi, 1981.
3. Richard R. Goldsberg, *Methods of Real Analysis*, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi, 1970.
4. Robert G. Bartle and Donald R. Sherbert, *Introduction to Real Analysis*, 2-e John Wiley and Sons, 2000.
5. S. Arumugam, *Modern Analysis*, New Gamma Publishers, Palayamkottai, 1993.

E-Learning Source: <https://ocw.mit.edu/courses/mathematics/18-100c-real-analysis-fall-2012/>

M957C - MATHEMATICAL PHYSICS

Objective: This course intends to introduce applications of various mathematical techniques to problems of Theoretical Physics. Examples could be chosen from all 4 traditional divisions of Modern Fundamental Theoretical Physics – Classical Mechanics, Electrodynamics, Quantum Mechanics and Statistical Physics.

Unit 1:

Vector calculus and applications in electromagnetic theory and fluid mechanics.

Unit 2:

Introduction to tensor calculus: review of basics, index notation, tensors in physics and geometry, Levi-Civita tensor, transformations of vectors, tensors and vector fields, covariance of laws of physics.

Unit 3:

Calculus of variations and extremal problems, Lagrange multipliers to treat constraints, Introduction to the Lagrangian and Hamiltonian formulations of classical mechanics with applications.

Unit 4:

Gamma and Beta functions, Dirac delta function, Special functions, Review of Legendre, Bessel functions and spherical harmonics (with applications to Quantum mechanics), series solutions, generating functions, orthogonality and completeness,

Unit 5:

Applied linear algebra: Dirac notation, dual vectors, projection operators, symmetric hermitian, orthogonal and unitary matrices in physics, diagonalization, orthogonality and completeness of eigenvectors, spectral decomposition and representation, simultaneous diagonalization, normal matrices, applications to coupled vibrations, Schrodinger equation in matrix form.

Books for Study

1. Arfken and Weber, *Mathematical Methods for Physics*, Elsevier, 6th Ed., 2005.
2. Riley, Hobson and Bence, *Mathematical Methods for Physics and Engineering*, Cup, 3rd Edition, 2010.

Books for References:

1. P. K. Chattopadhyay, *Mathematical Physics*, Wiley Eastern, New Delhi, 1992.
2. S. S. Rajput, *Mathematical Physics*, Pragati Pragasana, Meerut, 11th Edition, 1996.
3. Charlie Harper, *Introduction to Mathematical Physics*, California State University, Hayward.
4. B. D. Gupta, *Mathematical Physics*, Vikas Publishing House Pvt. Ltd, New Delhi, 2004.
5. L. A. Pipes and L.R. Harvill, *Applied Mathematics for Engineers and Physicists*, McGraw Hill, London, 1970.

E-learning sources: <https://nptel.ac.in/courses/115/103/115103036/#>

Certificate Programme – LaTeX for Mathematics

Objective: To train students in the preparation of projects and dissertations using LaTeX.

Unit – I: Basic Document and Bibliography

What is LATEX – Simple typesetting – Fonts Type size – Document class – page style – page numbering – Formatting lengths – parts of a document – Dividing the document – what next? – Introduction – natbib – The BIBTEX program – BIBTEX Style files – Creating a bibliographic database.

(Chapters 1 - 4)

Unit - II: Contents, Index, Glossary, Text, Row and Column

Table of contents – Index – Glossary. Borrowed words – Poetry in typing – Making lists – When order matters – Description and definitions.

(Chapters 5 - 7)

Unit – III: Typesetting Equations and Theorems

Keeping tabs – Tables – The basics – Custom commands – More on mathematics – mathematics miscellany – New operations– The many fact of mathematics – Symbols – Theory in LATEX – Designer theorem-the amsthm package – Housekeeping.

(Chapters 8 - 9)

Unit - IV: Several Kinds of boxes and Floats

LR boxes – Paragraph boxes – Paragraph boxes with specific height – Nested boxes – Role boxes – The figure environment – The table environment.

(Chapters 10 - 11)

Unit – V: Cross References in LATEX, Footnotes, Margin pars and Endnotes

Why cross reference? – Let LATEX do it – Pointing to a page-the package varioref – Pointing outside-the package xr – Lost the keys? Use lables.tex – Footnotes – Marginal notes – Endnotes. (Chapters 12 - 13)

Book for Study

1.A Primer, *Latex Tutorials*, Indian TEX users group, Trivandrum, India.www.tug.org.in

Books for Reference

1.Peter Flynn, *A beginner's introduction to typesetting with LATEX*, Silmaril Consultants, Textual Therapy Division, 2003.

2.George Gratzer, *More Math into LATEX*, 4th Edition, Springer Science, 2007.

3.Frank Mittelbach, Michel Goossens, *The LaTeX Companion*, Second Edition, Addison-Wesley, 2004.

4.Apostolos Syropoulos, Antonis Tsolomitis, Nick Sofroniou, *Digital Typography using Latex*, With 68 Illustrations, Springer-Verlag, 2003.

5.Dr Helmut Kopka, Dr Patrick Daly, *A Guide to Latex: Document preparation for beginners and advanced users*, Addison Wesley; 3rd edition (4 January 1999)

E Learning Resources: <https://www.latex-tutorial.com/tutorials/>
<https://www.tug.org/twg/mactex/tutorials/ltxprimer-1.0.pdf>
<https://www.latex-tutorial.com>
<http://www.tug.org.in/tutorials.html>
<https://miktex.org/>
<http://www.docs.is.ed.ac.uk/skills/documents/3722/3722-2014.pdf>

Certificate Course – Mathematics for Competitive Examinations – I (IDC)

Objective: To prepare the students for competitive examinations

Unit – I

Average– Problems on numbers-Problems on Ages.

(Book 1: Chapters 6, 7, 8)

Unit – II

Percentage - Profit and Loss – Partnership – Ratio and proportion.

(Book 1: Chapters 10, 11, 13)

Unit – III

Time and work–Time and distance-Problems on Trains.

(Book 1: Chapters 15, 17, 18).

Unit – IV

Analogy – Classification – Series Completion – Coding – Decoding – Blood Relations.

(Book 2, Chapter – 1, Sections 1 – 5).

Unit – V

Puzzle Test – Sequential Output Tracing – Direction Sense Test – Logical Venn Diagrams – Alphabet Test.

(Book 2, Chapter – 1, Sections 6 – 10).

Books for Study

1.R. S. Aggarwal, *Quantitative Aptitude for Competitive Examinations*, Revised Edition, S. Chand and Company Ltd., Ram Nagar, New Delhi, Reprint 2012.

2.R. S. Agarwal, *A Modern Approach To Verbal And Nonverbal Reasoning*, S. Chand, 2005.

Book for Reference:

1.V.V. K. Subbiraj, *Test of Reasoning – Verbal/Non-Verbal & General Intelligence for Competitive Examinations*, Sura Books, 2007.

E-learning source: www.tcyonline.com/tests/mathematics-competitive-exam

<http://www.indiabix.com/online-test/non-verbal-reasoning-test/>

<http://books.tamilcube.com/career/aptitude-test/non-verbal-reasoning/non-verbal-reasoning-questions-001.aspx>

<https://www.kent.ac.uk/careers/tests/spatialtest.htm>

<http://www.careerbless.com/aptitude/qa/home.php>

<http://www.careerride.com/online-aptitude-test.aspx>

M1049 - Complex Function Theory

Objective: To study the Maximum Principle, Schwarz Lemma, Evaluation of Certain Integrals, Analytic Continuation, Representation of Meromorphic and Entire Functions and Mapping Theorems.

Unit – I: Maximum Principle, Schwarz’ Lemma and Liouville’s Theorem

Maximum Modulus Principle - Hadamard’s Three Circles/Lines Theorems - Schwarz’s Lemma and its Consequences - Liouville’s Theorem - Doubly Periodic Entire Function - Fundamental Theorem of Algebra - Zeros of certain Polynomials

(Chapter 6, Sections: 6.1 to 6.7)

Unit – II: Evaluation of Certain Integrals

Integrals of type $\int_{\alpha}^{2\pi+\alpha} R(\cos \theta, \sin \theta) d\theta$ – Integrals of type $\int_{-\infty}^{\infty} f(x)dx$ – Integrals of type $\int_{-\infty}^{\infty} g(x) \cos mx dx$ - Singularities on the Real Axis – Exercises.

(Chapter 9, Sections: 9.1 to 9.4 and 9.7 (9.73 to 9.76))

Unit – III: Analytic Continuation

Direct Analytic Continuation - Monodromy Theorem - Poisson Integral Formula - Analytic Continuation via Reflection.

(Chapter 10, Sections: 10.1 to 10.4)

Unit – IV: Representations of Meromorphic and Entire Functions

Infinite Sums and Meromorphic Functions - Infinite Product of Complex Numbers – Infinite Product of Analytic functions - Factorization of Entire Functions - The Gamma Function - The Zeta Function.

(Chapter 11, Sections: 11.1 to 11.6)

Unit – V: Mapping Theorems

Open Mapping Theorem and Hurwitz’ Theorem - Basic Results on Univalent Functions - Normal Families – The Riemann mapping theorem (without proof) - Bieberbach Conjecture - The Bloch-Landau Theorems

(Chapter 12, Sections: 12.1 to 12.6)

Book for Study

1.S. Ponnusamy, *Foundations of Complex Analysis*, Second Edition, Narosa Publishing House, New Delhi, 2005.

Books for Reference

- 1.Lars. V. Ahlfors, *Complex Analysis*, Third Edition, Indian Edition, McGraw Hill, Inc. in 1979.
- 2.Theodore W. Gamelin, *Complex Analysis*, Springer- Verlag New York, Inc. in 2001.
- 3.B. Choudhary, *The Elements of Complex Analysis*, 2-e, Wiley Eastern Limited, 1992.
- 4.Boston, *Complex Variables*, Silverman- Houghton Mifflin Company, 1975.
- 5.John B. Conway, *Functions of One Complex Variable*, 2-e, Springer International student Edition, 1973.
- 6.S. Arumugam, A. Thangapandi Isaac, A. Somasundram, *Complex Analysis*, Scitech Publications Pvt. Ltd., New Delhi, 2007.
- 7.Serge Lang, *Complex Analysis*, 2-e, Springer-Verlag, New York, 1993.

E – Learning sources: <https://ocw.mit.edu/courses/mathematics/18-04-complex-variables-with-applications-fall-2003/>

M1050 - Functional Analysis

Objective: To provide students with a strong foundation in functional analysis, focusing on spaces, operators and fundamental theorems. To develop student's skills and confidence in mathematical analysis and proof techniques.

Unit – I: Banach Spaces

Definition and Some examples – Continuous linear transformations – The Hahn-Banach theorem.

(Chapter 9, Sections: 46, 47,48)

Unit – II: Banach Spaces (contd.)

The natural imbedding of N^* in N^{**} – The Open Mapping theorem – The conjugate of an operator.

(Chapter 9, Sections: 49, 50, 51)

Unit – III: Hilbert Spaces

Definition and some simple Properties –Orthogonal complements – Orthonormal sets – The conjugate space H^* .

(Chapter 10,Sections: 52, 53, 54, 55)

Unit – IV: Hilbert Spaces (contd.)

The Adjoint of an operator – Self-Adjoint operators –Normal and Unitary operators – Projections.(Chapter 10, Sections: 56, 57, 58, 59)

Unit – V: Algebras of Operators

The definition and some Examples – Regular and singular elements – Topological divisors of zero – The Spectrum – The formula for the spectral radius.

(Chapter 12, Sections: 64, 65, 66, 67, 68)

Book for Study

1. Simmons G.F., *Introduction to Topology and Modern Analysis*, McGraw – Hill International Book Company, New York, 22nd reprint 2014.

Books for Reference

1. B. Choudhary, Sudarsan Nanda, *Functional Analysis with Applications*, Wiley Eastern Limited, New Delhi, 1989.

2. B. V. Limaye, *Functional Analysis*, 2-e, New Age International Ltd, Publishers, 1996.

3. Chandrasekara Rao. K, *Functional Analysis*, Narosa Publishing House, 2006.

4. E. Kreyszig, *Introductory Functional Analysis with Applications*, John Wiley & Sons, New York, 1978.

5. Ponnusamy. S, *Foundations of Functional Analysis*, Narosa Publishing House, New Delhi, 2002.

6. Somasundaram. D, *A First Course in Functional Analysis*, Narosa Publishing House, New Delhi, 2006.

E-Learning source: <http://www.math.ucdavis.edu/~hunter/book/ch5.pdf>

M1051 - Difference Equations

Objective: To introduce the process of discretization, discrete version of Differential Equations, oscillation and the asymptotic behaviour of solutions of certain class of difference equations. Solving difference equations using z-transforms is stressed.

Unit – I: The Difference Calculus

The Difference Operator – Summation – Generating Functions and Approximate Summation. (Book 1: Chapter 2, Sections: 2.1 - 2.3)

Unit – II: Linear Difference Equations

First order Equations - General Results for Linear Equations – Solving Linear Equations – Applications – Equations with Variable Coefficients.

(Book 1: Chapter 3, Sections: 3.1 - 3.5)

Unit – III: The Z-transform Method

Definitions and Examples, Properties of the Z-transform - The Inverse Z-transform and Solutions of Difference Equations: The power series method, the partial fractions method and inversion integral method - Volterra Difference Equation of convolution type (The scalar case).

(Book 2: Chapter 6, Sections: 6.1 - 6.3)

Unit – IV: Oscillation Theory

Three-term difference Equations – Self-Adjoint Second Order Equations - Nonlinear Difference Equations.

(Book 2: Chapter 7, Sections: 7.1 - 7.3)

Unit – V: Asymptotic Behaviour of Difference Equations

Tools of Approximation - Poincare's Theorem - Asymptotically Diagonal Systems – High-Order Difference Equations - Second Order Difference Equations.

(Book 2: Chapter 8, Sections: 8.1 - 8.5)

Books for Study

1. Walter G. Kelley, Allan C. Peterson, *Difference Equations, An Introduction with Applications*, Second Edition, Academic Press, New York, 2001.

2. Saber N. Elaydi, *An Introduction to Difference Equations*, Third Edition, Springer Verlag, New York, 2005 (First Indian Reprint 2008).

Books for Reference

1. Ronald E. Mickens, *Difference Equations Theory, Applications and Advanced Topics*, Third Edition, CRC Press, New York, 2015.

2. R. P. Agarwal., *Difference Equations and Inequalities*, Marcel Dekker, 1999.

3. S. Goldberg, *Introduction to Difference Equations*, Dover Publications, 1986

4. V. Lakshmikantham and Trigiante, *Theory of Difference Equations Numerical Methods and Applications*, Second Edition, Academic Press, New York, 1988.

E – Learning source: <http://people.math.aau.dk/~matarne/11-imat/notes2011a.pdf>,

<http://pj.freefaculty.org/guides/stat/Math/DifferenceEquations/DifferenceEquations-guide.pdf>

M1052A - Stochastic Processes

Objective: To introduce to the students the basic ideas of Stochastic processes, Markov chains, Markov process and Renewal process and to motivate research in these areas.

Unit – I: Stationary Process

Specification of Stochastic processes – Stationary processes – Markov chains – Definitions and Examples – Higher Transition Probabilities – Generalization of Independent Bernoulli trials – Sequence of chain dependent trials.

(Chapter 2, Sections: 2.2 - 2.3; Chapter 3, Sections: 3.1 - 3.3)

Unit – II: Markov Chains

Stability of a Markov system – Graph theoretic approach – Markov chain with denumerable Number of states – Reducible chains – Statistical inference for Markov chains.

(Chapter 3, Sections: 3.6 - 3.10)

Unit – III: Markov Processes with Discrete State Space: Poisson process and its extensions

Poisson process – Poisson process and related distributions – Generalizations of Poisson process – Birth and death process – Markov process with discrete state space (Continuous time Markov chains).

(Chapter 4, Sections: 4.1 - 4.5)

Unit – IV: Markov Processes with Continuous State Space

Brownian motion–Wiener process – Differential equations for a Wiener process – Kolmogorov Equations – First Passage time distribution for Wiener process.

(Chapter 5, Sections: 5.1 - 5.5)

Unit – V: Renewal Processes and Theory

Renewal process – Renewal process in continuous time – Renewal equation – Stopping time: Wald's equation – Renewal theorems– Delayed and equilibrium renewal processes.

(Chapter 6, Sections: 6.1 - 6.6)

Book for Study

1.J.Medhi, *Stochastic Processes*, Second edition, New Age International Publication, New Delhi, 2002.

Books for Reference

1.Erhan Cinlar, *Introduction to Stochastic process*, Prentice Hall Inc., 1975

2.Samuel Karlin, *A first course in Stochastic process*, 2-e, Academic press 1968.

3.S. K. Srinivasan and A. Vijayakumar, *Stochastic Process*, Narosa Publishing House, New Delhi, 2003.

4.V. NarayanBhat, *Elements of Applied Stochastic Processes*, John Wiley and sons, 1972.

E–Learning source: www.expocentral.com/directory/scence/math/stochastic/process

M1052B - Skill Enhancement Course IV– Complex Analysis

Objective: Empowering students to crack competitive examinations such as NET, SET and TRB. To complement the theoretical content of the subject with exercise problems

Unit – I: Analytic Functions and Power Series

Differentiability and Cauchy–Riemann Equations –Harmonic Functions –Power Series as an Analytic Function – Exponential and Trigonometric Functions – Logarithmic Functions – Inverse Functions.

(Chapter 3, Sections: 3.1 - 3.6)

Unit – II: Complex Integration

Curves in the Complex Plane – Properties of Complex Line Integrals – Winding Number or Index of a Curve – Cauchy Integral Formula –Morera's Theorem– Taylor's Theorem – Zeros of Analytic Functions – Laurent Series.

(Chapter 4, Sections: 4.1, 4.2, 4.5, 4.7, 4.8, 4.10 - 4.12)

Unit – III: Conformal Mappings and Mobius Transformations

Principle of Conformal Mapping – Basic Properties of Mobius Maps – Fixed Points and Mobius Maps – Triples to Triples under Mobius Maps – The Cross-Ratio and its Invariance Property – Conformal Self-maps of Disks and Half-planes.

(Chapter 5, Sections: 5.1 - 5.6)

Unit – IV: Maximum Principle and Singularities

Maximum Modulus Principle – Liouville’s Theorem – Doubly Periodic Entire Functions – Fundamental Theorem of Algebra – Zeros of certain Polynomials – Isolated and Non-isolated Singularities – Removable Singularities – Poles – Further Illustrations through Laurent’s Series – Meromorphic Functions.

(Chapter 6, Sections: 6.1, 6.4 - 6.7, Chapter 7, Sections: 7.1-7.4, 7.6)

Unit – V: Calculus of Residues

Residue at a Finite Point – Residue at the Point at Infinity – Residue Theorem – Number of Zeros and Poles – Rouché’s Theorem.

(Chapter 8, Sections: 8.1 - 8.5)

Book for Study

S. Ponnusamy, *Foundations of Complex Analysis*, Second Edition, Narosa Publishing House, New Delhi, 2012.

Books for Reference

1.B. Choudhary, *The Elements of Complex Analysis*, 2-e, Wiley Eastern Limited, 1992.

2.Boston, *Complex Variables*, Silverman- Houghton Mifflin Company, 1975.

3.John B. Conway, *Functions of One Complex Variable*, 2-e, Springer International student Edition, 1973.

4.S. Arumugam, A. Thangapandi Isaac, A. Somasundram, *Complex Analysis*, Scitech Publications Pvt. Ltd., New Delhi.

E - Learning Source

<http://www.isibang.ac.in/~statmath/stinc/database /notes /CASolutions.pdf>

http://www.unibuc.ro/prof/timofte_c/docs/res/2016febComplex-Analysis-Problems.pdf

M1052C - Theory of Transforms

Objective: To impart the basic knowledge of principles of Fourier series and Z-Transforms; To give different techniques to solve integral problems using Transforms.

Unit – I:

Fourier Series - Euler Formulae - Conditions for a Fourier Expansion - Functions having points of discontinuity - Change of Interval - Even and Odd Expansion - Half Range Series – Typical waveforms - Complex Form of Fourier Series - Practical Harmonic Series.

(Chapter 10: Sections 10.1 - 10.11)

Unit – II:

Integral Transforms – Fourier Integral Theorem – Fourier Transforms – Properties of Fourier Transforms – Applications to solve integral problems.

(Chapter 22: Sections 22.1 - 22.5)

Unit – III:

Convolution – Parseval’s Identity for Fourier Transforms – Problems – Relation between Fourier and Laplace Transforms - Fourier Transforms of the derivative of a function – Application of Transforms to boundary Value Problems.

(Chapter 22: Sections 22.6 - 22.9, 22.11)

Unit – IV:

Z – Transform – Some standard Z – Transform – Linearity Property– Damping Rule – Some Standard Results – Shifting u_n to the right and left – Multiplication by n – Two basic theorems – Problems.

(Chapter 23: Sections 23.1 - 23.9)

Unit – V:

Some Useful Z – Transforms – Some Useful Inverse Z-transforms – Convolution Theorem – Convergence of Z-Transforms – Evaluation of Inverse Z-Transforms – Application of Difference Equations – Problems.

(Chapter 23: Sections 23.10 - 23.16)

Book for Study

1.Dr.B.S. Grewal and J.S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 40th Edition 2007, Fifth Reprint 2008.

Books for Reference

1.Dr. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons, Inc, 8th Edition 1999.

2.James S. Walker, *Fourier Analysis*, Oxford University Press 1988.

E–Learning source: https://onlinecourses.nptel.ac.in/noc20_ma41/preview

Certificate Course – Mathematics for Competitive Examinations – II (IDC)

Objective: Quantitative Aptitude Tests evaluate numerical ability and problem solving skills of candidates. This test forms the major part of a number of important entrance exams for different fields. CAT, MAT, XAT, and GMAT and many other significant exams have Quantitative Aptitude as a major section.

Many companies use it in their selection procedure. Topics that may be included in different exams are:

Unit – I

Simple interest, compound Interest - Problems on Calendars and Clocks.

(Book 1: Chapters 21, 22, 27, 28).

Unit – II

Permutations and combinations – Tabulation- Bar graphs-Pie Charts – Line Graphs.

(Book 1: Chapters 30, 36, 37, 38, 39).

Unit – III

Number, Ranking & Time Sequence Test – Mathematical Operations-Logical Sequence of Words – Arithmetical Reasoning – Inserting the Missing Character.

(Book 2, Section:1, Chapters 11 – 15)

Unit – IV

Data Sufficiency – Decision Making – Assertion and Reason – Verification of Truth of the Statement – Arguments – Assumptions – Courses of Actions – Conclusions – Question – Statements.

(Book 2, Section:1, Chapters 16 – 20, Section:2, Chapters 2 – 5, 8)

Unit – V

Non- Verbal Reasoning – Series - Analogy – Classification – Analytical Reasoning – Completion of Incomplete Pattern — Rule Detection – Grouping of Identical Figures.

(Book 2, Section: 3, Chapter 1 – 4, 8, 12,13)

Book for Study

1.R. S. Aggarwal, *Quantitative Aptitude for Competitive Examinations*, Revised Edition, S.Chand and Company Ltd., Ram Nagar, New Delhi, Reprint 2012.

2.R. S. Agarwal, *A Modern Approach To Verbal And Nonverbal Reasoning*, S.CHAND, 2005.

Book for Reference

1. V.V. K. Subbiraj, *Test of Reasoning – Verbal/Non-Verbal & General Intelligence for Competitive Examinations*, Sura Books, 2007.

E - Learning Source

<http://www.indiabix.com/online-test/non-verbal-reasoning-test/>

<http://books.tamilcube.com/career/aptitude-test/non-verbal-reasoning/non-verbal-reasoning-questions-001.aspx>,

<https://www.kent.ac.uk/careers/tests/spatialtest.htm>

<http://www.careerbless.com/aptitude/qa/home.php>,

<http://www.careerride.com/online-aptitude-test.aspx>

C725 - Advanced Business Statistics (For M.Com)

Objective: To apply statistical techniques for interpreting and drawing conclusion for business problems.

Unit – I: Partial and Multiple Correlation

Introduction - Partial Correlation – Multiple Correlation – Multiple Regression Analysis – Reliability of Estimates-
Miscellaneous Illustrations

(Volume – II: Chapter 9: Pages: 1109 - 1135)

Unit –II: Theory of Probability and Theoretical Distributions

Introduction – Probability Defined – Importance of the Concept of Probability – Calculation of Probability –
Theorems of Probability - Conditional Probability - Bayes' theorem – Probability Distribution – Binomial
Distribution - Poisson Distribution.

(Volume – II: Chapter 1: Pages: 751 - 770 and 774 - 788; Chapter 2: Pages: 806 - 823, 826 - 833 and 858 - 879)

Unit – III: Statistical Inference-Test of Hypothesis

Introduction – Standard Error and Sampling Distribution – Estimation – Test of Significance for Large Samples –
Test of Significance for Small Samples - Miscellaneous Illustrations.

(Volume – II: Chapter 3: Pages: 882 - 951)

Unit – IV: Chi square test and Goodness of Fit

Introduction - Chi square defined – Conditions of Additive Chi-Square Test – Yate's Corrections - Uses of Chi-
Square Test – Additive Property of Chi-Square – Chi-Square Test for Specified Value of Population Variance –
Miscellaneous Illustrations.

(Volume – II: Chapter 4: Pages: 953 - 1003)

Unit– V: F-Test and Analysis of Variance

The F Test or the Variance Ratio Test – Application F Test – Analysis of Variance – Assumptions In Analysis of
Variance – Technique of Analysis of Variance – Coding data – Analysis of Variance in Two-Way Classification
Model.

(Volume – II: Chapter 5: Pages: 1006 - 1038)

Book for Study

1.S.P. Gupta, *Statistical Methods, Volume I & Volume II*, Sultan Chand & Sons, New Delhi, 2009.

Books for Reference

- 1.S.C. Gupta and V.K. Kapoor, *Fundamentals of Mathematical Statistics*, 11-e, Sultan Chand & Sons, New Delhi, 2004.
- 2.S. P. Gupta & M. P. Gupta, *Business Statistics*, 14th enlarged edition, Sultan Chand & Sons, Educational publishers, New Delhi, reprint 2007.
- 3.Richard I Levin and David S. Rubit, *Statistics for Management*, Seventh edition, Pearson Education, New Delhi, 2002.
- 4.P.R. Vittal, *Business Mathematics and Statistics*, Margham Publications, Sixth revised edition, 2011.

MBA145T - Advanced Business Statistics for Management (For MBA)

Objective: To impart the knowledge to analyze the data using statistical techniques, such as hypothesis testing and regression estimation.

Unit – I: Introduction to Probability and Binomial Distribution

Introduction – Classical definition – Addition theorem – Multiplication theorem – Conditional probability– Binomial frequency distribution – Mean and standard deviation of binomial distribution – Mode of the binomial distribution.

(Chapters 1 and 2)

Unit – II: Large Samples and Small Samples t-test

Population – Sampling distribution – Central Limit Theorem - Test of hypothesis – Large sample tests – Confidence interval – Determination of sample size – Small sample t-test – Test for a specified mean – t-test for paired observations – Confidence interval for small samples.

(Chapters 7 and 9)

Unit – III: Small Samples – F Test and Chi-Square Test

F-test for two sample standard deviations– ANOVA: One way classification – Two way classification – Chi-square test: Uses – Chi-square test for a specified population variance – Chi-square test for independence of attributes and goodness of fit – Comparing two populations.

(Chapters 10 and 11)

Unit – IV: Correlation and Regression Analysis

Correlation: Correlation – Simple Correlation – Rank correlation – Examples.

Regression: Deviation of Regression Lines – Properties of regression coefficients. (Chapters 12 (12.1-12.48) and 13 (13.1-13.30))

Unit – V: Time Series Analysis

Components of Time series –Secular Trend – Seasonal variation – Cyclic variation – Irregular variation – Measurement of Trend – Graphic method – Semi Average method –Moving Average method – Period of moving average – Measures of Seasonal variation –Method of Averages – Moving average method – Ratio of moving average method – Ratio to Trend.

(Chapter 17).

Book for Study

1.P.R.Vittal, *Quantitative Techniques (for M. Com, M.B.A and others)*, Margham Publications, Chennai, Reprint 2013.

Books for Reference

1.S. P. Gupta & M. P. Gupta, *Business Statistics*, 14th enlarged edition, Sultan Chand and sons, educational publishers, New Delhi, reprint 2007.

2.Richard I Levin and David S. Rubit, *Statistics for management 7-e*, Pearson Education, New Delhi, 2002.

3.A.D. Aczel and J. Sounderpandian, *Complete Business Statistics*, 6-e, Tata McGraw Hill, 2004.

4.Anand Sharma, *Statistics for Management*, Himalaya Publishing house, 2-e, 2008.

5.D.R. Anderson, D.J. Sweeney and T.A. Williams, *Statistics for business and economics*, 8-e, Thomson (South-Western) Asia, Singapore, 2002.

6.T.N. Srivatsava, Shailaja Rego, *Statistics for Management*, Tata McGraw Hill, 2008.

E – Learning source: <http://www.e-booksdirectory.com/mathematical-statistics>

Mathematical Foundations (For M.Sc. Computer Science)

Objective: To impart the knowledge of the concepts needed to test the logic of program, understanding in Identifying structures, properties of languages and Optimization method.

Unit– I: Mathematical Logic

Statements and Notation– Connectives–Negations –Conjunction –Disjunction– Statements and Formula and Truth Tables – Normal forms – Predicate calculus – Inference theory for Statement calculus and predicate calculus.

(Book - 1, Chapter 1: Sections: 1.2.1 - 1.2.4; 1.2.6 - 1.2.14; 1.3.1 - 1.3.5; 1.4.1 - 1.4.3; 1.5.1 - 1.5.5; 1.6.4 - 1.6.5)

Unit– II: Modeling Computation and Languages

Finite automata – Deterministic finite state automata (DFA) – Representation of a finite automaton – Acceptability of a string by FA – Language Accepted by finite automaton – Acceptability of a string by NFA – Equivalence of FA and NFA – Phrase structure grammars – Chomsky hierarchy of languages.

(Book - 2, Chapter XII: Sections 2 to 9, 16 &17, Pages:12.1-12.20 and12.43 - 12.57)

Unit– III: Optimization Methods

Transportation model – Northwest – Least cost –Vogel approximation methods (IBFS only) –Assignment model – Hungarian method – Project scheduling by PERT and CPM.

(Book - 3, Chapter3: Sections3.1 - 3.4; Chapter 4: Sections 4.1 - 4.4 and Chapter 10: Sections 10.1 - 10.6)

Unit– IV: Statistical Method

Testing of hypothesis: Test based non-normal population – Student’s t, F distribution – Chi square test – Goodness of fit.

(Book - 4, Chapter 20: Sections: 20.1 - 20.17; Chapter 21: Sections: 21.1 - 21.14; Chapter 22: 22.1 - 22.14; Chapter 23: Sections: 23.1 - 23.35)

Unit– V: Graph Theory

Introduction to graphs – Graph terminology – Representation of graphs – Graph Isomorphism – Euler and Hamilton.

(Book - 5, Chapter 8: Sections 8.1 - 8.3and 8.5)

Books for Study

- 1.Tremblay. J.P. and Manohar, *Discrete Mathematical Structures with Application to computer science*, McGraw Hill Book Company, 1975.
- 2.M.K. Venkataraman and N. Chandarasekaran, *Discrete Mathematics*, The National Publishing Company, 2003.
- 3.Paneer Selvam. R, *Operations Research*, Prentice Hall of India, 2nd Edition, 2006.
- 4.P.R.Vittal, *Business Mathematics and Statistics*, Margham Publications, Sixth Revised Edition, 2011.
- 5.Kenneth H. Rosen, *Discrete Mathematics and its Application*, McGraw Hill book company, 1999.

Books for Reference

- 1.Hopcroft and Ullman, *Introduction to Automata theory, Languages and Computation*, Narosa Publishing House, Delhi, 2002.
- 2.A.M. Natarajan, P.Bala Subaramani, A. Tamilarasi, *Operations Research*, Pearson education, Asia, 2005.
- 3.Prem Kumar Gupta, D. S Hira, *Operation Research*, S. Chand Company Ltd, New Delhi, 3rd edition, 2003.
- 4.A. Tamilarasi, A.M. Natarajan, *Discrete Mathematics and its Application*, Khanna Publishers, 2nd edition, 2005.
- 5.Hamdy A. Taha, *Operation Research – An Introduction*, Pearson Edun., 2004.

E –Learning source: <http://www2.math.umd.edu/~jmr/241/calc.htm>

C826 - Quantitative Techniques for Business Decisions (For M.Com)

Objective: To apply OR techniques for interpreting and drawing conclusion for business problems.

Unit – I: Linear Programming Problem

Introduction – Graphical Solution Method – Some Exceptional Cases – General Linear Programming Problem – Fundamental Properties of Solution – The Computational Procedure - Simplex Method.

(Chapter 3: Sections: 3.1 - 3.4 and Chapter 4: Sections: 4.1 - 4.3)

Unit –II: Transportation Problem

Introduction - L.P Formulation of the Transportation Problem – Existence of Solution in T.P – Transportation Table – Solution of a Transportation Problem – Finding Initial Basic Feasible Solution - Test for optimality – Economic Interpretation of u_j 's and v_j 's – Degeneracy in Transportation Problem – Transportation Algorithm (Modi Method) . (Chapter 10: Sections: 10.1 - 10.3, 10.5, 10.8 - 10.13)

Unit – III: Assignment Problem

Introduction - Mathematical Formulation of the Problem - Solution Methods of Assignment Problem – Special Cases in Assignment Problems – Travelling Salesman Problem.

(Chapter 11: Sections: 11.1 - 11.4, 11.7)

Unit – IV: Inventory Control

Introduction– Types of Inventories – Reasons for Carrying Inventories – The Inventory Decisions – Objective of Scientific Inventory Control – Costs Associated with Inventories – Factors Affecting with Inventory Control – An inventory Control Problem - Deterministic Inventory problem with No shortages.

(Chapter 19: Sections: 19.1 - 19.10)

Unit – V: Network scheduling by PERT and CPM

Introduction – Network: Basic Components – Logical Sequencing - Rules of Network Construction – Concurrent Activities – Critical Path Analysis – Probability Considerations in PERT- Distinction between PERT and CPM.

(Chapter 25)

Book for Study

1.Kanti Swarup, P.K. Gupta, Man Mohan, *Operations Research*, Sultan Chand & Sons, New Delhi, 2008.

Books for Reference

1.P.K. Gupta, *Operations Research*, 8-e, Krishna Prakasam Mandir, Meerut, 1993.

2.P.K.Gupta and D.S. Hira, *Operations Research*, S. Chand & Company, New Delhi, 2000.

3.J.K.Sharma, *Operations Research Theory and Applications*, 2-e, Macmillian Business Books, 2003.

4.Hamdy A. Taha, *Operations Research*, Pearson Education, New Delhi, 2002.

E– Learning source: <http://mathworld.wolfram.com>

MCA162T - OPTIMIZATION TECHNIQUES (For MCA)

Objective: To obtain knowledge on linear programming problems, transportation problems, assignment problems, inventory models, queuing models, project management and Game theory problems.

Unit – I: Linear Programming

Introduction – Concept of Linear Programming Model – Graphical Method – Linear Programming Methods (Simplex Method and Big M Method) – Duality (Formulation of dual problem).

(Chapter 2: Sections 2.1, 2.2, 2.4, 2.5 (2.5.1, 2.5.2) and 2.7 (2.7.1))

Unit – II: Transportation and Assignment Problem

Transportation: Introduction –Mathematical Model – Types of Transportation Problem (Balanced and Unbalanced) – North West Corner Method, Least Cost Method, Vogel’s Approximation Method, UV Method.

Assignment: Introduction –Zero-One Programming Model – Types of Assignment – Hungarian Method (Balanced and Unbalanced Problem).

(Chapters 3 & 4: Sections 3.1 - 3.4 and 4.1 - 4.4)

Unit – III: Inventory Control and Queuing Theory

Inventory: Introduction –Models of Inventory (Only Problems Using Models) – **Queuing:** Introduction – Terminology – Empirical Queuing Models (Only Problems Using Models).

(Chapters 7 & 9: Sections 7.1 - 7.2 and 9.1 - 9.3 (9.3.1-9.3.3))

Unit – IV: Project Management

Introduction –Phases of Project Management – Guidelines for Network Construction – Critical Path Method – Project Evaluation and Review Technique.

(Chapter 10: Sections 10.1-10.4, 10.6)

Unit – V: Decision Theory and Game Theory

Decision Theory: Introduction –Decision under Certainty – Decision under Risk – Decision under Uncertainty.

Game Theory: Introduction –Game with Pure Strategies – Game with Mixed Strategies–Dominance property – Graphical Method for $2 \times n$ or $m \times 2$ games.

(Chapters 11 & 12: Sections 11.1 - 11.4 (11.4.1-11.4.3) and 12.1-12.5)

Book for Study

1.R. Panneer Selvam, *Operations Research*, Second edition, Prentice Hall of India, New Delhi, 2011.

Books for Reference

1.Kanti Swarup, P.K. Gupta, Manmohan, *Operations Research*, Sultan Chand & Sons, New Delhi, 2008.

2.Sasieni, Arthur Yaspan, Lawrence Friedman, *Operations Research Methods and Problems*, Wiley International Edition, 1959.

3.S.D. Sharma, *Operations Research*, 15-e, Kedarnath Ram Nath & Co Publishers, 2007.

4.Hamdy A. Taha, *Operations Research*, Prentice Hall of India, New Delhi, 2007.

E – Learning source: <http://mathworld.wolfram.com>

MBA245T - Applied Operations Research for Management (For MBA)

Objective: To impart the knowledge of quantitative methods used in linear programming problems, transportation problems, assignment problems, project management, game theory problems, replacement and maintenance.

Unit – I: Linear Programming

Introduction – Concept of Linear Programming Model – Development of LP Model – Graphical Method – Linear Programming Methods (Simplex Method) – Duality.

(Chapter 2: Sections 2.1 – 2.5.1 and 2.7.1)

Unit – II: Transportation and Assignment Problem

Transportation Problem: Introduction – Mathematical Model – Types of Transportation problem – Methods to solve Transportation problem.

Assignment Problem: Introduction – Types of Assignment problem – Hungarian Method.

(Chapter3: Sections 3.1 – 3.4, Chapter 4: Sections 4.1– 4.4)

Unit – III: Project Management

Introduction – Phases of Project Management – Guidelines for Network Construction – Critical Path Method – Project evaluation and Review Technique.

(Chapter 10: Sections 10.1 -10.4, 10.6)

Unit – IV: Decision Theory and Game Theory

Decision Theory: Decision under Certainty – Decision under Risk – Decision under Uncertainty.

Game Theory: Game with Pure Strategies – Game with Mixed Strategies – Dominance property – Graphical Method for $2 \times n$ and $m \times 2$ games.

(Chapter 11: Sections 11.1 – 11.4(11.4.1-11.4.3), Chapter 12: Sections 12.1-12.5)

Unit – V: Replacement and Maintenance Analysis

Introduction – Types of Maintenance – Types of Replacement problem – Determination of economic life of an asset – Simple probabilistic model for items which completely fail.

(Chapter 13: Sections 13.1-13.5)

Book for Study

1.R. Panneer Selvam, *Operations Research*, 2-e, Prentice Hall of India, New Delhi, 2011.

Books for Reference

1.Hamdy A. Taha, *Operations Research*, Prentice Hall of India, New Delhi, 2007.

2.P.R. Vittal, *Quantitative Techniques (for M. Com, M.B.A and others)*, Margham Publications, Chennai, Reprint 2013.

3.Kanti Swarup, P.K. Gupta, Manmohan, *Operations Research*, Sultan Chand & Sons, New Delhi, 2008.

4.Sasieni, Arthur Yaspan, Lawrence Friedman, *Operations Research Methods and Problems*, Wiley International Edition, 1959.

5.S.D. Sharma, *Operations Research*, 15-e, Kedarnath Ram Nath& Co Publishers, 2007.

E – Learning source: <http://mathworld.wolfram.com>

Mathematical Foundations (To M.Sc. Software Technology)

Objective: To impart the knowledge of the concepts needed to test the logic of program, understanding in Identifying structures, properties of languages and Optimization method.

Unit– I: Mathematical Logic

Statements and Notation– Connectives–Negations –Conjunction –Disjunction – Statements and Formula and Truth Tables – Normal forms – Predicate calculus – Inference theory for Statement calculus and predicate calculus.

(Book1, Chapter 1: Sections: 1.2.1 - 1.2.4; 1.2.6 - 1.2.14; 1.3.1 - 1.3.5; 1.4.1 - 1.4.3; 1.5.1 - 1.5.5; 1.6.4 - 1.6.5)

Unit– II: Modeling Computation and Languages

Finite automata – Deterministic finite state automata (DFA) – Representation of a finite automaton – Acceptability of a string by FA – Language Accepted by finite automaton – Acceptability of a string by NFA – Equivalence of FA and NFA – Phrase structure grammars – Chomsky hierarchy of languages.

(Book2, Chapter XII: Sections 2 - 9, 16 &17, Pages: 12.1 - 12.20 and12.43 - 12.57)

Unit– III: Optimization Methods

Transportation model – Northwest – Least cost –Vogel approximation methods (IBFS only) –Assignment model – Hungarian method – Project scheduling by PERT and CPM.

(Book3, Chapter3: Sections3.1 - 3.4; Chapter 4: Sections 4.1 - 4.4 and Chapter 10: Sections 10.1 - 10.6)

Unit– IV: Statistical Method

Testing of hypothesis: Test based non-normal population – Student’s t, F distribution – Chi square test – Goodness of fit.

(Book 4, Chapter 20: Sections: 20.1 - 20.17; Chapter 21: Sections: 21.1 - 21.14; Chapter 22: 22.1 - 22.14; Chapter 23: Sections: 23.1 - 23.35)

Unit– V: Graph Theory

Introduction to graphs – Graph terminology – Representation of graphs – Graph Isomorphism – Euler and Hamilton.

(Book5, Chapter 8: Sections 8.1 - 8.3and 8.5)

Books for Study

- 1.Tremblay J.P. and Manohar, *Discrete Mathematical Structures with Application to computer science*, McGraw Hill Book Company, 1975.
- 2.M.K. Venkataraman and N. Chandarasekaran, *Discrete Mathematics*, The National Publishing Company, 2003.
- 3.Paneer Selvam. R, *Operations Research*, Prentice Hall of India, 2nd Edition, 2006.
- 4.P.R.Vittal, *Business Mathematics and Statistics*, Margham Publications, Sixth Revised Edition, 2011.
- 5.Kenneth H. Rosen, *Discrete Mathematics and its Application*, McGraw Hill book company, 1999.

Books for References

- 1.Hopcroft and Ullman, *Introduction to Automata theory, Languages and Computation*, Narosa Publishing House, Delhi, 2002.
- 2.A.M. Natarajan, P.Bala Subaramani, A. Tamilarasi, *Operations Research*, Pearson education, Asia, 2005.
- 3.Prem Kumar Gupta, D. S Hira, *Operation Research*, S. Chand Company Ltd, New Delhi, 3rd edition, 2003.
- 4.A.Tamilarasi, A. M. Natarajan, *Discrete Mathematics and its Application*, Khanna Publishers, 2nd edition, 2005.
- 5.Hamdy A. Taha, *Operation Research – An Introduction*, Pearson Edun., 2004.

Statistical and Numerical Methods (For MCA)

Objective: This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.

Unit – I: Large Samples and Small Samples t-test

Population – Sampling distribution – Central Limit Theorem – Test of hypothesis – Large sample tests – Confidence interval – Determination of sample size – Small sample t-test – Test for a specified mean – t-test for paired observations – Confidence interval for small samples.

(Book – 1: Chapters 7 and 9)

Unit – II: Small Samples – F Test and Chi-Square Test

F-test for two sample standard deviations – ANOVA: One way classification – Two way classification – Chi-square test: Uses – Chi-square test for a specified population variance – Chi-square test for independence of attributes and goodness of fit – Comparing two populations.

(Book -1: Chapters 10 and 11)

Unit – III: Solution of Equations and Eigenvalue Problem

Newton Raphson method – Gauss elimination method – pivoting – Gauss Jordan methods – Iterative methods of Gauss Jacobi and Gauss Seidel – Matrix inversion by Gauss Jordan method.

(Book - 2: Chapters 2, 3, 4: 2.11, 3.4 (3-4), 3.5, 4.4 and 4.11)

Unit – IV: Interpolation, Numerical Differentiation and Numerical Integration

Newton's forward and backward difference interpolation – Lagrange's and Newton's divided difference interpolations – Approximation of derivatives using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

(Book - 2: Chapters 7, 8: 7.1-7.3, 7.12, 7.14, 8.2, 8.4, 8.5 (1-3))

Unit – V: Numerical Solution of Ordinary Differential Equations

Taylor's series method – Euler's method – Modified Euler's method – Fourth order Runge-Kutta method for solving first order equations – Milne's predictor corrector methods for solving first order equations – Finite difference methods for solving second order equations.

(Book - 2: Chapter 10: 10.3-10.5, 10.7-10.9, 10.17)

Books for Study

1.P.R.Vittal, *Quantitative Techniques (for M. Com, M.B.A and others)*, Margham Publications, Chennai, Reprint 2013.

2.B. S. Grewal and J. S. Grewal, *Numerical methods in Engineering and Science*, 6th Edition, Khanna Publishers, New Delhi, 2004.

Books for Reference

1.A.D. Aczel and J. Sounderpandian, *Complete Business Statistics*, 6-e, Tata McGraw Hill, 2004.

2.S. C. Chapra and R.P. Canale, *Numerical Methods for Engineers*, 5th Edition, Tata McGraw-Hill, New Delhi, 2007.

3.S. P. Gupta & M. P. Gupta, *Business Statistics*, 14th enlarged edition, Sultan Chand and sons, educational publishers, New Delhi, reprint 2007.

4.C. F. Gerald and P. O. Wheatley, *Applied Numerical Analysis*, 6th Edition, Pearson Education Asia, New Delhi, 2006.

E-learning sources: [http:// www.e-booksdirectory.com/mathematical-statistics](http://www.e-booksdirectory.com/mathematical-statistics) ,
<http://www.math.ust.hk/~machas/numerical-methods.pdf>

Quantitative Aptitude Techniques (For MCA)

Objective: To obtain aptitude skills and to solve quantitative problems.

Unit – I

Averages – Problems on numbers – Problems on ages – Percentage.

(Chapters – 6, 7, 8 and 10)

Unit – II

Profit and loss – Ratio and proportion – Time and work – Pipes and cisterns.

(Chapters – 11, 12, 15 and 16)

Unit – III

Partnership – Time and distance – Problems on trains.

(Chapters – 13, 17 and 18)

Unit – IV

Boats and streams – Simple interest – Compound interest.

(Chapters – 19, 21 and 22)

Unit – V

Calendar – Clocks – Permutations and Combinations – Probability.

(Chapters – 27, 28, 30 and 31)

Book for Study

1.R.S. Aggarwal, *Quantitative Aptitude for Competitive Examinations*, Revised Edition, S. Chand and Company Ltd., Ram Nagar, New Delhi, and Reprint 2015.

E – Learning source: www.tcyonline.com/tests/mathematics-competitive-exam

B. Sc PHYSICS

P113 - Mechanics

Objectives

- To impart knowledge on concepts of Centre of gravity, Projectiles, Circular motion, Impact and Dynamics of rigid bodies.
- To learn the method of determining the centre of gravity of objects.
- To understand the projectile motion up and down an inclined plane.
- To learn the concept of Moment of inertia and the method of determining the Moment of Inertia of compound pendulum.
- To make the students to understand the basic concepts of Hydrostatics and Hydrodynamics.

Unit – I: Centre of gravity

Centre of mass –centre of gravity – distinction between centre of mass and centre of gravity –centre of gravity of solid cone, solid hemisphere, hollow hemisphere, solid tetrahedron.

Unit – II: Projectiles and Circular Motion

Projectiles: Projectile –range of projectile up an inclined plane – range of projectile down an inclined plane.

Circular Motion:Relation between linear velocity and angular velocity–Normal acceleration–banking of curve–motion of a carriage along a banked curved track.

Unit – III: Impulse and Impact

Impulse –impulsive force –impact – laws of impact – coefficient of restitution – impact of a smooth sphere on a smooth fixed horizontal plane –direct impact of two smooth elastic spheres – loss of kinetic energy due to direct impact–oblique impact of two smooth elastic spheres – loss of kinetic energy due to oblique impact.

Unit – IV: Dynamics of Rigid bodies

Moment of inertia –radius of gyration–Theorems of moment of inertia–moment of inertia of sphere about a diameter –moment of inertia of a spherical shell about a diameter.

Kinetic energy of rotation of a body–Compound pendulum – theory of compound pendulum – equivalent simple pendulum – reversibility of centre of oscillation and centre of suspension – determination of „g“ and M.I of a compound pendulum about an axis through its centre of gravity

Unit – V: Hydrostatics and Hydrodynamics

Hydrostatics: Laws of flotation-Pressure and thrust– center of pressure – centre of pressure of a rectangular lamina with one side in the surface of the liquid.

Hydrodynamics:Equation of continuity–Euler’s equation for unidirectional flow –Bernoulli’s theorem (no proof) – Applications: Torricelli’s theorem.

Books for study

1. M.Narayanamurti and Nagarajan, Dynamics, National Publishing Company, 8th Edition, 2002.
2. R. Murugesan, Mechanics and Mathematical Physics, S. Chand and company Pvt.Ltd., 2015.
3. M.Narayanamurti, Statics, Hydrostatics and Hydrodynamics, National Publishing Company, 1994.

Books for reference

1. P.Duraipandian, LaxmiDuraipandian, MuthamizhJayapragasam, Mechanics, 6th edition, S. Chand and Company Ltd., 2005.
2. D.S.Mathur, Mechanics, 3th Edition, S. Chand and Company Ltd., 1981.
3. M. Ray and G. C. Sharma, A Text Book on Dynamics, 13th Edition, S. Chand and company, New Delhi, 2005.
4. S.G. Venkatachalapathy, Mechanics, Margham Publication, 2012.
5. C. L. Arora, Refresher course in Physics for B. Sc. Classes (Vol-I), S. Chand Publishing, New Delhi, 1981.
6. Halliday, Resnick, Walker, Fundamentals of Physics, 8th Edition, John Wiley & Sons, New Delhi, 2009.
7. T.K. Manichavachagam Pillai and Narayanan, Statics, The National Publishing Company, Madras, 1961
8. University Physics FW sears, M.W Zemansky and H.D Young 13e, 1986, Addison Wesley
9. Mechanics: Berkeley Physics course Volume 1: Charles Kittel et.al, 2007, Tata McGraw Hill.

Websites

http://www.brainkart.com/article/Centre-of-gravity_3124/ <https://www.esaral.com/statics-dynamics-notes-for-notes-for-class-11-iit-jee-neeet/> http://www.brainkart.com/article/Laws-of-flotation_39932/ http://www.brainkart.com/article/Applications-of-Bernoulli---s-Theorem_36211/ <http://www.brainkart.com/article/Equation-of->

continuity_36208/#:~:text=which%20is%20called%20the%20equation,the%20velocity%20of
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P114 - Properties of Matter

Objectives

- To impart knowledge on Elasticity, Moduli of elasticity, relation between elastic constants and the methods of determining rigidity modulus of material of objects.
- To learn, understand and determine the Young's modulus of material of objects.
- To learn about the concept of Viscosity and understand the Poiseuille's method and Searle's method of determining the viscosity of liquids.
- To comprehend the concept of Surface tension and evaluate the surface tension and interfacial surface tension of liquids by drop weight method.
- To learn and understand the concepts of osmosis and diffusion and their applications.

Unit - I: Elasticity-I

Moduli of elasticity– relation between elastic constants – Poisson's Ratio – expression for Poisson's ratio in terms of elastic constants –Elastic energy - Factors affecting elastic modulus and tensile strength- work done in stretching and work done in twisting a wire – twisting couple on a cylinder – determination of Rigidity modulus by static torsion – Torsional pendulum – Rigidity modulus determination-

Unit - II: Elasticity-II

Bending of beams – expression for bending moment – cantilever – expression for depression at the loaded end – determination of Young's modulus by cantilever depression experiment (mirror and telescope) – non-uniform and uniform bending theory and experiment to determine Young's modulus (pin and microscope).

Unit - III: Viscosity

Viscosity – Streamline and turbulent flow – rate flow of liquid in a capillary tube – Poiseuille's formula – determination of coefficient of viscosity of a liquid by variable pressure head method
— viscosity of a highly viscous liquid – Searle's viscometer -variations of viscosity of a liquid with

temperature – lubrication.

Unit - IV: Surface Tension

Synclastic and anticlastic surface – surface tension- Relation between surface tension and surface energy - surface tension and interfacial surface tension – drop weight method(Theory and experiment) – variation of surface tension with temperature – Jaeger’s method

Unit - V: Osmosis and Diffusion

Osmosis-Reverse osmosis-Laws of osmosis-osmotic pressure-Experimental determination of osmotic pressure by Berkley Hartley’s method-Osmotic and vapour pressure of a solution- biological significance of osmosis. Diffusion-Rate of diffusion –Explanation based on kinetic theory of matter-diffusion through the Cell Membrane -Pressures of Gases Dissolved in Water and Tissues

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1. R. Murugesan, Er. KiruthigaSivaprasath, Properties of Matter and Acoustics, S. Chand company, New Delhi, 2012.
2. BrijLal, N. Subramaniam, Properties of Matter, S. Chand company, New Delhi, 2012.
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2. Richard Wormell, An Elementary Course of Hydrostatics and Sound, KessingerPublishing, 2009.
3. D. Halliday, R.Resnick and J. Walker “Fundamentals of physics”, 6th Edition, Wileyplus , NY, 2013
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P212 - Heat and Thermodynamics

Objectives:

- To learn basic concepts of calorimetry, C_p and C_v of a gas, Vanderwaal's equation of state and derive expressions for critical constants in terms of Vanderwaal's constants.
- To define coefficient of thermal conductivity of a material and describe experimental methods for determining thermal conductivity of a good and a bad conductor.
- To learn about Planck's quantum theory of radiation and interpret energy distribution in the spectrum of a black body radiation.
- To study Boltzmann's Law of equipartition of energy and apply it to find the specific heat capacity of mono atomic and diatomic gases.
- To learn and understand Joule Thomson effect, explain the different methods of producing low temperature and liquefaction of Hydrogen and Helium.
- To learn laws of thermodynamics, explain the working of Otto engine, define thermodynamic potentials, derive Maxwell's relations and deduce Clausius- Clapeyron Equation.

Unit-I: Calorimetry

Specific heat capacity and thermal capacity – specific heat capacity of a liquid by cooling method (Spherical calorimeter) – specific heat capacity of a liquid by Joule's Calorimeter - specific heat capacity of gases – C_p and C_v – Meyer's relation – Joly's method to find C_v – Vanderwall's equation of state – critical constants – deduction of critical constants.

Unit-II: Transmission of Heat

Conduction

Thermal conductivity – rectilinear flow of heat – thermal conductivity of a good conductor –Forbe's method – thermal conductivity of a poor conductor – Lee's disc method

Black body Radiation

Blackbody radiation – Stefan – Boltzmann law – Planck's law-Planck's quantum theory of radiation-distribution of energy in the spectrum of a black body – Wien's displacement law and Rayleigh Jeans Law-

Unit-III: Kinetic Theory of Gases

Postulates – derivation of Maxwell’s law of distribution of velocities – mean free path – transport phenomena: viscosity, conduction and diffusion – Boltzmann’s Law of equipartition of energy and its applications to specific heat of gases; mono – atomic and diatomic gases.

Unit-IV Low temperature Physics

Joule-Thomson effect –Porous plug-theory and experiment-Liquefaction of hydrogen Liquefaction of Helium by K.Onnes method-Properties of Helium I and Helium II-Adiabatic demagnetization – superconductivity-Type I and type II-Meissner effect –Applications of superconductors

Unit-V Thermodynamics

Thermodynamic equilibrium -I, II and III law of thermodynamics-Otto engine – working and efficiency-Fundamentals of thermodynamic potentials: Enthalpy, Gibbs, Helmholtz and Internal Energy functions – Maxwell’s relations & applications:Clausius-Clapeyron Equation – TdS equations-Entropy changes in reversible & irreversible processes, Entropy –temperature diagrams.

Books for study

1. R. Murugesan, Er. KiruthigaSivaprasath, Thermal Physics, S. Chand company, NewDelhi, 2012.
2. D. S. Mathur, Heat and Thermodynamics, S. Chand, New Delhi, 2011.
3. BrijLal, N. Subrahmanyam, P. S. Hemne, Heat Thermodynamics and Statistical Physics, S. Chand Company, New Delhi, 2012.
4. Dr.D.Jayaraman and Dr.K.Ilangovan, Thermal Physics and Statistical mechanics ,Revisededition, S.ViswanathanPvt Ltd,2016

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1. Bergman, Lavine, Incropera, Dewitt, Fundamentals of Heat and Mass Transfer, 7thEdition, John Wiley & Sons, 2011.
2. Moran, Shapiro, Fundamentals of Engineering Dynamics, 6th Edition, John Wiley & Sons,2008.
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4. A. Kumar , S.P. Taneja, Thermal Physics, S. Chand Publications, 2014.
5. M. W. Zemasky, R. Dittman, Heat and Thermodynamics, McGraw Hill, 1981.
6. MeghnadSaha, B.N. Srivastava , A Treatise on Heat, Indian Press, 1969.
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en.wikipedia.org/wiki/Kinetic_theory_of_gases <http://hyperphysics.phy-astr.gsu.edu/hbase/Kinetic/kinthe.html> https://en.wikipedia.org/wiki/Liquid_hydrogen
https://en.wikipedia.org/wiki/Meissner_effect
<https://www.elprocus.com/what-is-superconductor-types-materials-properties/>
<http://www.shmoop.com/thermodynamics/kinetic-theory-gases.html>

P213 - Waves and Oscillations

Objectives

- To introduce the concepts of waves, wave motion, interference of sound waves, Beats
- To introduce the concept of interference of sound waves and beats.
- To understand SHM, Lissajous figures and the concepts related to them.
- To comprehend the concepts of damped vibrations, forced vibrations and resonance
- To acquire knowledge on the production, detection and applications of ultrasonic waves.
- To provide a better understanding of factors affecting acoustics of buildings

Unit - I: Waves and Wave Motion

Waves: Types of waves – Mechanical waves – Electromagnetic waves – Matter waves – shockwaves – types of mechanical waves: transverse and longitudinal waves.

Wave Motion: Relation between frequency, wave length and velocity – progressive waves – expression for plane progressive waves – differential equation of wave motion – particle velocity – wave velocity – relation between particle velocity and wave velocity – Analytical treatment: Energy of progressive waves.

Unit - II: Stationary waves, Interference of sound waves

Stationary waves: Principle of superposition – formation of stationary waves – analytical treatment of stationary waves – energy of a stationary wave – distinction between a progressive and a stationary waves.

Interference of sound waves:Condition for interference – Demonstration: Quincke's tube- Beats – applications.

Unit - III: Harmonic Oscillations and Lissajous' figures

Simple harmonic motion – differential equation of simple harmonic motion –total energy of a vibrating particle – simple harmonic oscillations of a mass between two strings– oscillations in LC circuit.

Lissajous' figures-composition of two simple harmonic vibrations of equal periods acting at right angles.

Unit - IV: Vibrations

Free, damped and forced vibrations –theory of forced vibrations-sharpness of resonance– application.

Laws of transverse vibration of strings – Determination of frequency of a.c. mains by Sonometer (using steel wire)–Frequency of a vibrator Melde's method: Transverse mode and longitudinal mode.

Unit - V: Acoustics of Buildings and Ultrasonics

Acoustics of Buildings: Reverberation – reverberation time – absorption coefficient – Sabine's formula– optimum reverberation time – factors affecting acoustics of buildings.

Ultrasonics: Production of ultrasonics by piezo electric oscillator – detection:piezo electricdetector – properties– Applications: Non-Destructive testing – SONAR – ultrasonic scanning.

Books for study

- 1.N. Subramanyam, Brijlal, A Text book of Sound, 2nd edition, Vikas Publishing HousePvtLtd, New Delhi, 2008.
- 2.N.K.Bajaj, The Physics of waves and Oscillations, Tata McGraw Hill, New Delhi, 2006.
- 3.M. Ghosh, A text book of Sound, 2nd Edition, S. Chand & Co., New Delhi, 1987.

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- 1.Iain G. Main, University of Liverpool, Vibrations and waves in Physics, CambridgeUniversity Press, 2012
- 2.D.P. Khandelwal, Oscillations and Waves (Himalaya Pub. House, Bombay)
- 3.S.P Puri, Fundamentals of vibrations and waves, Tata McGraw Hill, New Delhi, 1992.
- 4.P.K.Ghosh, The mathematics of waves and vibrations, Macmillan Co. of India, 1975.
- 5.Frank S Crawford Jr., Waves, Tata McGraw Hill Education Private Ltd., New Delhi,2011.
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- http://www.brainkart.com/article/Relationship-between-velocity,-frequency-and-wavelength-of-a-wave_3147/
- http://www.brainkart.com/article/Equation-of-a-plane-progressive-wave_3151/
- http://www.brainkart.com/article/Superposition-principle-of-waves_3156/
- http://www.brainkart.com/article/Standing-waves-in-strings---Sonometer_3161/ <http://www.physics-assignment.com/generationproduction-of-ultrasonic-waves>
- <http://www.ques10.com/p/10186/piezoelectric-effect/> http://www.brainkart.com/article/Interference-of-waves_3157/ http://www.brainkart.com/article/Beats---Analytical-method-and-Uses-of-beats_3159/
- [http://www.brainkart.com/article/Simple-Harmonic-Motion-\(SHM\)_36295/#:~:text=Simple%20harmonic%20motion%20is%20a,directed%20towards%20that%20fixed%20point.](http://www.brainkart.com/article/Simple-Harmonic-Motion-(SHM)_36295/#:~:text=Simple%20harmonic%20motion%20is%20a,directed%20towards%20that%20fixed%20point.) <http://www.nextgurukul.in/wiki/concept/ICSE/X/Physics/Free,-Damped-and-Forced-Vibrations.htm>
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PP207 - Physics Main Practicals – I

Objectives

- To determine the Young's modulus of materials in the form of a beam.
- To calibrate voltmeter and ammeter using potentiometer.
- To determine the viscosity and surface tension of liquids.
- To learn the usage of spectrometer and to determine the refractive index of material of a prism..
- To construct basic logic gates using discrete components and verify their truth tables.
- To construct low range power pack and stabilized power supply circuits and measure their outputs.

1. Measurements of length (or diameter) using Vernier caliper, Screw gauge and Travelling microscope
2. Young's Modulus – By Cantilever Depression (Mirror and Telescope)
3. Young's Modulus-Non Uniform Bending – Pin and Microscope
4. Rigidity Modulus by Torsional Pendulum
5. Surface Tension and Interfacial Surface Tension – Method of Drops
6. Viscosity of a Liquid– Constant Volume Method – Graduated Burette
7. Comparison of Viscosities – Constant Volume Method
8. Viscosity of a Highly Viscous Liquid – Stoke's Method
9. Sonometer – Frequency of AC mains
10. Sonometer – Determination of Frequency of Tuning fork
11. To determine the Frequency of an electrically maintained tuning fork by Melde's experiment
12. Focal length of a long focus convex lens
13. Focal length of a concave lens
14. Air wedge-Thickness of a wire
15. Spectrometer–Refractive index of the material of a Solid prism
16. Spectrometer – Refractive index of a liquid – Hollow prism
17. Potentiometer – Calibration of a low range Voltmeter
18. Verification of Ohm's law
19. Figure of merit of an aperiodic Galvanometer– Potential Divider Method

20. Post office box – Resistance and Specific resistance of a coil.
21. Construction of a low range power pack.
22. Zener Diode characteristics
23. Construction of logic gates AND & OR using diodes and NOT using transistor
24. Stabilized power supply using zener diode
25. Joule's Calorimeter-Specific heat capacity of a liquid-Half time correction

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2. M. N. Srinivasan, S. Balasubramaniam, R. Ranganathan, A Text Book of Practical Physics, 2nd Ed., S. Sultan Chand & Sons Publications, New Delhi, 2014.
3. Jerry D. Wilson, CBS college., 1986
4. D. Chattopadhyay, P.C. Rakshit, New central book agency (p) LTD., 1987
5. C. Isenberg, S.S Chomet, Viva books Private Limited., 1998
6. Narasimhan & Ramamoorthy, B.G. Paul & Co., 1961

P312 - Electricity and Magnetism

Objectives

- To introduce to the students the basic concepts of Electrostatics
- To make the students understand concepts on working and applications of capacitors and electrometers
- To explain the principle and working of Potentiometer and Carey Foster's Bridge. Also to understand the working of LCR and resonance circuits.
- To provide an overview of the fundamental principles of Coulomb's law, Biot-Savart law and magnetostatics.
- To make the students understand the various types of magnetism.

Unit I: Electrostatics

Gauss law – charge inside the closed surface – charge outside the closed surface – insulated conductor – electric field due to a uniformly charged sphere – Coulomb's law – electric field intensity – electric induction – electric potential – electric current – relation between electric field and electric potential in vector form – potential due to the charged conducting sphere – Poisson's and Laplace's equations

Unit II: Capacitors and Electrometers

Capacitance – principle of a capacitor – capacitance of spherical (inner sphere earthed and outer sphere

earthed) and cylindrical capacitors – energy of a charged capacitor – energy density – loss of energy due to sharing of charges

Electrometers – Kelvin's attracted disc electrometer – measurement of potential difference and relative permittivity of a dielectric slab – Quadrant electrometer – heterostatic and idiostatic uses

Unit-III: Current Electricity

Carey foster's bridge – theory – measurement of resistance and temperature coefficient of resistance of a coil – Potentiometer – principle – resistance of potentiometer wire – calibration of ammeter – calibration of voltmeter (low range and high range) – LCR Circuit

– series resonant circuit – parallel resonant circuit – comparison between series and parallel resonant circuits

Unit IV: Magnetostatics

Ampere's circuital law – curl of magnetic field – Biot-Savart law – magnetic induction at a point on the axis of a circular coil carrying current – Force on a current carrying conductor placed in a magnetic field – theory of moving coil ballistic galvanometer – damping correction – figure of merit of BG – absolute capacitance of a capacitor

Unit - V: Magnetism

Magnetic properties of materials: Magnetic intensity, permeability, magnetic susceptibility – relation between the three magnetic vectors B, H and M – Curie temperature – Magnetic materials: dia, para, ferro, antiferro, ferri – electron theory of magnetism – Langevin's theory of dia magnetism and para magnetism – general applications of magnetic materials

Books for study

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2. M. Narayanamurthy., N. Nagarathanam., Electricity & Magnetism, Meerut, Nationalpublishing Co, 2001.

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1. K. K. Tewari, Electricity and Magnetism, Magnetism, S Chand & co., New Delhi, 2001.
2. Brijlal and N. Subramanyan, Electricity and Magnetism, Agra., Ratan & Prakash,1995.
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4. B. D. Dugal and C. L. Chopra. Fundamentals of Electricity and Magnetism, ShobanlalNagin Chand, New Delhi, 2000.
5. Edward Purcell, Electricity and Magnetism, Cambridge University press, UnitedKingdom, 2011.

6. Dugald C. Jackson, An elementary book on Electricity, Magnetism and their Applications, The Macmillian Company, New York, 1994.

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<https://www.toppr.com/ask/content/story/amp/capacitance-in-spherical-and-cylindrical-capacitor-problem-11-76074/>

P313 - Optics

Objectives

- To impart the knowledge on angular dispersion produced by prism, aberrations in lenses and methods of minimizing them in thin lenses.
- To understand the basic phenomena of interference and determination of thickness of a thin wire and refractive index of medium by using various interference experiments
- To explain the diffraction of light and classify Fresnel's and Fraunhofer diffraction with illustration of necessary theory and experiments.
- To illustrate the polarization of light waves, their types and explain the various optical activity produced when the light passing through the crystal.
- To apply the LASER/MASER action produced in the material; analyze the principle, working mechanism and applications.

Unit – I: Geometrical Optics

Dispersion produced by a prism-angular dispersion-dispersive power-combination of prisms to produce

(i) Dispersion without deviation (ii) deviation without dispersion-direct vision spectroscope. Aberration

in lenses-spherical aberration-methods to minimize spherical aberration-chromatic aberration-achromatic combination of two lenses (i) in contact (ii) out of contact.

Unit– II: Interference

Interference: Amplitude and wave front – Young’s Double Slit experiment – phase change on reflection: Stokes’ treatment. Interference in Thin Films – condition for maxima and minima – Air wedge – thickness of thin wire – Newton’s Rings: measurement of wavelength and refractive index – Michelson’s Interferometer – Determination of wavelength – Wavelength difference.

Unit – III: Diffraction

Fresnel Diffraction: Half – period zones – Explanation of rectilinear propagation of light-theory of zone plate-Fresnel’s Diffraction pattern of a slit and a narrow wire

Fraunhofer diffraction: Single slit– double Slit-diffraction grating - normal incidence-Experiment to determine wavelength and Dispersive power of grating

Unit – IV: Polarization

Transverse nature of light waves – double refraction – optical axis – plane polarized light – production and analysis by Nicol prism – circular and elliptical polarization – optical activity – Fresnel’s explanation of optical rotation-Analysis of light by Laurent's half shade polarimeter- polaroids – applications.

Unit – V: LASER and MASER

Laser: characteristics – Einstein’s coefficients-Principle of laser-Population inversion – pumping – types – principle of Laser action – condition for Laser action – CO₂ Laser – semiconductor Laser – applications of Laser.

Maser – principle of Maser action – Ammonia gas Maser.

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<http://electrons.wikidot.com/principle-and-application-of-laser>

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P414 - Modern Physics

Objectives

- To gain knowledge about positive rays and mass spectrographs.
- To acquire knowledge about magnetic dipole moment due to orbital and spin motions of electron.
- To study and understand Zeeman effect and Paschen-Back effect.
- To gain knowledge about electronic spectroscopy.
- To review the fundamental concepts of vibrational spectroscopy.

Unit - I: Positive rays : Discovery – Properties – Positive ray analysis: Thomson's Parabola method – Detection of Isotopes -Dempster's mass spectrographs –Aston's Mass spectrograph – uses of mass spectrograph.

Unit - II: Structure of the atom : Vector atom model – spatial quantization and electron spin –Quantum numbers associated with electron – Pauli's exclusion principle – Spin-orbit coupling in atoms: LS and jj couplings – periodic classification of elements.

Unit - III: Magneto Optical Properties of Spectrum: Magnetic dipole – moment due to orbital motion of the electron – Magnetic dipole moment due to spin – Stern and Gerlach experiment – Normal and Anomalous Zeeman effect – Experiment – Larmor's theorem – Paschen – Back effect.

Unit-IV: Electronic Spectroscopy: Electromagnetic spectrum – interaction of electromagnetic radiation with matter – scattering, dispersion and transmission of radiation-Fundamental laws of absorption-Lamberts Bouguer's law, Beer's law – deviations from Beer's law – absorptivity and absorbance – absorbance and transmission spectrum – Origin of visible and UV spectra- UV-Visible spectrophotometer

Unit-V: Vibrational Spectroscopy : Vibrational spectroscopy of diatomic and simple molecules: Harmonic Oscillator – Anharmonic Oscillator –Normal modes of vibration of CO₂ and H₂O molecules – Experimental setup of IR spectrometer.

Raman Effect - Classical theory of Raman Scattering - Quantum theory of Raman Scattering (no derivation) – experimental setup of Raman spectrometer – comparison of IR and Raman spectroscopy

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1. R. Murugesan, Modern Physics, S. Chand and Company Ltd., New Delhi, 2009.
2. N. Subrahmanyam and Brijlal, Atomic Physics, S. Chand and Company Ltd., New Delhi, 2010.
3. C. N. Banwell, E. M. McCash, Fundamentals of Molecular Spectroscopy, 5th Edition, Tata McGraw-Hill Publications, New Delhi, 2002.

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1. S. N. Ghoshal, Atomic and Nuclear Physics, Volume–I, S. Chand and Company Ltd., New Delhi, 1996.
2. Arthur Beiser, Concepts of Physics, Tata McGraw – Hill – New Delhi, 2003.
3. Sehgal Chopra Sehgal – Modern Physics, Sultan Chand Sons, New Delhi, 2004.
4. G. Aruldas, Molecular Structure and Spectroscopy, 2nd Edition, Prentice – Hall of India Pvt. Ltd. New Delhi, 2007.
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- http://www.readorrefer.in/article/Photoelectric-effect---Dual-Nature-of-Radiation_2942
- <http://www.physics-assignment.com/vector-atom-model>
- http://www.chembio.uoguelph.ca/educmat/chm364_preuss/1_10%20Vector%20model.pdf
- www.quora.com/What-is-an-expression-for-the-magnetic-dipole-moment-of-a-revolving-electron
- <http://www.physics.nus.edu.sg/~L3000/Level3manuals/stern-Gerlach.pdf> <http://www.physics-assignment.com/zeeman-effect>
- <http://hyperphysics.phy-astr.gsu.edu/hbase/quantum/paschen.html>
- http://www.readorrefer.in/article/Bragg---s-law-for-X-ray-diffraction_2933
- http://www.readorrefer.in/article/X-ray-spectra---continuous-and-characteristic-X-ray-spectra_2935
- http://www.readorrefer.in/article/Bragg-s-X-ray-spectrometer_2934
- http://www.readorrefer.in/article/Moseley-s-law-and-Applications-of-Moseley-s-law_2936
- <http://nptel.ac.in/courses/122101002/downloads/lec-25.pdf>

P415 - Electromagnetism

- To impart knowledge on concepts of Electromagnetic induction
- To make students understand the concept of self-inductance
- To understand the working principle of Ballistic galvanometer and its applications
- To learn the principle and working of earth inductor and A.C generator
- To apply Maxwell's equations to discuss the propagation of electromagnetic waves in free space.

UNIT-I: Electromagnetic Induction:

Faraday's laws of electromagnetic Induction-Deduction of Faraday's law from Lorentz's force-Rotational Electromotive force-Moving conducting rod in a constant magnetic field-Conducting rod sliding along a stationary U-shaped conductor placed on a uniform magnetic field- Rectangular loop of wire moving through a non uniform magnetic field

UNIT-II Self Inductance

Self Inductance: Inductors and inductance-Physical significance of self-inductance-self inductance of solenoid, two parallel wires,two coaxial cylinders-Self inductance by Anderson Bridge.

UNIT-III Mutual Inductance

Mutual Inductance: Mutual Inductance between two arbitrary circuits-Newman's formula- reciprocity theorem-Proof-Theory of B.G-Damping correction-Measurement of mutual inductance by B.G

UNIT-IV Electromagnetic Devices:

Earth inductor: horizontal and vertical components of earth's magnetic field-Search coil: measurement of strong magnetic field-Eddy currents-Applications-Induction coil-Automatic make and Break arrangement-A.C.Generator

UNIT-V Electromagnetic waves

Maxwell's Displacement current-Significance of displacement current-Maxwell's equations in integral and differential forms-Significance-Maxwell's equations in free space-Electromagnetic waves in free space-Electromagnetic waves in isotropic non-conducting media (Dielectrics).

Books for study

1. K.K.Tewari, Electricity and magnetism, S.Chand and Company Ltd, New Delhi,2018
2. D.C.Tayal, Electricity and Magnetism, Himalaya Publishing House, New Delhi,2012

Books for Reference

1. Brijlal and N. Subrahmanyam, Electricity and Magnetism, RatanPrakashanMandirEducational &

University Publishers, Agra, 1999.

2. R.Murugesan, Electricity and Magnetism, S.Chand and Company Ltd, New Delhi,1999.

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<http://vlabs.iitkgp.ernet.in/asnm/exp23/index.html>

<https://www.britannica.com/technology/induction-coil>

http://odessa.phy.sdsmt.edu/~lcorwin/PHYS721EM1_2014Fall/ChiranjibiFinal.pdf

<https://physicsabout.com/maxwells-equations/>

<http://hyperphysics.phy-astr.gsu.edu/hbase/electric/maxeq.html>

PP413 - Physics Main Practicals – II

Objectives

- To determine the Young's modulus of materials in the form of a beam by subjecting them to Uniform and Nonuniform bending.
 - To calibrate voltmeter and ammeter using potentiometer.
 - To determine the viscosity and surfacetension of liquids.
 - To learn the usage of spectrometer and to determine the wavelength of spectral lines.
 - To verify the logic functions of basic logic gates and design arithmetic circuits using discrete components and ICs.
 - To construct analog dual power supply and voltage stabilization circuits and measure their outputs.
1. Young's Modulus – Non-Uniform Bending (Scale and Telescope)
 2. Young's Modulus – Uniform Bending (Pin and Microscope)
 3. Rigidity Modulus by Static Torsion method
 4. Surface Tension of a liquid – Capillary rise method
 5. Viscosity of a liquid – Graduated burette – Constant Time method
 6. Viscosity of Highly viscous liquid – Searle's viscometer
 7. Specific Heat Capacity of a liquid by cooling
 8. Thermal conductivity of bad conductor – Lee's disc method
 9. Resolving Power of a Prism

10. Newton's rings – Determination of R and μ
11. Air wedge – Thickness of insulation
12. Spectrometer – Grating – Minimum deviation method
13. Dispersive power of Grating – Normal incidence method
14. Refractive index of the material of a prism – i-d curve
15. Potentiometer – Resistance and Specific resistance of a wire
16. Potentiometer – Calibration of High range voltmeter
17. Potentiometer – Calibration of High range Ammeter
18. Carey Foster's Bridge – Resistance and Specific Resistance
19. Figure of merit for charge – BG
20. High Resistance by Leakage – BG
21. Comparison of Capacities
 - i) Using BG
 - ii) Using De-Sauty's Bridge
22. Voltage Stabilization using IC
23. Dual Power Supply using Zener diodes
24. Bridge rectifier using diodes
25. Logic Gates OR and AND using Transistors
26. Verification of truth tables of logic gates (AND, OR, NOT, NAND, NOR, EXOR) using ICs.
27. Verification of De Morgan's theorems
28. NAND as universal gate
29. Half adder and Full adder
30. To study the a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor

Books for reference

1. C.C. Ouseph, U. J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan Pvt. Ltd., Chennai, 2012.
2. M. N. Srinivasan, S. Balasubramanian, and R. Ranganathan, A Text Book of Practical physics, 2nd revised edition, S. Sultan Chand & Sons publications, 2014.
3. D. Chattopadhyay, P.C. Rakshit, New central book agency (p) LTD., 1987
4. S. Panigrahi & B. Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd. 2015
5. R.P. Jain, Modern Digital Electronics, 4th Edition, Tata McGraw Hill publishing company limited, New Delhi, 2003.

6. Anchal Srinivasa & R.K. Shukla, Practical Physics, New age International Publishers, Bengaluru, 2nd edition, 2018.

AP105A - Allied Physics for Mathematics-I

Objectives

- To develop an understanding of basic concepts of mechanics, elasticity, viscosity, surface tension, heat and optics.
- To study the elastic behavior of the solids and viscosity of the liquids
- To comprehend and learn the concepts of heat and heat transmission
- To understand the concepts of interference and polarization of light waves and their applications.

Unit – I: Mechanics

Centre of mass – centroid – centre of gravity – centre of gravity of a solid cone – centre of gravity of a hollow hemisphere – impulse – impulsive forces – conservation of linear momentum – collision – elastic and inelastic collision – impact – laws of impact – co-efficient of restitution – impact of a sphere on a smooth fixed plane – velocity and loss of kinetic energy of sphere after impact – direct impact between two smooth spheres – velocities of spheres after direct impact – loss of kinetic energy due to direct impact.

Unit–II: Elasticity

Moduli of elasticity – beam – bending of beams – expression for bending moment – cantilever – depression at the loaded end of a cantilever – determination of Young's modulus by cantilever depression method (scale and telescope) – non uniform bending theory and experiment (pin and microscope) – torsional couple per unit twist – work done in twisting a wire – torsional pendulum – theory – rigidity modulus by torsional oscillations (without symmetrical masses).

Unit – III: Viscosity and Surface Tension

Viscosity: coefficient of viscosity and its dimensions – rate of flow of liquid in a capillary tube (Poiseuille's formula) – determination of co-efficient of viscosity of a low viscous liquid by variable pressure head – variation of viscosity of a liquid with temperature.

Surface Tension: surface tension and its dimensions – synclastic and anticlastic surface – molecular theory – surface energy – excess pressure – application to spherical and cylindrical drops and bubbles – surface tension and interfacial surface tension – drop weight method.

Unit – IV: Heat

Heat – temperature – specific heat capacity and thermal capacity – specific heat capacity of a liquid by Joule's calorimeter – specific heat capacity of gases – C_p and C_v – Meyer's relation – Joly's method to find

C_v – thermal conductivity – thermal conductivity of a poor conductor – Lee’s disc method – Low temperature Physics: Joule – Kelvin effect – simple theory of Porous

– Plug experiment – adiabatic demagnetization- refrigerating mechanism (ammonia gas plant)- superconductivity.

Unit – V: Optics

Aberration – spherical aberration in lenses – methods of minimizing Spherical aberration – chromatic aberration – achromatic combinations of two thin lenses in contact and at finite distance – dispersion of light – refraction through a prism of small angle –deviation – determination of refractive index of solid prism – interference – conditions for interference maxima and minima – air wedge – thickness of a thin wire –polarization – types of polarization

–applications –polarizer and analyzer – double refraction–production and analysis by Nicolprism.

Books for study

- 1.R. Murugesan, Allied Physics paper I & II, S. Chand &Co. Ltd. New Delhi, 2010.
- 2.R. Murugesan, Mechanics and Mathematical Physics, S. Chand & Company Ltd, New Delhi,2008.
- 3.R. Murugesan, Properties of matter, New Delhi, S. Chand & company Ltd, 2009.
- 4.BrijLal, N. Subrahmanyam, P. S. Hemne, Heat and Thermodynamics, S. Chand Company,New Delhi, 2012.
- 5.R. Murugesan, Er. Kiruthiga Sivaprasath, Thermal Physics, S. Chand company, New Delhi,2012.
- 6.R. Murugesan, Optics and spectroscopy, New Delhi, S. Chand & company Ltd., 2010.

Books for reference

1. P. Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasam, Mechanics, S. Chand &company Pvt. Ltd, New Delhi, 2015.
2. B. H. Flowers, E. Mendoza, Properties of matter, Wiley Plus, 1991.
3. A. Kumar , S.P. Taneja, Thermal Physics, S. Chand Publications, 2014.
4. Murugesan. R, Modern Physics, New Delhi, S. Chand & company Ltd, 2001.
5. Subrahmanyam. N and Brijlal, Optics, S. Chand& company Ltd, 2009.
6. S. L. Kakani, K. C. Bhandari, Optics ,S. Chand& Sons, New Delhi, 1987.
7. Ajoy Ghatak, Optics 5th Edition, Tata-McGraw Hill Education, 2012

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<https://byjus.com/physics/centre-of-gravity/> <https://www.khanacademy.org/science/physics/linear-momentum/center-of-mass/a/what-is-center-of-mass>

<https://www.slideshare.net/KThirumurugan/dynamics-projectile-impulse-impact>

<https://civilengineer.webinfolist.com/mech/bm.htm> <https://www.cmi.ac.in/~ravitej/lab/5-cantilever>

<http://www.vpscience.org/materials/US01CPHY01%20Unit2%20Elasticity%20PMP.pdf>

<https://www.cscscientific.com/viscosity>

<https://www.usgs.gov/special-topic/water-science-school/science/surface-tension-and-water>

<https://byjus.com/physics/surface-tension/>

<https://byjus.com/physics/heat-transfer-conduction-convection-and-radiation/>

<http://hyperphysics.phy-astr.gsu.edu/hbase/thermo/heatra.html>

http://www.iiserpune.ac.in/~bhasbapat/phy221_files/Lee's%20Method.pdf

<https://www.britannica.com/technology/aberration>

<https://www.microscopyu.com/techniques/polarized-light/principles-of-interference>

<https://www.slideshare.net/qahtaniliya/air-wedge-interference>

<https://www.britannica.com/science/polarization-physics>

AP205 - Allied Physics for Mathematics–II

Objectives

- To understand the working principle of Lasers and their applications
- To study the different types of optical fibers and its applications
- To understand the properties of ultrasonics and its applications
- To study the critical potential and quantum numbers associated with the vector atom model.
- To study the process of artificial transmutation, radio isotopes and their applications, working of accelerators.
- To study the fundamentals of electrical and electronic devices and circuits.

Unit – I: Laser and Fiber optics

Laser: Characteristics of laser – conditions to achieve laser action – population inversion – pumping process – types of laser – Nd:YAG Laser – CO₂ Laser – applications of lasers.

Fiber optics: Construction of fiber – total internal reflection – acceptance angle and numerical aperture – applications – optical fibers in a simple communication system – fiber optic displacement sensor

Unit – II: Sound

Simple harmonic motion (SHM) – composition of two simple harmonic vibrations of equal time periods (1:1) acting at right angles to each other – Lissajou's figures – applications of Lissajou's figures – laws of transverse vibrations - determination of frequency of AC by Sonometer (steel wire) - ultrasonics –

properties – production of ultrasonic waves by Piezo-electric oscillator method – detection of ultrasonics by Piezo-electric method – applications of ultrasonics: Industrial applications – SONAR – non-destructive testing (NDT): pulse echo technique.

Unit – III: Atomic Physics and Nuclear Physics

Atomic Physics: Vector atom model – Spatial quantization – Spinning electron – Quantum numbers associated with the vector atom model – Excitation potential – Ionization Potential – Determination of critical potentials – Frank and Hertz method–Photoelectric effect – Laws of photo electric emission – Einstein’s photoelectric equation–photo cell.

Nuclear Physics: Radioactivity – Artificial Transmutation – Rutherford’s experiment – Radio isotopes – Applications – Radiation damage and effects – Radiation dose, dosimetry – short term and long term biological effects of radiation – Radiation safety.

Unit – IV: Electricity

Current – voltage –resistance – Ohms law –Resistors– types of resistors – color coding scheme – series and parallel connections of resistors –voltage division in series circuits – current division in parallel circuits – capacitor – types of capacitors – series and parallel connections of capacitors –Growth and decay of current in a circuit containing resistance and inductance– Potentiometer – principle – Calibration of low range voltmeter –Calibration of High range Ammeter.

Unit V: Electronics

Analog Electronics: Zener diode – zener diode characteristics – low range stabilized powersupply – Integrated circuits – Advantages and disadvantages

Digital Electronics: Binary concept – logic gates : OR, AND, NOT, NOR, NAND and Ex-ORgates – construction of two inputs AND, OR gates using diodes and NOT gate using Transistor – De Morgan’s theorems – NAND as Universal gate – Arithmetic circuits: Half adder – Fulladder– Half subtractor– Full subtractor.

Books for study

1. R. Murugesan, Allied Physics paper I & II, S. Chand &Co. Ltd. New Delhi, 2010.
2. M.R. Shenoy, Sunil K. Khijwania, Ajoy Ghatak, Bishnu P. Pal, Introduction to fiberoptics, Viva Books, 3rd edition, 2015
3. R. Murugesan, Modern Physics, S. Chand &Co. Ltd. New Delhi, 3rd Edition, 2017.
4. Brijlal and N. Subramanyam, A Text Book of Sound, Vikas Publishing. Pvt. 2008.
5. Murugesan. R, Electricity and Magnetism, S.Chand and Co New Delhi, 2003.
6. V. K. Metha, Principles of Electronics, S.Chand and Co New Delhi, 11th Edition, 2008.

7. V. Vijayendran, Introduction to Integrated Electronics: Digital and Analog, Viswanathan, S., Printers & Publishers Pvt Ltd, 2009.

Books for reference

1. C. K. Sarkar, D. C. Sarkar, Optoelectronics and Fiber optic communication, New Age International Publishers, New Delhi, 2001.
2. S. N. Ghoshal, Atomic and Nuclear Physics, S. Chand & Company, New Delhi, Ltd.,
3. K. K. Tewari., Electricity and Magnetism, Magnetism, S. Chand & co., New Delhi, 2001.
4. R. L. Saihgal, A Text Book of Sound, S. Chand & Co. Pvt. Ltd, New Delhi, 1979.
5. M. Narayanamurti, N. Nagaratnam, Electricity and Magnetism, The National Publishing company, 1990.

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<http://hyperphysics.phy-astr.gsu.edu/hbase/phyopt/totint.html>

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<http://www.electrical4u.com/quantum-numbers/> http://www.readorrefer.in/article/Laws-of-photoelectric-emission_2946/ <http://physics.tutorcircle.com/modern-physics/betatron.html>

<https://www.electronics-tutorials.ws/blog/passive-devices.html>

<https://byjus.com/physics/zener-diode/> <https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/>

<https://circuitfever.com/logic-gates-using-diodes-and-transistor/>

<https://www.geeksforgeeks.org/adders-and-subtractors-in-digital-logic/>

<https://technobyte.org/half-adder-full-adder-half-subtractor-full-subtractor/>

PAP205A - Allied Physics Practicals for Mathematics

Objectives

- To relate theoretical concepts to real world applications and experiments.
- To familiarize the students with elastic, optics, sound laboratory experiments and procedures.
- To observe reliable data and record the observations.

- To organize the measurements, estimate errors and write the laboratory record.
- To develop an understanding of basic concepts of electrical and electronic experiments

List of experiments

1. Young's Modulus– Cantilever depression (Mirror & Telescope).
2. Young's Modulus-Non Uniform Bending(Pin and Microscope)
3. Rigidity Modulus by torsional oscillations (without symmetrical mass).
4. Co-efficient of viscosity of a liquid– graduated burette– Constant volumemethod.
5. Surface tension – Drop weight Method
6. Interfacial surface tension - Drop weight Method
7. Frequency of AC –Sonometer.
8. Air wedge–Determination of thickness of wire.
9. Verification of ohm's law.
10. Potentiometer– Calibration of low range voltmeter.
11. Logic gates using IC's (AND, OR, NOT) and Verification of De Morgan's theorems.
12. Zener diode Characteristics
13. Low range stabilized power supply using Zener diode
14. Construction of AND, OR logic gates using diodes and NOT gate using transistor.
15. NAND as Universal gate.
16. Half adder and half subtractor.

Books for reference

1. C.C. Ouseph, U. J. Rao, V. Vijayendran, Practical Physics and Electronics, S.Viswanathan Pvt. Ltd., Chennai, 2012.
2. M. N. Srinivasan, S. Balasubramanian, and R. Ranganathan, A Text Book of Practical physics, 2nd revised edition, S. Sultan Chand & Sons publications, 2014.
3. D. Chattopadhyay, P.C. Rakshit , New central book agency (p) LTD., 1987
4. S.Panigrahi&B.Mallick,Engineering Practical Physics, Cengage Learning IndiaPvt.Ltd. 2015
5. R.P. Jain, Modern Digital Electronics, 4th Edition, Tata McGraw Hill publishingcompany

limited, New Delhi, 2003.

6. Anchal Srinivasa & R.K. Shukla,
Publishers, Bengaluru, 2nd edition, 2018.

Practical Physics, New age International

AP309A - Allied Physics for Chemistry –I

Objectives

- To study the basics of elasticity and its importance in beams.
- To study the concepts of viscosity and the various methods to determine the parameters experimentally.
- To understand the concepts behind thermodynamics and thermodynamic laws.
- To study the propagation of sound waves, the production of ultrasonic waves, Acoustics and their applications.
- To distinguish the geometrical and physical optics.
- To understand the concept of basic electronics and digital electronics.

Unit – I: Properties of matter

Elasticity: Stress – strain – Hooke's Law – Elastic moduli – beam – bending of beams – expression for bending moment – Young's modulus by non-uniform bending (Optic lever & telescope) theory and experiment – torsional couple per unit twist – work done in twisting a wire – torsional pendulum – theory – rigidity modulus by torsional oscillations experiment (without symmetrical masses).

Viscosity: Coefficient of viscosity – rate of flow of liquid in a capillary tube (Poiseuille's formula) – Poiseuille's method for determining coefficient of viscosity of a liquid (Variable pressure head).

Unit – II: Thermodynamics

Zeroth and first law of thermodynamics – reversible and irreversible processes – isothermal process – adiabatic process – work done during adiabatic and isothermal process - second law of thermodynamics – Carnot's engine – efficiency of Carnot's engine – Entropy – change of entropy when ice converted into steam - third law of thermodynamics – Maxwell thermodynamical relations ; derivation and application in Clausius - Clapeyron equation and specific heat relation.

Unit – III: Sound and Acoustics

Wave Motion: longitudinal waves and transverse waves – velocity of transverse vibrations in a stretched string – laws of transverse vibrations – experiment to determine the AC frequency using sonometer.

Ultrasonics: Definition – production of ultrasonic waves by Piezo-electric method – applications – non-destructive testing (Echo pulse method).

Acoustics: Intensity of sound–Decibel and Bel–Loudness of sound–Reverberation–Sabine’s reverberation formula–Acoustic intensity–Factors affecting the acoustics of Buildings.

Unit – IV: Optics

Geometrical Optics: Chromatic and spherical aberration in lenses – condition for achromatism of two thin lenses placed in contact and separated by a finite distance – Methods of reducing spherical aberration – deviation and dispersion of light – determination of refractive index of the given solid prism.

Physical Optics: Interference – condition for interference – air wedge – determination of thickness of a thin wire by air wedge – Newton’s rings (determine the radius of curvature).

Unit – V: Electronics

Analog electronics: PN junction diode – rectifiers – half wave – full wave and bridge rectifiers – zener diode – characteristics of zener diode— zener diode as voltage regulator—junction transistor – types of transistors – working of NPN transistor (common base) – integrated circuits – advantages and disadvantages.

Digital electronics: AND, OR, NOT, NOR, NAND, EX-OR gate – construction of AND, OR gates using diodes (Two input) and NOT gate using transistor – NAND as a Universal gate – half and full adders.

Books for study

1. R. Murugesan, Properties of matter, revised edition, S. Chand & Co. Pvt. Ltd, New Delhi, 2019.
2. N. Subrahmanyam, Brij Lal, Waves and oscillations, 2nd revised edition, Vikas publishing, 2019
3. R. Murugesan, Optics, 25th revised edition, S. Chand & Co. Pvt. Ltd, New Delhi, 2012.
4. V. K. Metha, Principle of Electronics, S.Chand& Co. Pvt. Ltd, New Delhi, 2003.
5. Anil K. Maini, Digital Electronics: Principles, Devices and Applications, 1 st edition, John Wiley & Sons Ltd, 2007.
6. R. Murugesan, Er. KiruthigaSivaprasath, Thermal Physics, revised edition, S. Chand& Co, 2018.

Books for reference

1. N. Subrahmanyam, and Brij Lal, Properties of matter, S. Chand & Co. Pvt.Ltd, New Delhi, 2005.
2. N. Subrahmanyam, and Brij Lal, A text book of sound, Vikas Publishing House, New Delhi, 1985.
3. Murugesan and KiruthigaSivaprasath., A Text Book of Optics, 9th revised edition, S.Chand & Co. Pvt. Ltd, New Delhi, 2014.
4. R. Murugesan, KiruthigaSivaprasath, Modern Physics, 7th revised edition, S. Chand&Co., 2014
5. Devaraj Singh, Giridhar Mishra, Raja Ram Yadav, Thermal Physics, Kinetic Theory and

thermodynamics, Narosa publications, 2016

6. Frank. L. Pedrotti, S. J Leno M. Pedorotti, Leno S. Pedorotti, Introduction to optics, 3rd edition, 2012

7. N. Subrahmanyam, and Brij Lal, Optics, 25th revised edition, S. Chand & Co. Pvt. Ltd, New Delhi, 2012.

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<https://people.bath.ac.uk/ensmjc/Notes/acoustics.pdf> <https://www.win.tue.nl/~sjoerdr/papers/boek.pdf>

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Digital_Electronics

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<http://www.phys.ens.fr/~ebrunet/Thermo-en.pdf>

<https://ocw.mit.edu/courses/chemistry/5-60-thermodynamics-kinetics-spring-2008/lecture-notes/>

http://www.crectirupati.com/sites/default/files/lecture_notes/TD-lecture%20notes.pdf

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AP409A - Allied Physics for Chemistry –II

Objectives

- To study the basic ideas of electricity and magnetism
- To study vector atom model and to determine the methods of critical potential
- To study the structure of the alkali spectral lines
- To study the basics of nuclear reactions, process of radioactivity and its applications
- To understand the concepts of wave mechanics and dualistic nature of light
- To study the different methods of preparing thin films, nanomaterials and their applications

Unit – I: Electricity and Magnetism

Electricity: D.C circuits: growth and decay of current in L.R circuit – growth and decay of charge in C.R circuit – time constant – potentiometer – principle – calibration of high range ammeter – calibration of low range voltmeter.

Magnetism: Intensity of magnetization – susceptibility – types – Properties of para, dia and ferromagnetic materials – Langevin's theory of diamagnetism.

Unit – II: Atomic Physics

Structure of the atom: Concepts of Sommerfeld's and Vector atom model – spatial quantization – spinning electron – quantum numbers associated with the vector atom model - Doublet structure of the alkali spectral lines – Fine structure of the hydrogen spectral terms - Pauli's exclusion principle.

Critical Potentials: Excitation potential – ionization Potential – determination of critical potential – Frank and Hertz method.

Unit – III: Nuclear Physics

Nuclear Reactions and Radioactivity: Nuclear reactions – types of reactions – conservation laws – Q-value of a nuclear reaction – Neutron – discovery – detection – properties of neutron – artificial transmutation – Rutherford's experiment – artificial radioactivity – radioisotopes – applications.

Nuclear Energy and Elementary particles: Nuclear fission – energy released in fission – chain reaction – nuclear fusion and particle accelerators – cyclotron and betatron - elementary particles – classification of elementary particles.

Unit – IV: Modern Physics

Dual nature of light – matter waves – Louis de Broglie concepts of matter waves – de Broglie wavelength for matter waves – G.P. Thomson's experiment to confirm the wave nature of electron – Davisson and Germer's experiment. Heisenberg's Uncertainty principle – statement – position and momentum of a particle – Gamma ray microscope – diffraction of a beam of electrons by a slit.

Photo electric effect: Laws of photo electric emission – Einstein's photo electric equation – applications (Specific applications)

Unit – V: Material Science

Thin: Thin films – preparation of thin films – Thermal Evaporation– sputtering – pulsed laser deposition– applications of thin films -Thin film solar cells.

Nanomaterials and Applications: Nanomaterials – classification based on dimension –preparation of nanomaterials: top–down and bottom–up approach – ball milling – sol-gel method – applications of nanomaterials in medicine, industry, sensors and textiles – Moore's law – quantum dots – applications of quantum dots.

Books for study

1. R. Murugesan, Kiruthiga Sivaprasath, Modern Physics, 18th Edition, S. Chand & Co. Ltd, New Delhi, 2019.
2. N. Subrahmanyam and Brij Lal, Atomic and Nuclear Physics, S Chand & Co., 2007.

3. R. Murugesan, Electricity and Magnetism, 10th Edition, S.Chand & Co. Ltd, New Delhi, 2017.
4. A. K. Bandyopadhyay, Nano Materials, New Age International Publishers, New Delhi, 2009.
5. S. Shanmugam, Nanotechnology, MJP Publishers; 1st edition (28 April 2019), Chennai, 2019.

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- 1.N. Subrahmanyam and Brij Lal, Atomic Physics, S. Chand & Co. Ltd., New Delhi, 2013.
- 2.S.N. Ghoshal, Atomic and Nuclear Physics, S.Chand & Co. Ltd, New Delhi, 2004.
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- http://www.sc.mahidol.ac.th/scpy/courses/scpy663/lecture3_evaporation.pdf
- [nccr.iitm.ac.in/2011.pdf](http://www.nccr.iitm.ac.in/2011.pdf)
- http://www.brainkart.com/article/Magnetism-and-Electromagnetism_39869/
- http://ocw.nctu.edu.tw/course/physics/solidphysics_lecturenotes/chapter11.pdf
- <https://www.freebookcentre.net/physics-books-download/Atomic-and-Molecular-Physics-NPTEL.html>
- <http://ducc.du.ac.in/web4/ever-shrinking-mex/43m9vc1.php?3c6e0b=langevin%27s-theory-of-dia-and-paramagnetism>
- <https://nptel.ac.in/content/storage2/courses/113106065/Week%208/Lesson19.pdf>
- https://www.phys.sinica.edu.tw/TIGP-NANO/Course/2020_Spring/notes/08_chapter_2_20200409.pdf
- https://www.researchgate.net/publication/259118068_Chapter_-_INTRODUCTION_TO_NANOMATERIALS
- http://www.sathyabamauniversity.ac.in/uploads/notes/note_1437661719.pdf

PAP409A - Allied Physics Practicals for Chemistry

Objectives:

1. To perform experiments on elasticity of materials and viscosity of liquids
2. To demonstrate an experiment to determine the frequency of ac mains
3. To perform experiments on interference of light waves and its applications.
4. To do calibration of voltmeter and ammeter using potentiometer
5. To design simple analog and digital electronic circuits.

1. Young's Modulus – Non-Uniform bending – Optic lever and Telescope.
2. Rigidity Modulus of the wire – Torsional Pendulum.
3. Co-efficient of viscosity of a liquid – graduated burette – Constant volume method.
4. Determining the AC frequency using sonometer
5. Construction of centre tap full wave rectifier using diodes.
6. Spectrometer – refractive index of the material of solid prism.
7. Air wedge – Determination of thickness of wire.
8. Zener diode regulated power supply.

9. Construction of AND, OR logic gates using diodes and NOT gate using transistor.
10. Logic gates using IC's (AND, OR, NOT, NOR, NAND, X-OR).
11. NAND as universal gate.
12. Potentiometer – Calibration of low range voltmeter.
13. Potentiometer – Calibration of high range ammeter.
14. Half adder and Full adder.
15. Newtons ring experiment to determine the focal length of the lens.

Books for reference

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2. M. N. Srinivasan, S. Balasubramanian, and R. Ranganathan, A Text Book of Practical physics, 2nd revised edition, S. Sultan Chand & Sons publications, 2014.
3. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.
4. Dr.S.Somasundaram, Practical Physics, Apsara publications, Tiruchirapalli, 2012.

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2. https://www.electronics-tutorials.ws/diode/diode_7.html
3. https://www.youtube.com/watch?v=6dmfI_H5k7U
4. <https://www.youtube.com/watch?v=Q8Otf6k3uGk>
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6. <https://vlab.amrita.edu/?sub=1&brch=281&sim=1513&cnt=2>
7. https://www.electronics-tutorials.ws/logic/logic_1.html
8. [youtube.com/watch?v=cdMJvFT-Afc](https://www.youtube.com/watch?v=cdMJvFT-Afc)
9. <https://www.youtube.com/watch?v=x3VvjHVBGDU>

AP309B - Allied Physics for Computer Science –I

Objectives

- To make the students to explore the Physics in active devices and also to introduce the concept of semiconductors and their working principles
- To explore the principles and applications of passive devices.
- To understand the series and parallel circuits and their short and open circuits in realtime applications.
- To induce the minds of the students to understand the principle and applications of LASER in science and technology.
- To make the students the importance of the optical fiber communication, LED, Photoresistor and solar cell.

Unit – I: Active Devices

Semiconductor – types of semiconductor – PN junction diode – V-I characteristics of junction diode – zener diode – V-I characteristics of zener diode – zener diode as a voltage regulator – bipolar junction transistor(BJT): types – PNP and NPN transistor – working of NPN transistor –CB, CE and CC modes – characteristics of CE mode – single stage CE transistor amplifier – band width and cut off frequencies.

Unit – II: Passive Devices

Resistor: Colour coding scheme–types of resistors–factors affecting resistance of a material –specific resistance.

Capacitor: Principle–capacitance–factors affecting capacitance of the capacitor–types of

Integrated Circuits: Advantages and disadvantages–IC classification–fabrication of components resistor and capacitor on monolithic IC's.

Unit – III: Series and Parallel Circuits

Series Circuit: current– voltage– resistance – Total resistance in a series circuit- ohm's law– polarity of voltage drop–voltage division technique – short circuits – effects of short circuit – detecting short circuits – open circuit in series connection – effects of open circuit in series connection– detecting open circuit.

Parallel Circuit: Total resistance in parallel circuit–current division technique – shorts in parallel circuits – opens in parallel circuit – applications of parallel circuits – fuse and circuit breaker.

Kirchhoff's laws; current law and voltage law.

Unit – IV: LASER

LASER – characteristics – stimulated absorption – spontaneous emission – stimulated emission

population inversion – Einstein coefficients for three level system – types of pumping – principle of laser – conditions to achieve laser action – carbon di-oxide (CO₂) laser, Helium-Neon laser, Nd:YAG (Neodymium–doped Yttrium Aluminium Garnet; Nd:Y₃Al₅O₁₂) Laser– semiconductor laser – application of lasers in industry, computer and communication fields.

Unit – V: Fiber Optics and Opto–Electronic Devices

Optical fiber – construction – working principle – light propagation in optical fibers – acceptance angle and numerical aperture – classification of fibers based on materials, refractive index profile and modes– losses in optical fibers – fiber optic communication system – block diagram – advantages of optical fiber communication over conventional communication systems.

Construction and working: Light emitting diodes (LEDs) – liquid crystal display— photo resistor – photo diode – solar cells

Books for study

1. Bernard Grob, Basic Electronics, McGraw Hill Kogakusha Ltd, Delhi, 1977.
2. Mehta V. K., Principles of Electronics, S. Chand & Company, delhi, 2003.
3. Allen Mottershead, Electronic devices and Circuits: An introduction, Prentice Hall of India Private Limited, New Delhi, 2000.
4. Sarkar C.K and Sarkar D.C, Optoelectronics and Fiber optic communication, New Age International Publishers, New Delhi, 2001.

Books for reference

1. K. Maini, Electronics and Communications simplified, Khanna Publisher, New Delhi, 1993.
2. Pallab Bhattacharya, Semiconductor optoelectronic devices, Pearson Education (Singapore) Pvt. Ltd, New Delhi, 2001.
3. Subramanyam, Applied Electronics, The National Publishing Company, Chennai, 1996.

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<https://www.escomponents.com/blog/2019/7/31/active-amp-passive-components-what-is-the-difference-between-the-two>
www.explainthatstuff.com/fiberoptics.html
ecee.colorado.edu/~bart/book/book/chapter4/ch4_6.htm
<http://www.physics-and-radio-electronics.com/physics/laser/differenttypesoflasers.html>
www.explainthatstuff.com/lasers.html
learn.sparkfun.com/tutorials/what-is-a-circuit
<https://techterms.com/definition/circuit>

AP409B - Allied Physics for Computer Science – II

Objectives

- To introduce the fundamental concepts and working principles of various semiconductor devices and their applications.
- To introduce the basic concepts of operational amplifier and its various applications.
- To familiarize the switching characteristics of transistor, various multivibrators, applications of diode as integrator, differentiator, clipper and clamper.
- To familiarize with the different number systems and combinational circuits utilized in the digital circuits.
- To study the working of various flip-flops, registers, counters and their applications.

Unit – I: Semiconductor Devices and Applications

Half wave, full wave and bridge rectifiers—efficiency—ripple factor—Filter circuits - Types of filters: capacitor filters – π filters—JFET – construction and working of n-channel FET – characteristics – parameters of JFET – advantages of JFET over BJT- Common source FET amplifier.

Unit – II: Operational Amplifiers and Applications

Operational amplifiers – characteristics of ideal operational amplifier – CMRR – voltage gain of op-amp in inverting and non-inverting modes – Applications of OPAMP in inverting mode: voltage follower– summer – subtractor – integrator and differentiator.

Unit – III: Switching and Wave Shaping Circuits

Switching circuit – switch – types – mechanical – electro-mechanical – transistor as an electronic switch – advantages of electronic switches over electromechanical

switches – multivibrators – types: Astable and Bistable multivibrators using transistors – working – differentiating circuits – output waveforms – integrating circuits – output waveforms-clipping and clamping circuits using diodes.

Unit – IV: Combinational circuits

Number system: Binary, Decimal, Octal, Hexa decimal and their mutual conversions – logic gates AND, OR using diodes –NOT gate using Transistor – EXOR gate - NAND as a Universal gate – De Morgan's laws and their circuit implications – arithmetic circuits: half adder – full adder – half subtractor-full subtractor-Multiplexer(2:1) – demultiplexer(1:2).

Unit –V: Sequential circuits:

Flip Flops – triggering in flip-flops-types – clocked RS flip flop – D flip flop – J-K flip flop. Shift registers: serial in serial out-serial in parallel out-parallel in parallel out-parallel in serial out - Counters: Synchronous and asynchronous counters- Modulus of a counter-Synchronous and asynchronous decade counter.

Books for study

1. V.K Methta, Principles of Electronics, S. Chand & Co, New Delhi, 2001.
2. M. Arul Thalpathi, Basic and Applied Electronics, Comtec Publisher, Chennai, 2005.
3. Malvino Leach, Digital Principles and Applications, Tata McGraw Hill,1992.

Books for reference

1. Floyd, Digital Fundamentals, Pearson education, New Delhi, 2004.
2. V. Vijayendran, Digital Fundamentals, S. Viswanathan Publishers, Chennai, 1999.
3. Ramakant A. Gyakwad, Op–amps and Linear Integrated Circuits, PHI Pvt. Ltd, 2015.

Websites

<https://www.elprocus.com/semiconductor-devices-types-and-applications/>

<https://electronicspost.com/write-short-notes-on-clipping-circuit-and-clamping-circuit/>

https://en.wikipedia.org/wiki/Operational_amplifier_applications

https://www.electronics-notes.com/articles/analogue_circuits/operational-amplifier-op-amp/circuits.php

https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_linear_wave_shapping.htm

<https://www.geeksforgeeks.org/multiplexing-and-demultiplexing-in-transport-layer/> <https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/>

<https://circuitglobe.com/demorgans-theorem.html>

<https://www.maximintegrated.com/en/products/interface/high-speed-signaling/MAX9396.html> <https://www.electronics-tutorials.ws/sequential/conversion-of-flip-flops.html> https://www.electronics-tutorials.ws/counter/count_2.html

PAP409B - Allied Physics Practicals for Computer Science

Objectives:

- To have an hands on training to handle the electronic components and bread board
- To construct the logic circuits and demonstrate the output by truth tables
- To realize the importance of calibration of voltmeter and galvanometer
- To verify the theorems and Physics laws using passive and active devices
- To construct stabilized power supply by them self

1. Figure of merit of an aperiodic galvanometer – current sensitivity and voltagesensitivity.
2. R–S and D–Flip Flops using NAND gates.
3. (i)Logic gates AND,OR and NOT using IC (ii)Verification of De Morgan’s theorem
4. Half adder and Half subtractor.
5. Frequency of AC – Sonometer.
6. Verification of Ohm’s law
7. Potentiometer – calibration of low range voltmeter
8. Zener diode characteristics
9. Construction of stabilised power supply using zener diode
10. Construction of logic gates OR and AND using diodes and NOT using transistor
11. NAND as a universal gate
12. Full adder.

M.Sc PHYSICS

P717 - Mathematical Physics - I

Objectives:

1. To review the concepts of matrices and complex numbers
2. Exposing the students to learn in the integral transforms such as Fourier transform and Laplace transform in detail.
3. To make the students to understand and solve problems on linear differential equations and series solutions of differential equations
4. To enable the students to understand the basic principles and importance of tensor analysis,
5. To learn the basic notations, theorem and probability distribution in physics.

Unit-I: Matrices and Complex Numbers

Matrices: Rank of matrix-Cayley-Hamilton Theorem-Eigen values and eigenvectors
Introduction to complex number - Arithmetic of Complex Numbers-Exponential and circular functions of complex numbers – Logarithmic functions of complex variables – Separation of real and imaginary parts of circular functions - Separation of real and imaginary parts of hyperbolic functions.

Unit-II: Integral Transforms

Fourier transform: Fourier sine, cosine and complex integrals – Fourier sine and cosine transform (finite and infinite) – Properties of Fourier transforms (Linear property, change of scale property, shifting property and modulation theorem) - convolution theorem Laplace Transform:Laplace formulae – Properties of Laplace transforms (Linear property – Change of scale property, first and second shifting theorems) – special functions of Laplace transform (Gamma, Bessel, error, Heaviside's unit step and Dirac delta).

Unit-III: Ordinary Differential Equations:

General form of 1st order linear differential equation – solution of 1st order linear differential equation – General form of 2nd order linear differential equation – Homogeneous differential equation – solutions with constant coefficient – series solution of linear differential equation.

Unit –IV: Tensor Analysis

Introduction to tensors – transformation of coordinates-summation convention-Tensor transformation (contravariant, covariant tensors) – Rank of a tensor – Algebra of tensor: Addition, Subtraction, Product and Division (Quotient law) – Kronecker and Livi-Civita symbol – Symmetric and Anti-symmetric tensor – Isotropic tensor – Dual tensor – metric tensor – Christoffel's symbols (Both first and second kind)-Relations-transformations– Riemann curvature tensor, Ricci tensor-Tensor fields: Gradient of tensor fields (scalar, vector) – Divergence of vector – Curl of vector – Tensorial form of Gauss's and Stoke's theorem.

Unit –V: Probability

Definition-Sample space – event – probability theorem: Additive law & generalization – Multiplicative law & generalization – Probability distribution: Average – moments – constants: binomial– Poisson – Gaussian – variation – covariation and correlation.

Text Books

1. H K Dass, Dr. Rama Verma, Mathematical Physics, Sultan Chand & Sons, New Delhi, 2019

2. P Satyaprakash, Mathematical Physics, Sultan Chand & Sons, New Delhi, 2019.
3. B. D, Gupta Mathematical Physics, New Delhi, Vikas Publishing house, 2018.
4. B. S.Rajput, Mathematical Physics, 30th edition, Pragathi Prakashan, Meerut, 2017
5. G B Arfken, J Weber, Mathematical methods for Physicists, Elsevier academic press, 2016
6. E Kreyszig, Advanced Engineering Mathematics, Wiley India Pvt., Ltd.,, New Delhi, 2015

Books for Reference

1. K F Riley, M P Hobson, Essential Mathematical Methods for Physical Sciences, Cambridge University Press, USA, 2011
2. Suresh Chandra, A Text Book of Mathematical Physics, Narosa Publishing House, New Delhi, 2009.
3. Mary L.Boas, Mathematical methods in the physical sciences, Wiley India Pvt., Ltd., New Delhi, 2006.
4. Tai L. Chow, Mathematical Methods for Physicists: A concise introduction, Cambridge University Press, USA, 2000

Website references:

1. <https://www.mathsisfun.com/algebra/matrix-introduction.html>
2. <https://yutsumura.com/linear-algebra/the-cayley-hamilton-theorem/>
3. <https://www.mathsisfun.com/numbers/complex-numbers.html>
4. <http://www.math.chalmers.se/Math/Grundutb/CTH/mve025/1516/Dokument/F-analys.pdf>
5. <https://nptel.ac.in/courses/111/102/111102129/>
6. <https://www.uou.ac.in/lecturenotes/science/MSCPHY-17/pdf%20ppt%20MATHEMATICAL%20PHYSICS%20tensor%20unit%207.pdf>
7. <https://www.math24.net/linear-differential-equations-first-order>
8. <http://www.sosmath.com/tables/diffeq/diffeq.html>
9. https://nitsri.ac.in/Department/PHYSICS/M.Sc._Mathematical_methods_for_Physics.pdf
10. <https://www.stat.auckland.ac.nz/~fewster/325/notes/ch2.pdf>
11. <https://byjus.com/maths/probability-distribution/#:~:text=Probability%20Distribution%20Definition,outcomes%20of%20any%20random%20experiment.>

P718 - Classical Mechanics and Statistical Mechanics

Objectives:

1. To introduce the classical formulation approaches like Lagrangian and Hamiltonian dynamics and to study their application in mechanical systems and solving of problems.
2. To review the fundamental concepts of thermodynamics and to create an understanding of the principles of classical and quantum Statistical Mechanics and their applications.

Classical Mechanics

Unit – I: Lagrangian and Hamiltonian Formalisms

Constraints–Classification-- Lagrange equation from D'Alembert's principle-Lagrange's problems(spherical pendulum)- Hamilton's equation of motion- Variational principle-

deduction of Hamilton's equation from variational principle -cyclic coordinates and conservation theorems.

Canonical transformations- generating functions- condition for a function to be canonical-examples-Poisson brackets- Properties of Poisson's brackets- Invariance of Poisson's bracket under canonical transformation.

Unit – II: Hamilton-Jacobi Theory and Small Oscillations

Hamilton-Jacobi equation- Hamilton's characteristic function - Harmonic oscillator problem by Hamilton Jacobi method-Action- angle variables- Action- angle variables in systems of one degree of freedom - Application to Kepler's planetary motion.

Theory of small oscillations- Normal modes - oscillations and frequencies of free vibration - linear tri atomic molecule.

Unit – III: Rigid body dynamics

Degrees of freedom -Independent coordinates of a rigid body- orthogonal transformation-Euler's angle-Euler's theorem-Moments of inertia and Products of inertia –Moment of inertia tensor-principal axes- Angular momentum and kinetic energy- Torque and angular momentum-Euler's equation of motion-torque free motion-Symmetric top –Precession and nutation.

Statistical Mechanics

Unit – IV: Basics of statistical mechanics and Fluctuations

Introduction- Ensembles- Micro canonical, Canonical and Grand canonical ensembles-average ensemble - Liouville's theorem-Entropy-Gibbs paradox-Sackur-Tetrode equation-Partition function - Derivation of partition function (micro canonical ensemble) -correlation with thermodynamical quantities

Fluctuations and irreversible process- Fluctuations in micro canonical ensemble- Energy and concentration fluctuations in quantum statistics- one dimensional Random walk - Brownian motion.

Unit-V: Classical and Quantum Statistics

Postulates of classical statistics-Maxwell-Boltzmann distribution-application to diatomic molecule-postulates of quantum statistics-Bose-Einstein distribution-Bose-Einstein condensation-Thermodynamic properties of Bose Einstein gas-Liquid Helium-Fermi-Dirac distribution-Degeneracy-energy of Fermi gas -thermionic emission.

Text Books:

1. Gupta, Kumar and Sharma, Classical Mechanics, Pragati Prakashan, Meerut, 2012.
2. Palash B. Pal, An Introductory Course of Statistical Mechanics, Narosa Publishers, New Delhi, 2008.

Books for Reference:

1. Vimal Kumar Jain, Classical Mechanics, Ane Books Pvt. Ltd., 2009.
2. SrinivasaRao K. N., Classical Mechanics, Universities Press (India) Pvt. Ltd, 2003.
3. Laud B. B., Fundamentals of Statistical Mechanics, New Age International (P) Ltd. Publishers, New Delhi, 1998.
4. Kamal Singh, Sigh S. P., Elements of Statistical Mechanics, S. Chand & Company Ltd., New Delhi, 1999.
5. Upadhyaya, Classical Mechanics, Himalaya Publishing Co., New Delhi, 1999.

6. Herbert Goldstein, Charles P. Poole Jr. and John L. Safko, Classical Mechanics 3rd Edition, Addison-Wesley, 2001.
7. Calkin M. G., Lagrangian and Hamiltonian mechanics, Allied Publishers Ltd., 2000.
8. Panat P. V., Classical Mechanics, Narosa Publishers, New Delhi, 2008.
9. Madhumangal Pal, A Course on Classical Mechanics, Narosa Publishing House, New Delhi, 2009.
10. Walter Greiner, Classical Mechanics, System of Particles and Hamiltonian Dynamics, New York, Springer, 2009.
11. Agarwal B. K., Melvin Eisner, Statistical Mechanics, New Age International (P) Ltd. Publishers, New Delhi, 2005.

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1. <http://astro.physics.sc.edu/selfpacedunits/unit56.html>
2. <http://www.phy.auckland.nz/staff/smt/453310SC.html>
3. <http://www.damtp.cam.ac.uk/user/tong/dynamics.htm>
4. <http://farside.ph.utexas.edu/teaching/301/lectures/lectures.html>
5. <http://www.lancs.ac.uk/depts/physics/teaching/py332/phys332.htm>

P719 - Quantum Mechanics – I

Objectives:

1. To provide an understanding of fundamental principles of quantum mechanics and to introduce the basic ideas of Dirac formalism, approximation methods in Quantum Mechanics.
2. To make the students to understand the concept of angular momentum (both orbital and spin), the commutation rules, identical particles wave functions, and Pauli's spin matrices.

Unit – I: Basic Formalism

Origin of matter waves – Time dependent and independent Schrodinger wave equations for free particles – uncertainty relation – Physical interpretations of wave functions – probability current density – Continuity equation – Stationary states – Expectation value – Ehrenfest's theorem by Schrodinger method.

One dimensional applications: particles in a square well potential with rigid walls – Barrier penetration through a square potential – transmission probability – particle in a periodic potential (Qualitative study) – Bloch waves – Simple Harmonic Oscillator by Schrodinger method.

Unit – II: Three Dimensional Problems and Operator Formalism

Three dimensional problems: Schrodinger equation in spherical polar coordinates – system of two interactive particles – reduction – rigid rotator – particle in a spherically symmetric potential – Hydrogen atom.

Operator formalism: linear operators-significant properties – Hermitian operator- properties-simultaneous measurability of observables: commuting operators-commutation relations of position and momentum – Hamiltonian operators – Ehrenfest's theorem by operator method – Ladder operators – Simple Harmonic Oscillator by operator method.

Unit – III: Matrix Formalism and Symmetry in Quantum Mechanics

Hilbert's space – operators as matrices – matrix form of wave function – unitary transformations – Representation of Co-ordinate and Momentum in Schrodinger, Heisenberg

and Interaction pictures–Symmetries and conservation laws: Unitary transformations associated with translations, rotations–Parity and time reversal.

Unit – IV: Time Independent Approximation Methods

Time independent perturbation theory for non-degenerate and degenerate cases –Applications to ground state of anharmonic oscillator –Variation method – Application to ground state of Helium atom – WKB approximation method – WKB quantization rule – Application to Simple Harmonic Oscillator.

Unit – V: Angular Momentum, Identical Particles and Spin

Angular momentum operators – Commutation rules – Ladder operators – Eigen valuespectrum from angular momentum algebra – Matrix representation of angular momentum –Spin angular momentum– Addition of twoangular momenta – Clebsch–Gordan coefficients for $j_1 = j_2 = \frac{1}{2}$ – Symmetry and anti-symmetry of wavefunctions – Pauli’s spin matrices.

Text Books:

1. SatyaPrakash, Swati Saluja, Quantum Mechanics, Kedarnath Ramnath, Meerut, 2012.
2. Guptha Kumar Sharma, Quantum Mechanics, Jai Prakash Nath Publications, Meerut, 2012.
3. Aruldas.G, Quantum Mechanics, Prentice Hall of India Pvt. Ltd., New Delhi, 2007.

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1. David J.Griffith, Introduction to Quantum Mechanics, Pearson Education International, London, 2005.
2. Mathews P.M. andVenkatesan K., A Text Book of Quantum Mechanics, Tata McGraw Hill, New Delhi, 2010.
3. Chaddha G. S. Quantum Mechanics, New Age International (P) Ltd. Publishers, New Delhi, 2006.
4. Thankappan V. K., Quantum Mechanics, New Age International (P) Ltd. Publishers, New Delhi, 2008.
5. Singh S. P. Bagde M. K., Kamal Singh, Quantum Mechanics, S.Chand and Company Pvt., Ltd., New Delhi, 2000.
6. Devanathan.V, Quantum Mechanics, Narosa Publishing House, New Delhi, 2005.
7. Murugesan R., Modern Physics, S. Chand & Company Ltd., New Delhi, 2010.
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9. Kamal Singh, Singh S.P., Elements of Quantum Mechanics, New Delhi, S.Chand and company Pvt., Ltd., New Delhi, 2005.

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2. <http://www.theory.caltech.edu/people/preskill/ph229/>
3. <http://www.nsl.msui.edu/~pratt/phy851/lectures/lectures.html>
4. <http://walet.phy.umist.ac.uk/QM/LectureNotes/>
5. <http://www.ks.uiuc.edu/Services/Class/PHYS480/>
6. <http://www.mat.univie.ac.at/~gerald/ftp/book-schroe/index.html>
7. <http://people.deas.harvard.edu/~jones/ap216/lectures/lectures.html>
8. <http://www.netsa.org.lk/OcwWeb/Chemistry/5-73Introductory-QuantumMechanicsIFall2002/LectureNotes/index.htm>
9. <http://www.glue.umd.edu/~fivel/>

P720A - Elective: Electronic Devices and Applications

Objectives:

1. To acquire knowledge about analog and digital electronic devices and circuits.
2. To introduce structures, physical operations and circuit applications of semiconductor devices.
3. To develop the ability to analyze and design electronic circuits and to grasp the basic ideas of op-amps and its applications.
4. To understand analog and digital signals and conversion techniques
5. To know the fixed function of combinational logical circuits and their implementation.
6. To study the fundamentals and applications of sequential logic circuits.

Unit-I: Special Devices

UJT– construction – working – characteristics– relaxation oscillator – Thyristors –Silicon controlled rectifier (SCR) – working – Equivalent circuit of SCR –characteristics–SCR as switch–SCR half-wave and full-wave rectifiers–LASCR–DIAC –construction–characteristics– TRIAC–construction–characteristics.

Unit-II: Op-Amp applications

Op-amp – characteristics –CMRR –Integrator – differentiator – comparator – Log and Antilog amplifiers – Instrumentation amplifier – V to I and I to V converters – Sample and Hold circuits – Analog computation: Solving Simultaneous equations and Second order differential equations – Design of Op-Amp Low pass, High pass and Band pass active filters (first order only).

Unit - III: Waveform generators

Op-amp:Phase shift oscillator– Wein bridge oscillator (no derivation) –Astablemultivibrator– Triangular wave generator –saw tooth wave generator.

555 Timer:Functional diagram – Monostablemultivibrator–Astablemultivibrator–Schmitt trigger.

Unit – IV D/A and A/D Converters

Basic DAC and ADC Techniques – D/A converters:Binary Weighted Resistor – R-2R ladder D/A converters. A/D converters: Counter type– Successive approximation type –Dual slope– parallel comparator A/D converters.

Unit- V: Sequential and Combinational Circuits

Sequential circuits: Flip-Flops–JK and JK master slave flip-flops – Shift registers: Shift right shift register – Shift left shift register. Counters: Synchronous and Asynchronous decade counters – 4-bit binary up/down counters.

Combinational Circuits: Multiplexer (2:1, 4:1)–Demultiplexer (1:2, 1:4)–Encoder –Decimal to BCD encoder –Decoder: 2 to 4 decoder– 3 to 8 decoder–BCD to Decimal decoder–BCD to Seven segment decoder (7447).

Books for Study:

1. V. K. Mehta, Principles of Electronics, S. Chand & Co. Ltd., New Delhi, 2008.

2. Vijayendran.V, Introduction to Integrated Electronics: Digital and Analog, Third Reprint, S.Viswanathan (Printers & Publishers), PVT., Ltd, 2007.
3. Roy Choudhury.D and Shail B.Jain, Linear Integrated Circuits, 4th Edition, New Age International (P) Ltd, Chennai,2010.

Books for Reference:

1. Ramakant A. Gayakwad, Op-Amps and Linear Integrated Circuits, Third Edition, Prentice Hall India, New Delhi, 1997.
2. Donald P Leach, Albert Paul Malvino and Goutam Saha, Digital Principles and Applications, Sixth Edition, Tata McGraw Hill publishing company Ltd, New Delhi, 2008.
3. Allen Mottershead, Electronic Devices and Circuits, Prentice Hall India, New Delhi, 2000.
4. A.S. Sedra and K.C. Smith, Microelectronic Circuits, 6th Edition, Oxford University Press, 2010.
5. Kenneth C. Smith, KC's Problems and Solutions for Microelectronic Circuits, 6th Edition, Oxford University Press, New York 2009.
6. G. Roberts and A.S. Sedra, Spice, 3rd Edition, Oxford University Press, 1996.

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2. https://www.tutorialspoint.com/power_electronics/power_electronics_triac.htm
3. <https://www.electronics-tutorials.ws/power/unijunction-transistor.html>
4. <https://www.circuitstoday.com/lascr-light-activated-scr>
5. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_basics_of_operational_amplifier.htm
6. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_log_and_anti_log_amplifiers.htm
7. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_digital_to_analog_converters.htm
8. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_waveform_generators.htm
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10. http://generalengineering.sjsu.edu/docs/pdf/mse_prj_rpts/spring2010/Successive%20Approximation%20Analog%20to%20Digital%20Converter.pdf
11. <http://plc.cwru.edu/tutorial/enhanced/files/lcd/intro.htm>
12. <http://vsagar.com/2011/12/16/how-ic-555-works-fundamentals-of-ic-555-its-basicapplications/>
13. <http://www.ti.com/lit/ds/symlink/lm555.pdf>
14. http://www.youtube.com/watch?v=nV_AtmUS7IE

P720B - Elective: Energy and Environmental Physics

Objectives:

1. To introduce the students energy and its conversion, energy collection and utilization.
2. To teach the students regarding energy crisis and to enlighten the students regarding environmental pollution.

Unit - I: Energy and Thermodynamics

Energy- Concept and demand of energy - Growing energy needs - Environmental ethics - over exploitation of energy sources and associated problems - use of alternate energy sources- the first and second laws of thermodynamics - Free energy - Converting heat in to work - Reversible process –Carnot theorem - Conversion of matter in to more useful forms – Conversion of energy - Synthetic chemical fuels - Electrochemical energy conversion– Nuclear fission reactors - Fission power and environment - Role of an individual in conservation of natural resources - Conservation of the energy.

Unit - II: Nonrenewable Energy

Fossil fuels - Classification of fossil fuels, composition, physico- chemical characteristics and energy content of coal, petroleum, and natural gas - Origin and use of coal, coal –power plant - Cleaner coal combustion - Origin and uses of petroleum and natural gas - Composition and classification of petroleum and natural gas - Petroleum refinery - Gas hydrates- Environmental problems associated with petroleum.

Unit - III: Renewable Energy

Introduction - Types: Solar energy, geothermal, wind energy - Principals of generation of hydroelectric power - Principals of generation of solar electric power – Solar cell fabrication - I-V characteristics- Factors limiting the efficiency of silicon solar cells - Principles of Solar Water Heating System- Natural and Forced Circulation types - Principals of generation of electric power from wind - Ocean thermal energy conversion - Waste as renewable sources of energy - types of waste, classification based on chemical nature and physical state, composition of the waste - conversion of methane in to synthetic gas - factors effecting methane formation- Management of renewable energy.

Unit - IV: Bioenergy Resources and Fuel Cells

Biomass as a source of energy: Biomass and its uses - Classification of biomass – Biodiesel from Jatropha - Advantages and disadvantages of biodiesel - Storage and use of biodiesel - Biogas as a rural energy source - Biogas production mechanism from organic wastes - Gasification and combustion of biomass- Bioethanol production. Fuel cells: Hydrogen fuel cell, metal hydrate fuel cell, microbial fuel cell.

Unit - V: Environmental Pollution

Global warming as an energy problem - Impact of climate change on energy demand – Ozone layer depletion- Climate changes - Acid rain - Sea level raises - Nature and man made disasters - air pollution - Types and sources of air pollutants - Methods to control air pollution - water pollution - Types and sources of water Pollutants - Methods to control water pollution - soil pollution - Types and sources of soil pollutants- - Methods to control soil pollution- Biodegradable plastics- Biofertilizers - Biopesticides.

Books for Study

1. Taylor and Miller, Environmental Science -10th Edition, Thomson Asia Pvt., Ltd., Publications, Singapore, 2008.
2. Viswanathan B, An Introduction to Energy Sources- Indian Institute of Technology, Madras, 2006.
3. Boyle GF Renewable Energy - Power for a Sustainable Future, Second edition, Oxford University Press, 2004.

4. Singh, J.S., Singh S.P. and Gupta S. R. Ecology, Environment and Resource Conservation, Anamaya Publishers, New Delhi, 2006.

Books for Reference:

1. Gyll Henry and Gary W. Heinke Environmental Science and Engineering Pearson Education, New Delhi, 1996.
2. John Andrews and Nick Jelly, Energy Science: Principle, Technologies and Impacts - Oxford University Press, 2007.
3. Kurian Joseph and Nagendra R Essential of Environmental Studies, Pearson Education, New Delhi, 2004.
4. Sharma BK and Kaur SH Environmental Chemistry. Goel Publishing House, Meerut 1992.
5. Sukhatme K., Suhas P. Sukhatme, Solar Energy: Principles of Thermal Collection and Storage, Tata Mc-Graw Hill, New Delhi, 2006.
6. Nelson J., The Physics of Solar Cells, Imperial College Press, 2003.
7. Duffie J.A. and Beckman W.A., Solar Thermal Energy Engineering, John Wiley & Sons, 1990.
8. Mary D. Archer, Robert W. Hill, Clean Electricity from Photovoltaics, Imperial College Press, 2001.
9. J.N.B. Bell Air Pollution and Plant Life, 2nd Edition, John Wiley and Sons, New Delhi 2002.
10. N.P Cheremisinoff, Biotechnology for Waste and Wastewater Treatment, William Andrew Publishing, New York, 1996.
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3. www.jatrophabiodiesel.org/
4. www.gasification.org/
5. www.corecentre.co.in/Database/Docs/DocFiles/ems.pdf
6. <http://www.altenergy.org/renewables/solar.html>
7. http://en.wikipedia.org/wiki/Solar_power_in_India
8. http://en.wikipedia.org/wiki/Solar_energy
9. http://www.ucsusa.org/clean_energy/our-energy-choices/renewable-energy/how-solarenergy-works.html

P720C - Elective: Astrophysics

Objectives:

1. To facilitate the students to understand and explore the heavenly bodies.
2. To make the students to understand the various telescopes to explore the heavenly bodies and to help the students to know the members of solar system.

Unit - I: Galaxies and the Universe

The Milky Way galaxy: The composition of galaxies, the classification of galaxies, the interstellar medium, atomic and molecular clouds, the rotation curve of galaxies, Darkmatter in galaxies

The Universe: Clusters of galaxies, Active Galactic Nuclei, The Big bang cosmology, the Cosmic Background Radiation, The expansion rate of the universe, A review of current problems and ideas.

Unit - II: Stellar Evolution, Binary and Variable Stars

Nebulae – types of nebulae - The evolution of the Stars: Birth of a star – Death of a star – Chandrasekhar limit – white dwarfs – Neutron Stars – black holes – Supernovae explosions - Binary stars – visual Binary – spectroscopic Binary – Eclipsing Binary – Origin of Binary stars - Variable stars – types – cepheid variables, pulsating variables

Unit - III: Spectral Classification of Stars

The H-R diagram and the main sequence, The equation of hydrostatic equilibrium, Virial theorem, Eddington's theory of the stars, Mass luminosity relation, the life time of the stars of different masses, the solar neutrinos.

Unit - IV: Solar System

The Sun– physical and orbital data – photosphere – chromo sphere – corona - the internal temperature of the sun, the energy generation in the centre, nuclear reactions - Members of the solar system – Mercury – Venus – Earth – Mars- Jupiter – Saturn – Uranus - Neptune - Pluto – Moon - Asteroids – comets – Meteors.

Unit - V: Astronomical Telescope

Introduction to contemporary Astronomy: Optical, Infrared, Ultraviolet, Radio, X-ray and Gamma Ray Astronomy, Observational Techniques: Optical Telescopes: Reflecting and Refracting Telescope - Radio telescopes, Detectors for X-ray and Gamma rays – Hubble's space telescope.

Text Books:

1. K.S. Krishnaswamy, 'Astro physics a modern perspective', Reprint, New Age International (P) Ltd, New Delhi, 2002.
2. Baidyanath Basu, 'An Introduction to Astro Physics', second edition, Prentice Hall of India Private limited, New Delhi, 2010.
3. Sparke & Gallagher, Galaxies in the Universe, Cambridge Univ. Press, 2000
4. Longair M, High Energy Astrophysics Vol-I &II, , Cambridge Univ. Press, 1992
5. Ryden B, Introduction to Cosmology, Cambridge Univ. Press, 2002

Books for Reference:

1. R. Murugesan, 'Modern Physics', Eighteenth edition, S. Chand & Company Ltd, New Delhi, 2019.
2. S. Kumaravelu, 'Astronomy', Janki calendar corporation, Sivakasi, 1993.
3. Baker and Fredrick, 'Astronomy, ninth edition, Van Nostrand Reinhold, Co, New York, 1964.
4. Illustrated World of Science Encyclopedia – Vol. I and Vol. VIII – Creative World Publications, Chicago, 1971
5. Ryden B, Introduction to Cosmology, Cambridge Univ. Press, 2002
6. Shu F.H., Physical Universe, University Science Books, 1982
7. T. Padmanabhan, An Invitation to Astrophysics, World Scientific, 2006.

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2. <http://solarviews.com/eng/solarsys.htm>
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4. http://astro.unl.edu/naap/hr/hr_background1.html
5. <http://www.enchantedlearning.com/subjects/astronomy/stars/startypes.shtml>
6. <http://hyperphysics.phy-astr.gsu.edu/hbase/geoopt/teles2.html>
7. http://www.colorado.edu/physics/phys1230/phys1230_fa01/topic40.html
8. <http://www.infoplease.com/cig/theories-universe/scientific-origins-universe.html>
9. <http://www.thebigger.com/physics/universe/explain-the-various-theories-of-the-origin-of-universe/>
10. <http://solarviews.com/eng/starformation.htm>

P820 - Mathematical Physics - II

Objectives:

1. To provide an insight into complex analysis, Green's function and special functions, this will be helpful to the students to apply these techniques to solve Physics problems.
2. To make the students to use numerical techniques to tackle problems in physics that are not analytically soluble
3. To enable the students to understand the basics of group theory, that will make them to analyze symmetries and their implications in the field of Physics.

Unit-I: Complex Analysis

Complex function – Analytic function – Limit, Continuity – Differentiability – Cauchy-Riemann conditions-Cauchy's integral theorem (simply and multiply connected regions) – Cauchy's integral formulae – singularities of an analytic function – Residues – Cauchy's residue theorem –Evaluation of definite integrals-Contour integration.

Unit –II: Green's function

Homogeneous and non-homogeneous equation (introduction only) – Green's function for one dimensional case – Wronskian's determinant – General proof and symmetry property of Green's function – Boundary value problems – Eigen function expansion of Green's function- Green's function for Poisson's and its solution – Green's function for quantum mechanical scattering problem.

Unit –III: Special Functions

Series solutions – Legendre, Bessel, Hermite and Laguerre's differential equations - generating functions-orthogonal properties-Recurrence relations.

Unit –IV: Numerical Methods

Newton-Raphson method-Finite differences- Forward difference, Backward differences-Numerical integration- Trapezoidal rule- Simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rule-Interpolation- Newton forward and backward interpolation formula – Lagrange's interpolation- solving first order differential equations Runge-kutta method of fourth order.

Unit –V: Group Theory

Group – basic properties – Abelian group – isomorphic group – similarity transformation and classes – group multiplication tables - Representation of Groups: symmetric elements – transformation, matrix representation – Point groups – reducible and irreducible representations – The Great Orthogonality Theorem-Construction of character tables for

point groups C_{2v} and C_{3v}, structure of character tables –Mulliken's notations for irreducible representations – Applications: IR and Raman active vibrations of XY₃ type molecule – Application of group theory to chemical bonding.

Text Books:

1. H K Dass, Dr. Rama Verma, Mathematical Physics, Sultan Chand & Sons, New Delhi, 2013
2. Gupta B. D, Mathematical Physics, New Delhi, Vikas Publishing House, 2006.
3. P Satyaprakash, Mathematical Physics, Sultan Chand & Sons, New Delhi 2004.
4. Suresh Chandra, A Text Book of Mathematical Physics, Narosa Publishing House, New Delhi, 2006.
5. S.S. Sastry, Introductory methods of numerical analysis, Prentice hall of India Pvt., Ltd., New Delhi, 2012
6. M K.Jain, S.R.K.Iyengar, R.K.Jain, Numerical Methods : For Scientific And Engineering Computation, New Age Pvt., Ltd., New Delhi, 2012
7. P. Kandasamy, K.Thilagavathi, K.Gunavathi, Numerical Methods, S.Chand Pvt., Ltd, New Delhi, 2006

Books for Reference:

1. G.B Arfken, J Weber, Mathematical methods for physicists, Elsevier academic press, 2005
2. E Kreyszig, Advanced Engineering Mathematics, Wiley India Pvt Ltd, New Delhi, 2015
3. K F Riley, M P Hobson and S J Bence, Mathematical methods for physics and Engineering, Cambridge university press, USA, 2006
4. Mary L.Boas, Mathematical methods in the physical sciences, Wiley India Pvt Ltd, New Delhi, 2006.
5. Tai L. Chow, Mathematical Methods for Physicists: A concise introduction, Cambridge university press, USA, 2000
6. Chattopadhyay P. K., Mathematical Physics, , New Age International (P) Ltd, Madras

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2. <https://complex-analysis.com/>
3. <http://www.maths.lth.se/matematiklu/personal/olofsson/CompHT06.pdf>
4. <https://mathworld.wolfram.com/GreensFunction.html>
5. <https://brilliant.org/wiki/greens-functions-in-physics/>
6. <http://egyankosh.ac.in/bitstream/123456789/12543/5/Unit-3.pdf>
7. http://ion.uwinnipeg.ca/~gkunstat/MathPhys2014W/Resources/math_phys_redbook/06-Special%20Functions.pdf
8. <https://www.msuniv.ac.in/Download/Pdf/aa6c43e4d516475>
9. https://www.vssut.ac.in/lecture_notes/lecture1428550358.pdf
10. <https://medium.com/cantors-paradise/an-invitation-to-group-theory-c81e21ab739a>
11. [https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_\(Physical_and_Theoretical_Chemistry\)/Group_Theory/Group_Theory%3A_Theory](https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_(Physical_and_Theoretical_Chemistry)/Group_Theory/Group_Theory%3A_Theory)
12. <http://www.matfys.lth.se/education/FYS256/aryasetiawan.pdf>

13. [https://ethz.ch/content/dam/ethz/special-interest/chab/physical-chemistry/ultrafast-spectroscopy-dam/documents/lectures/spectroscopy FS20/ Script/PCV_Ch4.pdf](https://ethz.ch/content/dam/ethz/special-interest/chab/physical-chemistry/ultrafast-spectroscopy-dam/documents/lectures/spectroscopy_FS20/Script/PCV_Ch4.pdf)

P821 - Electromagnetic Theory

Objectives:

1. To provide a clear and logical presentation of basics of electromagnetic theory.
2. To introduce the laws governing the distribution and propagation of electromagnetic fields created by static and dynamic charge distributions and their interaction with matter.

Unit – I: Electrostatics

Electric field due to a system of charges-Charge distribution-charge densities-Electrostatic Potential- Multipole expansion of charge distribution-Gauss law in integral and differential forms -Poisson's equation-Laplace's equation-Solution of Laplace's equation in spherical coordinates-Conducting sphere in a uniform field-Field at external and internal points-displacement vector-Dielectric Polarization-Dielectric sphere in a uniform field-Field at external and internal points-Electrostatic energy.

Unit – II: Magnetostatics

Biot-Savart law- Integral and differential form-Application to a Circular coil-Ampere's circuital law in differential and integral forms-Application to a straight wire and Force between two parallel wire-Magnetic vector potential- Characteristics of Magnetic vector potential- Application to a distant current loop-Magnetic scalar potential-Characteristics of Magnetic scalar potential-Application to a magnetic dipole(circular current loop)-Magnetostatic energy.

Unit– III: Maxwell's Equations and their Applications

Faraday's laws of induction-Equation of continuity for charge-Maxwell's displacement current-Maxwell's equations in integral and differential form-significance-Non uniqueness of electromagnetic potential: Gauge invariance-Coulomb's and Lorentz gauges - Lorentz force-Lorentz force in terms of electric and magnetic potentials -Energy and momentum of the field-Conservation laws for a system of charges and electromagnetic fields-Poynting's theorem-continuity equation for energy.

Unit - IV: Fields and Radiation of Electromagnetic Sources

Retarded potentials-Oscillating electric dipole: magnetic vector and scalar potentials-electromagnetic fields-poynting vector and radiated power-Radiation from a small current element: radiation power and radiation resistance-Radiation from a linear antenna-Centre fed half antenna-Antenna arrays.

Unit – V: Wave Propagation and Properties

Wave equation and plane wave solution-Propagation of electromagnetic waves in free space, isotropic dielectric-Propagation in conducting media-Skin depth-Reflection and Refraction at a plane interface: kinematic properties-dynamic properties-Fresnel's formulae(oblique incidence)-Propagation between two perfectly conduction planes-Propagation of waves in a rectangular wave guide.

Text Books

1. Satya Prakash, Electromagnetic theory and Electrodynamics, Meerut, KedarNath Ram, 2010.
2. David.J. Griffiths, Introduction to Electrodynamics, New Delhi, Addison Wesley, 2012.

- Uma Mukherji, Electromagnetic field Theory and Wave Propagation, New Delhi, Narosa Publishing House, New Delhi, 2006.

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- Agarwal G. C., Chopra K. K., Electromagnetic Theory, K Nath & Co., Meerut 2019.
- Edward C. Jordan, Keith G. Balmain, Electromagnetic waves and Radiating Systems, Prentice Hall of India, 2005.
- Reitz John R., Foundations of Electromagnetic Theory, Pearson Education India, New Delhi, 2009.
- Puri S.P, Classical Electrodynamics, Tata McGraw-Hill publishing company Limited, New Delhi, 1997.
- Prasad K.D, Antenna and Wave Propagation, Sathyaprakashan, New Delhi, 1993.
- Meenakumari, R., Subasri R., Electromagnetic fields, second edition, New Age International Publishers, New Delhi, 2008.
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- <https://books.physics.oregonstate.edu/GSF/maxwell1.html>
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- http://odessa.phy.sdsmt.edu/~lcorwin/PHYS721EM1_2014Fall/Chap6p3_Hyun.pdf
- <https://winnerscience.com/2012/02/24/gauss-law-differential-form-derivation/>
- https://www.ece.mcmaster.ca/faculty/nikolova/antenna_dload/current_lectures/L03_RadIS.pdf
- http://dmoz.org/Science/Physics/Electromagnetism/Courses_and_Tutorials/
- <https://www.everythingrf.com/community/what-is-skin-depth>
- http://web.mit.edu/6.013_book/www/chapter13/13.4.html

P822 - Quantum Mechanics–II

Objective:

- To introduce the physical concepts and mathematical formalism of scattering theory, time dependent perturbation theory, its applications, relativistic quantum mechanics, Dirac equation and quantum field theory.
- To make the students to understand the concept of Quantum Field Theory by learning Relativistic Lagrangian and Hamiltonian of charged particle in an electromagnetic field and its formulations. Also learn Second K.G field, Maxwell's electromagnetic field, non-relativistic Schrödinger's field, Quantization of Dirac field and Interaction between fields.

Unit– I: Time Dependent Perturbation Theory

Time dependent perturbation theory – first order transitions – Constant and harmonic perturbations – Transition probabilities – Fermi–Golden rule–Semi classical treatment of an atom with electromagnetic radiation – Selection rules for dipole radiation – Adiabatic approximation – Sudden approximation – The density matrix – Spin density

Unit – II: Quantum theory of Scattering

Kinematics of scattering – Scattering cross sections – Scattering amplitude – Transformation from centre of mass system to laboratory frame – Partial wave analysis: Asymptotic

behaviour – Phase shifts – Differential and total cross sections – Optical theorem – Ramsauer–Townsend effect – Born approximation and its validity – Applications: Scattering by square well potential.

Unit – III: Relativistic Quantum Mechanics – I

Schrodinger relativistic equations – Klein–Gordon equation – K.G. equation for a charged particles in electromagnetic field – Solution of K.G. equation with Coulomb potential – Difficulties in K.G. equation – Dirac’s relativistic wave equation – Dirac Hamiltonian – Dirac Matrices – Equation of continuity using Dirac’s equation – Plane wave solutions of Dirac equation for a free particle – negative energy states.

Unit – IV: Relativistic Quantum Mechanics – II

Covariant form of Dirac equation – Properties of gamma matrices – Traces – Relativistic invariant of Dirac equation under Lorentz transformation – T–Transformation for the Dirac equation without and with electromagnetic field – Projection operators for energy and spin – Dirac equation under a central potential: Total angular momentum.

Unit– V: Quantization of Fields

Difference between classical and quantum fields – Relativistic Lagrangian and Hamiltonian of charged particle in an electromagnetic field –Lagrangian and Hamiltonian formulations of field – Second quantization of Klein–Gordon field – Creation and annihilation operators – Commutation relations–Quantization of non–relativistic Schrödinger’s field

Text Books:

1. Aruldas.G, Quantum Mechanics,Prentice Hall of India Pvt. Ltd. NewDelhi,2007.
2. Sathyaprakash, Quantum Mechanics, KedranathRamnath , New Delhi, 2001.
3. Guptha Kumar Sharma, Quantum Mechanics, Jai Prakashnath Publications, 2012.

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1. Devanathan.V, Quantum Mechanics, Narosa Publishing House, New Delhi, 2005.
2. Devanarayanan S., Quantum Mechanics, Scitech Publications (India) Pvt., Ltd., New Delhi, 2005.
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4. Thankappan V. K., Quantum Mechanics, New Age International (P) Ltd. Publishers, New Delhi ,2008.
5. Mathews P.M. and Venkatesan K., A Text book of Quantum Mechanics, Tata McGraw–Hill, New Delhi ,2010.
6. Guptha S.L and Guptha S.D, Advanced Quantum Theory and Fields, S.Chand and Co. Pvt. Ltd., New Delhi ,1986.
7. Sakurai J. J., Jim J. Napolitano, Modern Quantum Mechanics, 2nd Edition, Addison Wesley, New Delhi ,2010.

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1. <http://www.physics.sfsu.edu/~greensit/book.pdf>
2. http://webee.technion.ac.il/labs/Quantum_Engineering/files/papers/qm_lecture_notes.pdf
3. <http://physics.bgu.ac.il/~dcohen/ARCHIVE/qmc.pdf>

PP809 - Advanced Physics Practicals
(Any 15 Experiments)

1. Cornu's method - Young's modulus and Poisson's ratio by elliptical fringes.
2. Cornu's method - Young's modulus by hyperbolic fringes.
3. Determination of Stefan's constant.
4. Band gap energy - Thermistor.
5. Hydrogen spectrum - Hartmann's Interpolation formula- Rydberg's constant.
6. Viscosity of liquid - Meyer's disc.
7. Solar spectrum - Hartmann's Interpolation formula.
8. F.P. Etalon using spectrometer.
9. Iron / Copper arc spectrum.
10. Lasers: Study of laser beam parameters.
11. Particle size determination using Laser.
12. Electrical resistivity and conductivity of a semiconductor by four probe method.
13. Spectrometer - Charge of an electron.
14. Spectrometer- Polarizability of liquids by finding the refractive indices at different wavelengths.
15. Determination of dielectric constant of a liquid by RF oscillator method.
16. Determination of Planck's constant.
17. Fiber optic experiments – Numerical aperture, Acceptance angle and Attenuation of given optical fiber.
18. Coefficient of linear expansion –air wedge method
19. Impedance measurement using LCR Bridge
20. Dielectric constant of Liquids and Solids by capacitance method.
21. Experiment with Silicon solar cell
22. Measurement of absorption coefficient of a material (supplied) using laser light.
23. Laurentz half shade polarimeter

PP810 - Electronics Experiments
(Any 20 Experiments)

1. Characteristics of SCR and Triac
2. UJT characteristics and UJT as relaxation oscillator
3. Op-amp – Applications- Log amplifier, antilog amplifier, differentiator and integrator.
4. Op-amp -Study of the attenuation characteristics and design of the phase-shift oscillator.
5. Op-amp - Study of the attenuation characteristics and design of the Wien Bridge oscillator.
6. Op-amp-Schmitt trigger
7. Op-amp - Solving simultaneous equations
8. Op-amp - Design of square wave, saw tooth wave, and Triangular wave generators.
9. Op-amp - Design of active filters –Second order- low pass, high pass, band pass and band rejecter.
10. Op-amp – D/A converter - Binary weighted method - R/2R ladder method.
11. Modulus counters using IC 7490 and seven segment display.
12. 4 - Bit Synchronous/Asynchronous Up-down counters using IC 7473/IC7476.
13. 4 - Bit Shift Registers - Ring counter, Twisted Ring counter/Johnson's counter using IC 7473/IC7476.
14. IC 7483 - Arithmetic operations.
15. IC 555 –Astablemultivibrator and Voltage Controlled Oscillator.
16. IC 555 – Monostablemultivibrator and Frequency Divider.
17. IC 555 - Schmitt Trigger and Hysteresis loss.
18. Multiplexer and Demultiplexer.
19. Photodiode characteristics
20. Op-amp 8-bit DAC
21. Characteristics of LVDT
22. V-I Characteristics of Solar cell.
23. Op-amp: I to V, V to I converter
24. A/D converter: 4 bit simultaneous A/D converter and successive approximation A/D converter using IC0801/IC0804.

P823A - Elective: Microprocessor 8085 and Microcontroller 8051

Objectives:

1. To illustrate the architecture of 8085 Microprocessor and 8051 Microcontroller.
2. To familiarize students with instruction set and addressing modes of 8085 microprocessor and 8051 Microcontroller.
3. To familiarize the students with interfacing of memory with 8085 microprocessor.
4. To enable students to write assembly language programs and to know the interfacing applications.

Unit – I: Architecture and Interrupts of 8085A Microprocessor

8085A Microprocessor: Features of 8085A Microprocessor-Pin configuration of 8085A Microprocessor- Architecture of 8085A Microprocessor.

Interrupts: Interrupt and its need - Classification of Interrupts- Priorities of Interrupts- Enabling, Disabling and Masking of interrupts: EI, DI, SIM and RIM instructions.

Unit - II: Instruction Set and programming of 8085A

Instruction Set: Instructions-Classification of instructions based on length and function-Data Transfer Instructions - Arithmetic instructions - Logical Instructions - Branch Instructions-Stack and Stack Related Instructions - I/O Instructions - Subroutines - Addressing Modes.

Programming 8085A: 8-bit and 16 bit addition, 8-bit and 16 bit Subtraction, 8-bit BCD to HEX and HEX to BCD code conversions- Time delay subroutines and Delay calculations.

Unit - III: Interfacing Memory and I/O devices to 8085A

Memory Interfacing: Basic Concepts in Memory Interfacing- De-Multiplexing Address/Data bus- Interfacing memory chips: 2K×8, 4K×8 RAM interface-2K×8, 4K×8 EPROM interface.

Interfacing I/O Devices: I/O Mapped I/O-Memory Mapped I/O-Programmable Peripheral Interface (8255) - LED Interface-Flashing of LEDs-Multiplexed Seven segment display interface.

Unit –IV: Architecture of 8051 Microcontroller

Microcontroller- Difference between microprocessor and microcontroller- pin diagram of 8051 - Internal architecture of 8051 - Memory organization: Program memory and Data memory - Special function registers –Program status word- Port operation: Port 0, Port 1, Port 2, Port 3.

Unit – V: Instruction set of 8051 and Programming:

Instruction set: Data transfer instructions-Arithmetic instructions-Logic instructions-Control transfer instructions –Addressing Modes: Register addressing-Direct addressing-Register-Indirect addressing-Immediate addressing-Base register plus Index register-delay routines.

Programming: 8-bit addition, subtraction, Multiplication and division.

Text Books:

1. V.Vijayendran, Fundamentals of Microprocessor – 8085: Architecture, Programming and Interfacing, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai, 2009.
2. A. NagoorKani, Microprocessor and its Applications, 3rd Edition, RBA Publications, Chennai, 2017.
3. Krishna Kant, Microprocessors and Microcontrollers Architecture, Programming and System Design 8085, 8086, 8051, 8096, Second Edition, PHI Learning Private Limited, New Delhi, 2014.

Books for Reference

1. Ramesh S. Gaonkar, Microprocessor Architecture, Programming and applications with the 8085, 6th Edition, New Age International Publishers Ltd., New Delhi 2013.
2. Ram.B, Fundamentals of Microprocessor and Microcontroller, Seventh Edition, Dhanpat Rai Publications, New Delhi, 2012.

3. N. Senthilkumar, M. Saravanan, S. Jeevananthan, Microprocessors and Microcontrollers, Oxford University Press, 2010.
4. A.P. Godse, D.A. Godse, Microprocessor and Applications, Second Edition, Technical Publications, Pune, 2018.
5. U.S. Shah, Microprocessor and Applications, McMillan Publishers India Ltd., New Delhi, 2011.
6. Aditya Mathur, Introduction to Microprocessor, 3rd Edition, Tata McGraw Hill Publishing Company Ltd., 2017.
7. Muhammed Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinlay, The 8051 Microcontroller and Embedded Systems, Second Edition, Pearson Publications, 2007.
8. Subrata Ghoshal, 8051 Microcontroller: Internals, Instructions, Programming & Interfacing, Second Edition, Pearson Publications, 2014
9. AlkaKalra, Sanjeev Kumar Kalra, Architecture and Programming of 8085 Microcontroller, University Science Press, New Delhi, 2010.
10. Kenneth J. Ayala, The 8051 Micro Controller, 3rd Edition, Cengage Learning, New Delhi, 2007.

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1. https://www.tutorialspoint.com/microprocessor/microprocessor_8085_architecture.htm
2. https://www.tutorialspoint.com/microprocessor/microprocessor_8085_pin_configuration.htm
3. https://www.tutorialspoint.com/microprocessor/microprocessor_8085_addressing_modes_and_interrupts.htm
4. https://www.tutorialspoint.com/microprocessor/microprocessor_8085_instruction_sets.htm
5. https://www.tutorialspoint.com/microprocessor/microprocessor_intel_8255a_programmable_peripheral_interface.htm
6. https://www.tutorialspoint.com/microprocessor/microprocessor_intel_8255a_pin_description.htm
7. <http://aturing.umcs.maine.edu/~meadow/courses/cos335/Intel8255A.pdf>
8. <http://northcampus.uok.edu.in/downloads/20161125104535111.pdf>
9. https://www.tutorialspoint.com/microprocessor/microcontrollers_overview.htm
10. https://www.tutorialspoint.com/microprocessor/microcontrollers_8051_architecture.htm
11. https://www.tutorialspoint.com/microprocessor/microcontrollers_8051_pin_description.htm
12. https://www.tutorialspoint.com/microprocessor/microcontrollers_8051_input_output_ports.htm

P823B - Elective: Geophysics

Objectives:

1. To make the students to understand the physics and geology that form the basis for geophysical observation and measurement and to help the students to understand Earth structure and evolution.
2. To make the students to identify the physical processes governing the behavior of common geophysical systems and to make their own observations with a variety of geophysical instruments, and reduce, model, and interpret their data and uncertainties.

Unit – I: Introduction to Geophysics

Geophysics and its importance among earth Sciences-Earth as a member of the solar system - Geosphere: Scope of study of various Geospheres, Atmosphere, Ionosphere, Asthenosphere, lithosphere-hydrosphere and Biosphere. Meteorology, Oceanography and Hydrology - Atmosphere: Constituent, vertical structure, weather analysis and forecasting.

Unit – II: Gravity field

Gravity field and its variations on the surface, internal and external Field – Geoid, spheroid and Ellipsoid of the earth-shape and size of the earth - Geomagnetic field, Magnetic elements- Origin and Reversals of the magnetic field- Geothermics: Heat sources, Geothermal flux distribution over continents and oceans. Geochronology: Rock dating methods, U-Th, C-14, Fission-Track and magnetic dating.

Unit – III: Petrophysics

Different physical and engineering properties of rocks - Laboratory measurements of the physical properties of rocks: Density, Seismic wave velocities, magnetic susceptibility, Electrical resistivity, thermal conductivity, porosity and permeability.

Unit–IV: Seismology

Natural and Artificial seismology and its relation to other Earth System sciences. Classification of Earth quakes, Causes and propagation of Different seismic wave and fundamental laws - Interior of the Earth and Earth quake prediction.

Introduction to Seismograph: Principle and working of mechanical type seismograph, Milnes haw, wood Andersen seismograph, electromagnetic seismograph and broadband seismograph- Various methods for determination of focal depth and epicentre location.

Unit –V: Mineralogy

Introduction- symmetry and forms in common crystal classes –physical properties of minerals – isomorphism and polymorphism, classification of minerals – structure of silicates –mineralogy of common rock – forming minerals – mode of occurrence of minerals in rock.

Text Books:

1. William Lowrie, Fundamentals of Geophysics, 2nd Edition, Cambridge University Press, New York, 2007.
2. Markus.Bath, Introduction to Seismology, Revised Edition, Springer Basel AG, 2014.
3. G.W.Tyrrell, The principles of Petrology, 2nd Edition, Surjeet Publications, New Delhi, 2019.

Books for Reference

1. D.K. Jha, Textbook of Geophysics, ALP Books, 2015
2. Frank D. Stacey, Physics of Earth, 4th edition, Cambridge University Press, 2008.
3. John .M. Reynolds, An introduction to Applied and Environmental Geophysics, 2nd Edition, Wiley, 2011.
4. John Milsom, Asger Eriksen, Field Geophysics, 4th Edition, Wiley, 2011.
5. Peter Styles, Introducing Geophysics, Dunedin Academic Press, 2021.
6. C.M.R. Fowler, The Solid Earth, 2nd Edition, Cambridge University Press, 2004.
7. Karl Seibert, Applied Geophysics, Syrawood Publishing house, 2019
8. Robert J. Charlson, Gordon H. Orians, Earth System Science, 1st Edition, Academic Press, 2000.

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1. <https://earthquake.usgs.gov/learn/kids/become.php>
2. <http://www.eegs.org/what-is-geophysics>
3. <http://geophysics.geoscienceworld.org/>
4. <http://inside.mines.edu/Geophysics-Home>
5. <http://library.seg.org/journal/gpysa>
6. www.uio.no/studier/emner/.../ppt/.../6-introduction-to-petrophysics-august-2015.pdf
7. <http://petrowiki.org/Petrophysics>
8. <http://www.slb.com/services/characterization/petrophysics.aspx>

9. <http://www.geo.mtu.edu/UPSeis/waves.html>
10. <http://www.environmentalscience.org/career/seismologis>
11. <https://earthquake.usgs.gov/learn/glossary/?term=seismology>
12. <http://moes.gov.in/programmes/national-centre-seismology>
13. <http://serc.carleton.edu/NAGTWorkshops/mineralogy/index.html>
14. <http://www.environmentalscience.org/career/mineralogist>

P823C - Elective: Biophysics

Objectives:

1. To explore the fundamental background of physics behind the cellular and molecular structure and its dynamics.
2. To provide an insight knowledge about the application of light and bio compatible nonmaterial in the field of bio physics.
3. To know about the applications of bio sensors.

Unit- I Cellular Structure and Dynamics

Cell -Discovery of cell and Cell Theory- Comparison between plant and animal cells- Cell wall- Kinetics of cell growth-Mitosis & Cell divisionMolecular mechanism-Synchronization of cell cycles-Cell transformation-Cell Junctions-Cell transportation and malignant tumor growth - Cell aging and death-Differentiation of cultured cells-Water and ion transport.

Unit - II: Molecular structure and Functions

Intra molecular and intermolecular forces-Entropy transfer of living organisms-Structure and function of disaccharides and polysaccharide-Amino acids-Primary and secondary structures of proteins-Enzyme structure - Classification of enzymes -function relation-Semiconduction in biological macromolecules-concentration and mobility of charge carriers in proteins- cells and tissues- Determination of activation energy- Role of adsorbed water in tissues.

Unit-III: Biocompatible Nano materials and Bio sensors

Nanobiotechnology- definition and scope-Biocompatibility and cytotoxicity studies of Nanomaterials-Biological metal nanoparticle synthesis and biomedical application-Dendrimers, quantum dots-Biosensors: Ion sensors –Anion and cation sensors- Membrane electrodes, Enzyme electrodes–Biocatalyst based biosensors –ISFET for glucose, urea -Fibre optic sensors, Photo acoustic sensorsand Radiation thermometry.

Unit- IV: Photo-biophysics

Different sources of Non-Ionizing radiation-their physical- properties- Various types of optical radiations-UV- visible & IR sources- Lasers-Theory and mechanism-Optical properties of tissues-photo thermal –photochemical-photo ablation- electromechanical effect-Radiofrequency & Microwave radiation-Biomagnetism-Effects-application-Optical properties of skin, Acute and chronic effect of sunlight on skin, Photosensitivity, Photo toxicity.

Unit -V: Physiochemical Techniques

Sedimentation Principle- Types of rotors- Preparative and Analytical Centrifuges -Sterilization- Physical and Chemical methods of sterilization-Electrodes-types Design and properties and Utility, Skin contact impedance of Electrodes -chromatography-Instrumentation, working and biological applications of Column chromatography-Electrophoresis-Disc electrophoresis: Isoelectric focusing, -Radioisotopes and their Biological Applications

Books for Study:

1. P. Narayanan,Essentials of Biophysics, New Age International (P) Ltd. Publishers, New Delhi, 2000.

2. VasanthaPattabhi and N. Gautham, Biophysics, Narosa Publishing House, New Delhi, 2002.
3. Pranab Kumar Banargy, Introduction of Biophysics, S Chand and Co, New Delhi, 2000
4. N. Arumugam and Kumaresan "Biophysics" Saraspublication, 2015

Books for Reference:

1. Barrow C, Physical Chemistry for Life Sciences Mc-Graw Hill, 2007
2. Khandpur R. S., Handbook of Biomedical Instrumentation, Tata McGraw-Hill Publishing Co. Ltd, 2003.
3. David Friefelder, Molecular Biology, Narasa Publishing House, 2008
4. Thayalan, Basics of Radiobiological Principle" Jaypee Brothers Medical Publisher, New Delhi, 2003.
5. G Cooper & R Haussman, The Cell Molecular Approach, ASM Press, 2007.
6. HG Bohr, Handbook of Molecular Biophysics (Methods & Application), Wiley India Ltd, 2009.
7. Patric F Dillon, Biophysics A Physiological Approach, Cambridge Univ. Press, 2012.
8. James C & J Q Tran, Introductory Biophysics, John & Bartlet India Pvt., Ltd., 2011.
9. Roland Glaser "Bio physics: An Introduction" 2nd edition, Springer, 2012.

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2. <http://www.biophysics.org/>
3. www.biophysics.jhu.edu/class_sites
4. <https://www.cell.com/biophysj/collections/introduction-to-biophysics>
5. [http://www.moleculargenetics.utoronto.ca/cellular-molecular-structure-function\](http://www.moleculargenetics.utoronto.ca/cellular-molecular-structure-function/)
6. <https://en.wikipedia.org/wiki/Nanobiotechnology>
7. <https://www.nanowerk.com/nanobiotechnology.php>
8. <https://en.wikipedia.org/wiki/Biosensor>
9. <https://www.imamagnets.com/en/blog/what-is-biomagnetism/>

Self-Study Paper: Ultrasonics and Its Applications

Objectives:

1. To impart the fundamental concepts of ultrasonic waves, sources of ultrasound and its instrumentation
2. To make the students to understand the influence of ultrasonic studies on molecular interactions
3. To learn non-destructive testing and its importance and to make them understand about ultrasound and its application in medical field.

Unit – I: Fundamentals of Ultrasonic Waves and its Sources

Waves - wave parameters and characteristics – Classification of sound waves – ultrasonics waves – modes of ultrasonic waves – characteristic properties of ultrasonics waves – Behavior of ultrasonic waves.

Sources of ultrasound – materials of transmission and reception - characteristics of ultrasonic beam.

Unit – II: Ultrasonic Instrumentation and General Applications

Ultrasonic instrumentation: Sing around method – pulse superposition method- Pulse echo overlap method – cross correlation method – phase slope method – Direct method.

General applications: high intensity applications – low intensity applications.

Unit – III: Ultrasonic Studies for Molecular Interactions

Types of molecular interactions – Ultrasonic study of molecular interactions - Propagation in multicomponent liquid mixtures– Measurement techniques: continuous wave method – Pulse echo overlap method – Theories of ultrasonic velocity in mixtures and solutions– Acoustical parameter.

Unit – IV: Ultrasonic Non-Destructive Testing

Classification of Ultrasonic testing– basic methods: Resonance method – pulse method – acoustic emission method – calibration of testing systems – Flaw detector and applications – advantages in ultrasonic NDT.

Unit – V: Ultrasound in Medicine

Transducers for medical imaging - Types of scan: dynamic focus – compound scanning – resolution – axial, lateral – factors affecting image quality – clinical applications of scan: ophthalmology – obstetrics and gynecology – cardiovascular applications - ultrasound guided biopsy – tissue doppler mapping.

Books for study:

1. BaladevRaj, Rajendran V and Palanichamy, “Science and technology of Ultrasonics”, Narosa publications, 2009.
2. Sindhu Sadhu, “Ultrasonic studies in liquids and their correlation with the structural aspect”, GIAN publishing house, New Delhi, 1987.
3. David J Cheeke N, “Fundamental and Applications of Ultrasonic waves ”, CRC Press, 2002.
4. Jack Blitz, Ultrasonic: methods and applications, Newnes-Butterworth, 1971.
5. C.R. Hill, J.C.Bamber, G.R.TerHaar. “Physical principles of Medical Ultrasonic”, John Wiley & Sons, Publishing, 2004.

Books for Reference:

1. Robert T. Beyer and Stephen V. Letcher, “Physical Ultrasonics”, Academic Press London, 1969.
2. Karl F.Herzfeld and Theodore A Litovitz, Absorption and Dispersion of ultrasonic waves, Academic Press, New York, 1959.
3. I. Prigogine, the Molecular theory of solutions, North Holland Publishing Company, Amsterdam, 1957.
4. P. Warren Mason and R.N. Thurston (Editors), Physical Acoustics, Principles and methods. Academic Press, Elsevier, New York, 1975
5. Michel Postema, “Fundamentals of Medical Ultrasonic”, Spon press, 2011.

Website for reference:

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2. <https://www.encyclopedia.com/science-and-technology/physics/physics/ultrasonics>
3. <https://sci-hub.se/10.1088/0022-3735/16/3/001>
4. <https://instrumentationtools.com/ultrasonic-testing/>
5. <https://www.twi-global.com/technical-knowledge/faqs/ultrasonic-testing>
6. <https://byjus.com/physics/applications-ultrasound/>
7. <https://www.mana.md/different-uses-for-ultrasound/>

P917 - Solid State Physics

Objectives:

1. To provide an understanding of the basics of crystal physics, metals, semiconductors, superconductors and magnetism.
2. To familiarise the various theoretical models to study the properties of matter from a microscopic point of view.

Unit - I: Crystal Structure and Binding

Lattice- Crystal systems - Bravais lattices - Miller indices- Reciprocal lattice (SC, BCC, and FCC) -simple crystal structures-NaCl- ZnS and Diamond- X-ray diffraction-Bragg's law- Structure factor-Atomic form factor - Laue equations- crystal binding- crystals of inert gases - Van der Waals-London interaction- Cohesive energy - ionic crystals - Madelung constant-covalent crystals - Metal crystals-Hydrogen bonds.

Unit – II: Lattice Dynamics

One dimensional mono atomic lattice-one dimensional diatomic lattice- acoustical and optical modes - group and phase velocities-quantization of lattice vibrations-phonon momentum-Normal process-Umklapp process-Inelastic scattering by phonons-Lattice specific heat-Dulongpetit's law-Einstein's theory of specific heat-Debye's theory of specific heat.Thermal conductivity of solids – Thermal conductivity due to electrons – Thermal conductivity due to phonons.

Unit – III: Theory of Metals and Semiconductors

Free electron gas in three dimensions- Experimental methods in Fermi surface studies- De Hass Van Alphen effect- Hall Effect: Theory and Experiment- Band theory of solids metals and semiconductors- Bloch theorem-Kronig-Penny model Brillouin zone-construction of first and second Brillouin zones-Semiconductors: Intrinsic carrier concentration-Extrinsic carrier concentration-Impurity conductivity. Band gap engineering

Unit – IV: Magnetism

Quantum theory of para magnetism-Rare earth ion-Hund's rule - Quenching of orbital angular momentum-Adiabatic demagnetization- Quantum theory of ferro magnetism-Curie point and exchange integral-Heisenberg's interpretation of Weiss fieldMagnons-Curie temperature and susceptibility of ferrimagnets-Theory of anti-ferromagnetism-Neel temperature.

Unit – V: Super Conductivity

Experimental facts-Effect of magnetic fields and temperature-Meissner effect-Entropy and heat capacity-Energy gap-isotope effect-Type I and Type II superconductors-theoretical explanation-thermodynamics of superconducting transition-London equations-Coherence length-Penetration depth-BCS theory-single particle tunneling-Josephson tunneling-DC and AC Josephson effects-High temperature super conductors-SQUIDS (analytical treatment)-applications and limitations of superconductors.

Text Books

1. Charles Kittel, Introduction to Solid State Physics, Wiley & Sons, New York, Eighth Edition, 2018.
2. Dekker A. J, Solid State Physics, McMillan & Co, New Delhi, Reprinted, 2014.
3. Rita John, Solid State Physics, McGraw Hill Education (India) Private Limited, 2016
4. Pillai S.O, Solid State Physics, New age international publishers, New Delhi, Ninth edition 2020.
5. Gupta H. C, Solid State Physics, Vikas Publishing House Pvt. Ltd., Mumbai, 2001.

Books for Reference

1. Wahab M. A, Solid State Physics Structure and Properties of Materials, Narosa Publishing House, New Delhi, 2009.
2. Keer H. V, Principles of the Solid State, New age international publishers, New Delhi 2017.
3. Neil W. Ashcroft, David Mermin N, Solid State Physics, A Harcourt Publishers, Singapore, 2003.
4. Kachhava C. M, Solid State Physics Solid State Devices and Electronics, New age international publishers, New Delhi, 2003.

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2. <http://academic.uprm.edu/pcaceres/Courses/MEMO/id32.htm>
3. <http://academic.uprm.edu/pcaceres/Courses/MEMO/id3.htm>
4. http://en.wikipedia.org/wiki/Spin_wave
5. <http://www.cmpmp.ucl.ac.uk/~ahh/teaching/3C25/Lecture07p.pdf>
6. http://ocw.mit.edu/courses/materials-science-and-engineering/3-091sc-introduction-to-solid-state-chemistry-fall-2010/syllabus/MIT3_091SCF09_aln03.pdf
7. <http://griffin.ucsc.edu/teaching/08Q1-155/download/Lecture%2019%20-%20Magnetic%20Order.pdf>
8. <http://www.eng.utah.edu/~lzang/images/lecture-11.pdf>
9. http://nptel.iitm.ac.in/courses/103104045/pdf_version/lecture20.pdf
10. <http://www.eng.utah.edu/~lzang/images/lecture-12.pdf>

P918 - Atomic and Molecular Spectroscopy

Objectives:

1. To provide a knowledge of interaction of electromagnetic radiation with atoms and molecules and systematically introduce to spectra and basic theoretical concepts in spectroscopic methods.
2. To expose to the fundamental principles of various spectroscopic techniques for structural applications.

Unit-I: Electronic Spectroscopy

Interaction of electromagnetic radiation with matter-scattering, dispersion and transmission of radiation -vibrational, rotational and electronic energy levels-types of molecular spectra-band width-factors contributing to band width. Fundamental laws of absorption-Beer's law-origin of UV-Visible spectra-Instrumentation progression and sequences-Frank-Condon principle-transition probability - colour of the compounds-types of transitions -solvent effects on electronic transitions- selection rules for electronic transitions

Unit-II: Rotational Spectroscopy

Microwave Spectroscopy: Rotation of molecules - Pure rotational spectra of diatomic molecules – polyatomic molecules - study of linear molecules and symmetric top molecules – Hyperfine structure and quadruple moment of linear molecules – Experimental techniques – Molecular structure determination – Stark effect – inversion spectrum of ammonia – applications to chemical analysis.

Unit-III: Vibrational Spectroscopy

Infrared Spectroscopy : Vibrational spectroscopy of diatomic molecules – Harmonic oscillator – Anharmonic oscillator – Rotational vibrators – Normal modes of vibration of CO₂ and H₂O molecules–IR spectrometer - FTIR spectrometer – Interpretation of FTIR spectra of H₂O, CCl₄, Benzene molecules.

Raman Spectroscopy: Raman effect- Classical and Quantum theory of Raman Scattering- Rotational, vibrational Raman spectra-Stokes and anti-stokes Raman lines-selection rules-

Nuclear spin and its effect on Raman spectra - FT Raman instrumentation – Comparison of IR and Raman spectra – interpretation of Raman spectra (N_2 and O_2)

Unit –IV: Resonance Spectroscopy

Nuclear Magnetic Resonance (NMR) - Introduction-Interaction of spin and magnetic field population of energy levels-Larmor precession-Relaxation times- Bloch equations — steady state solution Double resonance- Chemical shift and its measurement- Coupling constant- Coupling between several nuclei- Quadrupole effects– Instrumentation:— ^{13}C and 1H NMR - Interpretation of NMR spectra.

Principle and theory of ESR – Nuclear interaction and hyperfine structure – Relaxation effects – ESR Instrumentation – Applications of ESR.

Unit-V: Mossbauer Spectroscopy and Surface Spectroscopy

Principle of Mossbauer spectroscopy: Doppler shift, recoil energy. Isomer shift, quadrupole splitting, magnetic interactions. Applications: Mossbauer spectra of high and low-spin Fe and Sn compounds. Electron energy loss spectroscopy (EELS)-Reflection absorption spectroscopy (RAIRS)- Photoelectron spectroscopy (PES) – Instrumentation – interpretation of spectrum; X-ray Fluorescence spectroscopy (XRF)- SIMS - Surfaces for SERS study-SERS Microbes-Surface selection rules.

Books for Study:

1. Kaur. H, Spectroscopy, 7th Edition, Pragati Prakashan, Meerut, 2012.
2. R. Colin N. Banwell and Elaine M. Mc Cash, Fundamentals of Molecular Spectroscopy, 4th Edition, Tata McGraw-Hill Publications, New Delhi, 2013
3. Aruldas G., Molecular Structure and Spectroscopy, 2nd Edition, Prentice Hall of India Pvt.Ltd., 2007
4. A K Saxena, Atomic and molecular spectroscopy and Lasers, S Chand Publishing company (P) Ltd., 2015

Books for Reference:

1. Satyanarayana D. N., Vibrational Spectroscopy: Theory and Applications, New Age International Publications, New Delhi, 2004.
2. Donald L. Pavia, Gary M. Lampman, George S. Kriz and James A. Vyvyan, Introduction to Spectroscopy, 4th Edition, Brooks Cole, 2008.
3. Towne and Schawlow, Microwave Spectroscopy, Tata McGraw Hill, New Delhi, 1995.
4. Dr. Ramphal Sharma, Fundamentals of Atomic and Molecular Spectroscopy, Himalaya Publishing House, New Delhi, 2008.
5. Gupta, Kumar, Sharma, Elements of Spectroscopy: Atomic, Molecular and Laser Physics, Pragati Prakashan, Meerut, 2011.
6. Rita Kakkar, Atomic and Molecular Spectroscopy, Basic Concepts and Applications, Cambridge University Press, 2015.

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2. http://en.wikipedia.org/wiki/Rotational_spectroscopy
3. <http://classes.uleth.ca/200303/chem3810a/NotesS2.pdf>
4. <http://www.pharmagupshup.in/2011/12/infrared-spectroscopy-free-study.html>
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7. <http://nmr.wsu.edu/files/pdf/theory.pdf>
8. <http://www.news-medical.net/health/Spectroscopy-Types.aspx>
9. <http://www.chem.uni-wuppertal.de/quasaar/han-sur-lesse/files/Wlodarczak1.pdf>
10. <http://www.internetchemistry.com/chemistry/microwave-spectroscopy.htm>
11. <http://web.mit.edu/5.33/www/lec/spec5.pdf>

12. http://www.chem.ucla.edu/harding/notes/notes_14C_IR.pdf
13. <http://www.chem.uic.edu/tak/chem52411/notes16/notes16-11.pdf>
14. <http://www.eng.uc.edu/~beaucag/Classes/Characterization/RamanCALTECH.pdf>
15. <https://www.patnauniversity.ac.in/e-content/science/physics/MScPhy89.pdf>

P919 - C Programming and Research Methodology

Objectives:

1. To introduce to the students the fundamentals of C programming.
2. To familiarize the students with the nature of research and scientific writing.
3. To introduce to the students various quality metrics to be followed while publishing paper.
4. To analyze, interpret and evaluate scientific hypotheses and theories using rigorous methods such as statistical and mathematical techniques.

Unit – I: Introduction to C Programming

Features of C–Basic structure of C program– Character set – Trigraph characters– Keywords and Identifiers–Constants– data types – Variables – Declaration of variables – Assigning values to variables – Operators: Arithmetic – Relational– Logical– conditional–Assignment– Increment– Decrement – Input/output functions– Escape sequence–Control statements: Branching and Looping statements.

Unit – II: Arrays strings and Functions

Arrays: Declaring and initializing one and two dimensional arrays– Strings: Declaring and initializing string variables–string handling functions–Functions: Library and User defined functions– Need for user–defined functions– Function declaration– Return values and their types– Calling functions– Categories of functions– Simple Programs: Celsius to Fahrenheit– Fahrenheit to Celsius – Solution of the quadratic equation–largest of given three numbers.

Unit – III: Identification of the Problem and Manuscript Writing

Identification of the problem: Literature survey – awareness of current status of the art– Reference collection – Mode of approach of actual investigation – Drawing inferences from data– Results and conclusions.

Significance of report writing – research papers – review paper – synopsis –Thesis – review process – publishing process.

Unit–IV: Quality Metrics and Error Analysis

SCI– Web of science–SCOPUS indexed journals – importance of peer reviewed journals – Indexing: i, h and citation index – Intellectual property rights (patents and copyright) – professional ethics.

Error analysis: Presentation of physical quantities with their inaccuracies– significant figures– Errors: classification and propagation–Probability distributions–Processing of experimental data–Graphical handling of data with errors.

Unit –V: Statistical Techniques

Introduction to statistics – Functions – Limitations – Measures of central tendency– Arithmetic mean – Median – Mode – Standard deviation – Co-efficient of variation (Discrete series and continuous series) – Correlation – Regression – Multiple Regression – t test – ANOVA test. Curve fitting: Straight line, parabola, exponential curves.

Text Books:

1. Balaguruamy. E, Programming in ANSI C, Tata McGraw–Hill, New Delhi, 2005.

2. Kothari. C. R. Research Methodology Methods and Techniques, New Age publishers, New Delhi, 2019.
3. Prathapan K, Research Methodology for Scientific Research, IK International Publishing House Pvt. Ltd, New Delhi and Bangalore, 2014.
4. John R. Taylor, An Introduction to Error Analysis: The Study of Uncertainties Measurements, 2nd Edition, University Science Books, California, 1997.
5. Vittal P. R, Mathematical statistics, Margham Publications, Chennai, 2002.

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1. Ashok N. Kamthane, Programming with ANSI and Turbo C, Pearson Education Ltd, New Delhi, 2002.
2. John E. Freund, Mathematical statistics, Prentice –Hall Pvt. Ltd., New Delhi, 1999.
3. Gupta S.C., Kapoor V.K., Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi, 2014
4. Suresh Chandra, Mohit K.Sharma, Research Methodology, Narosa Publishing house, New Delhi, 2013.
5. Rajaraman V, Computer oriented Numerical Methods, Prentice Hall Pvt. Ltd., New Delhi, 2001.
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7. Sukhendu Dey, Debobrata Dutta, Complete knowledge in C, Narosa Publishing house, New Delhi, 2009.
8. A Hand Book of Methodology of Research, Rajammal, P. Devadoss and K. Kulandaivel, RMM Vidyalaya press, 1976.
9. Research Methodology, Mukul Gupta, Deepa Gupta – PHI Learning Private Ltd., New Delhi, 2011.
10. G.W. Snedecor and W.G. Cochrans, Statistical Methods, Iowa State University Press, United States, 1967.

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3. https://www.tutorialspoint.com/objective_c/objective_c_constants.htm
4. https://www.tutorialspoint.com/objective_c/objective_c_functions.htm
5. http://dwb4.unl.edu/Chem/CHEM869Y/CHEM869YMats/Least_Squares.html
6. <http://pages.cs.wisc.edu/~cs354-1/cs354/karen.notes/C.basics.html>
7. <http://www.cs.auckland.ac.nz/compsci705s1c/lectures/literature-review.pdf>
8. http://www.ldeo.columbia.edu/~martins/sen_sem/thesis_org.html
9. <http://www.math.ubc.ca/~anstee/math184/184newtonmethod.pdf>
10. <http://www.mini.pw.edu.pl/~marcinbo/strona/download/c.pdf>
11. <http://www.phys.unsw.edu.au/~jw/thesis.html>
12. https://www.tutorialspoint.com/objective_c/objective_c_operators.htm
13. https://www.tutorialspoint.com/objective_c/objective_c_loops.htm
14. https://www.tutorialspoint.com/objective_c/objective_c_decision_making.htm
15. https://www.tutorialspoint.com/objective_c/objective_c_arrays.htm
16. https://www.tutorialspoint.com/statistics/arithmetric_mean.htm
17. https://www.tutorialspoint.com/statistics/arithmetric_median.htm
18. https://www.tutorialspoint.com/statistics/arithmetric_mode.htm
19. <http://egyankosh.ac.in/bitstream/123456789/20446/1/Unit-5.pdf>

1. To provide an introduction to nanomaterials, their synthesis, properties and applications.
2. To introduce to various thin films deposition techniques and characterization techniques.

Unit – I: Introduction to Nanomaterials

Introduction-Historical perspectives - Advantages and disadvantages of nanomaterials - Classification of nanomaterials based on dimension-Quantum semiconductors- Quantum confinement - Quantum dots- Different forms of Carbon- Carbon nano tubes- Types of CNT – Preparation, properties and applications of CNT- Fullerenes: synthesis and applications – Self Assembled Monolayers- synthesis of gold SAMs.

Unit – II: Preparation by chemical Method

Synthesis of nanomaterials: Top-down and Bottom-up approaches – Sol gel - Spin coating – Chemical bath deposition - Electro-deposition - Hydrothermal – Precipitation method – Reflux method – Advantages and disadvantages of chemical method.

Unit– III: Preparation by Physical Method

Introduction- Methods of preparation: Need for vacuum- working of vacuum pumps: Rotary and diffusion pumps - Gauges: pirani and penning gauges-Thermal evaporation- DC Sputtering – Need for RF sputtering- Pulsed Laser deposition- Plasma arching- Ball milling technique- Spray Pyrolysis -Advantages and disadvantages of Physical method.

Unit – IV: Characterization Techniques

Basic principles and instrumentation: Powder XRD (Calculation of grain size), HRSEM- TEM- TGA-AFM.

Unit – V: Applications of Nanomaterials and Thin Films

Nanomaterials in Photocatalysis – Thin film Solar cells - Nanostructured Gas sensors -Bio-Sensors- Drug delivery systems - Diluted magnetic semiconductor (DMS) - Quantum computers –Thin Film Transistors - NEMS and MEMS.

Text Books:

1. M.A. ShahTokeer Ahmad, Principles of Nanoscience and Nanotechnology, Alpha science international,2010
2. Chris Binns, Introduction to Nanoscience and Nanotechnology, John Wiley & sons, Inc. 2010
3. Chattopadhyay K. K., Banerjee A. N., Introduction to Nanoscience and Technology, PHI learning Pvt. Ltd., New Delhi, 2009.
4. Goswami A., Thin Film Fundamentals, New Age International (P) Ltd., New Delhi, 2007.

Books for Reference

1. Shanmugam S., Nanotechnology, MJP Publishers, Chennai, 2011.
2. Bandyopadhyay A. K., Nanomaterials, New Age International (P) Ltd., New Delhi 2009.
3. Pradeep. T, Nano: The Essentials, Tata McGraw- Hill Publishers Company Ltd., New Delhi, 2007.
4. Clive Whiston, X-Ray Methods, Wiley India Pvt. Ltd., New Delhi, 2008.
5. Charles. P. Poole, Frank. J. Owens, Introduction to nanotechnology,, John Wiley & Sons publications, New Jersey, 2003.
6. Mark Ratner, Daniel Ratner, Nanotechnology: A Gentle Introduction to the Next Big Idea, Prentice Hall, 2002.
7. Masuo Hosokawa, Kiyoshi Nogi, Makio Naito, Toyokazu Yokoyama, Nanoparticle Technology Handbook, Linacre House, Jordan Hill, 2007.

8. Joseph Goldstein, Scanning Electron Microscopy and X-ray microanalysis, Springer, London, 2003.
9. William F Smith, Javad Hashemi, Foundations of Materials Science and Engineering, Tata McGraw Hill, New Delhi, 2005.

Websites for Reference:

1. <https://smallbusiness.chron.com/advantages-disadvantages-nanotechnology-37398.html>
2. <https://www.cheaptubes.com/carbon-nanotubes-properties-and-applications/>
3. <https://www.geeksforgeeks.org/difference-between-bottom-up-model-and-top-down-model/>
4. http://www.ch.ic.ac.uk/harrison/Teaching/L1_Introduction.pdf
5. http://faculty.uml.edu/zgu/Teaching/documents/Lecture6Synthesis_000.pdf
6. <http://inside.mines.edu/~zhiwu/courses/550/lecture07.pdf>
7. http://www.asp.unijena.de/physik_international_multimedia/MultiphotonLab/2011Nano materials_Lecture06_semiconductors.pdf
8. <http://hanyangocw.hanyang.ac.kr/ocw/fusion-materials/nano-materials-characterization/1st.pdf>
9. <http://www.wright.edu/~lok.lewyanvoon/440/chp4.pdf>
10. <http://hanyangocw.hanyang.ac.kr/ocw/fusion-materials/nano-materials-characterization/6th.pdf>
11. <http://hanyangocw.hanyang.ac.kr/ocw/fusion-materials/nano-materials-characterization/9th.pdf>
12. <http://www.uccs.edu/~tchriste/courses/PHYS549/549lectures/kinetics.html>

P920B - Elective: Optical Physics

Objectives

1. To introduce to the students the concepts of electromagnetic waves, lasers, optical fibres and optical devices.
2. To make the students understand the applications of optics.

Unit - I: Electromagnetic Waves

Electrical Constant-Plane Harmonic Waves-Wave packets - Doppler Effect-Relativistic Correction to the Doppler Formula-Linear Partial Polarization-Scattering & Polarization-Circular & Elliptical Polarization-Matrix Representation-Orthogonal Polarization-Eigen Vectors & Jones Matrices- Reflection and Refraction at a Plane Boundary-Amplitudes of Reflected and Refracted Waves- Brewster's Angle.

Unit - II: Coherence and Interference

Theory of Partial Coherence-Coherence Time and Coherence Length-Spectral Resolution of a Finite Wave Train-Coherence and Line Width-Spatial Coherence-Extended Sources-Measurement of Stellar Diameter-Hanbury Brown Twiss Intensity Interferometry-Fabry Perot Interferometer-Theory of Multilayer Films.

Unit - III: Lasers

Characteristics of Laser Light-Atomic Basis for Laser Action-Laser Pumping-Creating a Population Inversion-Laser Resonator-Single Mode Operation-Q Switching-Mode Locking-Helium-Neon Laser- Argon Ion Laser-Carbon dioxide Laser-Solid State Lasers-Semiconductor Laser-Applications.

Unit – IV: Optical Fibres

Propagation of Light in an Optical Fibre-Acceptance Angle-Numerical Aperture-Step and Graded Index Fibres-Fibre Fabrication Techniques-Optical Fibre as a Cylindrical Wave Guide-Wave Guide Equations- Wave Equations in Step Index Fibres-Flow of Power in SI Fibres-Fibre Losses and Dispersion- Applications.

Unit – V: Optical Devices

Electro-optic, Magneto-optic and acousto-optic effects – Material properties related to get these effects – important Ferroelectric, Liquid crystal materials for these devices—Piezoelectric, Electrostrictive and magnetostrictive effects – important materials exhibiting these properties – and their application in sensors & actuator devices –Acoustic delay line –High frequency piezoelectric devices – Surface acoustic wave devices.

Text Books:

1. S.G. Lipson, H. Lipson, D.S. Tannhanser, Optical Physics, Cambridge University Press, New Delhi, 1999.
2. A. K. Ghatak, Optics, 3rd Edition, Tata McGraw Hill, New Delhi, 2002.

Books for Reference:

1. Shea D.C.O., Rusell Callen. W and Rhodes W.T., Introduction to Lasers & their Applications, Addison Wesley, 2005.
2. Stewart D. Personick, Fibre Optics Technology & Applications, Khanna Publishers, New Delhi, 2007.

Website References:

1. <http://hyperphysics.phy-astr.gsu.edu/hbase/phyopt/polclas.html>
2. electron9.phys.utk.edu/optics421/modules/m1/reflection_and_refraction.htm
3. https://en.wikipedia.org/wiki/Hanbury_Brown_and_Twiss_effect
4. <http://hyperphysics.phy-astr.gsu.edu/hbase/optmod/lasgas.html>
5. <http://www.worldoflasers.com/lasertypes-solid.htm>
6. <http://www.ques10.com/p/5043/explain-any-one-fiber-fabrication-process-with-nea/>
7. https://en.wikipedia.org/wiki/Surface_acoustic_wave
8. <https://www.britannica.com/technology/piezoelectric-device>
9. https://en.wikipedia.org/wiki/Liquid_crystal
10. https://en.wikipedia.org/wiki/Liquid-crystal_laser

P920C - Elective: Computational Quantum Mechanics

Objectives:

1. To introduce modern methods of molecular modeling and culminating in electronic structure modeling.
2. To introduce formalism of quantum computation.

Unit - I: Introduction to Computational Quantum Mechanics

Schrödinger equation-Atomic orbital's - spectra of hydrogen-like (one electron) atoms and alkali atoms - variation theorem - Spin and spin wave functions-Many electron systems-electrostatic approximation- Time dependent perturbation theory for two-level and multi-level systems, Effect of constant - perturbation and oscillating perturbation.

Unit - II: Basic Methods of Molecular Modeling

Force Field- semiempirical, *ab initio* and Density Functional methods. Applicability-comparison of accuracy - basics of electronic structure theory- Atomic units - qualitative role of kinetic and potential energy in shaping the orbitals- Born- Oppenheimer approximation-Geometric optimization.

Unit - III: Roothaan-Hall Hartree-Fock Method

Energy expression- Slater determinantal wave function- Basis set expansion of the orbitals- Basis set types: atomic, plane wave and grid basis sets- Atomic basis sets: Slater-type and Gaussian functions The Self-Consistent Field (SCF) method- Fock's theorem - invariance of the total wave function with respect to linear combination of occupied spin-orbitals- Hund's theorem and its implications.

Unit - IV: Ab initio Calculation:

Basic principles of ab initio method – Hartree self-consistent field method-Calculation of molecular energy- minimizing energy equation – Ab initio calculation using Roothaan –Hall equation (SCF procedure) - Application to Ab initio method.

Unit - V: Density Functional Theory (DFT):

Orbital energies, Koopmans' theorem, electrostatic properties - Canonical and localized molecular orbital's - molecular properties- Density functional theory-Major exchange-correlation function - calculation of equilibrium geometries- force constants- vibrational spectra- transition states.

Books for Study

1. F. Jensen, Introduction to Computational Chemistry, John Wiley & Sons, 2004.
2. V. C. Gupta, Principles and Applications of Quantum Chemistry, Kindle Edition, 2015.
3. Errol Lewars, Computational chemistry, Introduction to the Theory and Application of Molecular and Quantum Mechanics, Springer Publication, 2008.
4. M.B Smith and J. March, Advanced organic chemistry, John Wiley & Sons, 2001.

Books for Reference

1. C. J. Cramer Essentials of Computational Chemistry, John Wiley & Sons, 2002.
2. T. Clark A Handbook of Computational Chemistry, Wiley, New York, 1985.
3. R. Dronskowski Computational Chemistry of Solid State Materials, Wiley-VCH, 2005.
4. D. Rogers, Computational Chemistry Using the PC, 3rd Edition, John Wiley & Sons, 2003.
5. Szabo, N.S. Ostlund, Modern Quantum Chemistry, McGraw-Hill, New Delhi, 1982.

Website References

1. https://en.wikipedia.org/wiki/Computational_chemistry

2. https://www.google.co.in/?gfe_rd=cr&ei=iihZWMRIILT8gfEmKmoCQ&gws_rd=ssl#q=introduction+to+quantum+computational+chemistry
3. <http://www.ccl.net/cca/documents/dyoung/topics-orig/compchem.html>
4. <http://nptel.ac.in/courses/104101002/downloads/lecturenotes/module1/chapter1.pdf>

P922X - Self-Study Paper: Shock Waves and High Pressure Physics in Material Science

Objectives:

1. To create awareness about shock waves and its application in material science
2. To explore the behaviour of materials properties at harsh environments.
3. To enable the students to acquire knowledge on the high pressure materials science and its applications.

Unit-I: Shock Waves

Introduction of shock waves – origin: natural and artificial - types of sonic waves –difference between acoustical, ultrasonic, supersonic waves - types of shock waves: strong shock waves and weak shock waves - Mach number- Mach angle - energy conversion laws.

Unit-II: Shock Tube

Types of shock tubes –mechanism – conventional shock tubes- Table top shock tubes – Reddy tube and its generations- shock tube relations – principle, working, and calibration of P_2 , P_4 , T_2 , T_5 - advantages of Reddy tube – shock tunnels.

Unit-III: Behaviour of Materials under Shock Loaded Conditions

Review of fundamental concepts of shock wave loadings on materials- importance of shock wave recovery experiments in materials – applications of high shock resistance materials - recent advances in shock wave recovery experiments in crystalline materials - shock wave induced phase transitions- irreversible and reversible (crystallographic and magnetic phase transitions).

Unit-IV: Static high pressure Compression of Solids

High pressure compression techniques - Piston cylinder methods- Diamond Anvil Cell (DAC) - cubic press. Structure- property relationship at high pressure compression on materials- Pressure induced behavior of nanoparticles, applications of high pressure compression.

Unit-V: Materials under Extreme Conditions

Recent Trends and Future Prospects of materials in extreme condition: high temperature - hostile chemical environments - high radiation fields (gamma radiation) - high vacuum- high magnetic and electric fields – impact of extreme condition: crystallographic features - microstructures.

Text Books:

1. Shock Waves Made Simple, K.P.J. Reddy, C.S. Kumar, K. Takayama, Wiley, 2014.
2. G.I. Kanel; Shock Waves in Solid State Physics, CRC Press Publisher, 2019
3. A.K. Tyagi S. Banerjee, Materials Under Extreme Conditions, Recent Trends and Future Prospects, Elsevier Publisher, 2017

Books for Reference:

1. G.I. Kanel, S.V. Razoranenov, V.E. Fortov Shock wave Phenomena and the properties of Condensed matter
2. J.Wadsworth, G.W.Crabtree et al. Basic research needs for materials under extreme Environments. (2008) US DOE - Office of Basic Energy Sciences

Websites for References:

1. <https://shock.wsu.edu/>
2. <https://munin.uit.no/handle/10037/10307>
3. <https://apps.dtic.mil/dtic/tr/fulltext/u2/692295.pdf>
4. <https://link.springer.com/content/pdf/bfm%3A978-3-540-30421-0%2F1.pdf>
5. <https://physics.wsu.edu/studying-materials-under-extreme-conditions-using-shock-waves/>
6. <https://link.springer.com/article/10.1007/BF00859398>
7. <http://aero.iisc.ac.in/people/lhsr/history.html>
8. http://aero.iisc.ac.in/people/lhsr/assets/documents/LHSR_brochure.pdf
9. <https://www.ias.ac.in/article/fulltext/reso/012/06/0010-0023>

P1015 - Electronic Instrumentation Techniques

Objectives:

1. To expose the students to the principles and working of Transducers and Analog and Digital Instruments used in measurement of various physical quantities.
2. To make the students to understand the working of electrical and magnetic measurement instruments and to provide basic knowledge about the working of Compositional analysis instruments and Bio-medical instruments.

Unit – I: Transducers

Transducers -Classification of Transducers –factors for selection of a transducer- Principle, construction and working of Thermistor and LVDT, Electrical strain gauges and capacitive transducers : change in area of plates and change in distance between plates, Advantages and disadvantages of capacitive transducers- Hall effect transducer -Photovoltaic transducer, Photo emissive transducer, Moving coil type velocity transducer- Sismic type velocity transducer- Measurement of pressure using resistive transducer.

Unit – II: Digital Instrumentation

Principle, block diagram and working: Ramp type digital voltmeter, potentiometric type digital voltmeter -Digital Multimeter, digital LCR meters, digital pH meter, digital conductivity meter and digital storage Oscilloscope – introduction to virtual instrumentation, Supervisory control and data acquisition.

Unit - III: Electrical and Magnetic Measurements Instrumentation

Principles and Experimental techniques: AC and DC Photoconductivity measurement (method name)-Electrical Conductivity and Resistivity measurement by Vanderpauw four probe method - dielectric measurement, Vibrating Sample Magnetometer and magnetic susceptibility measurement by Gouy's method.

Unit – IV: Analytical Instrumentation Techniques

Principles and Experimental techniques: X-ray Photoelectron Spectroscopy (XPS), Auger Electron Spectroscopy, Atomic Absorption Spectroscopy, Atomic Emission Spectroscopy, Flame Photometry-SIMS, CHNS.

Unit – V: Bio-Medical Instrumentation

Introduction- Origin of bioelectric signals-Action and resting potential - Physiological transducers to measure blood pressure, Hb meter, Blood cell counters-Bio potential electrodes- types – bio potential recorders - block diagram – ECG - waveform – electrodes and leads – Einthoven triangle – block diagram - EEG- EMG - CT scanners .

Text Books

1. Kealey D. and Haines P. J., Analytical chemistry, Viva Publications, New Delhi, 2002.
2. Lakshmi Rekha R., Ravikumar C., Biomedical Instrumentation and Medical electronics, Lakshmi Publications, Chennai, 2009.
3. Douglas A.Skoog, F.James Holler, Timothy A. Nieman, Principles of Instrumental Analysis, Harcourt College Publishers, 5th Edition, 2001.
4. Rajendra Prasad, Electronic Measurements and Instrumentation, Khanna Publications, Chennai, 2004.
5. Ramambhadran S., Electronic Measurements and Instrumentation, Khanna Publications, Chennai, 2003.
6. R.S. Khandpur “Handbook of Biomedical Instrumentation”, 2nd Edition, Tata McGraw Hill, 2003.

Books for Reference

1. Cooper W. D. and Helfrick A. D., Electronic Instrumentation and Measurement Techniques, First edition, Dorling Kindersly Pvt., Ltd., India, 2009.
2. Bouwens A. J., Digital instrumentation, McGraw Hill international, New Delhi, 2002.
3. Robert B. Northrop, Analysis and Application of Analog Electric Circuits to Biomedical instrumentation, CRC press, Noida, 2004.

Websites for Reference

1. <http://www.sjsu.edu/faculty/selvaduray/page/papers/mate210/thinfilm.pdf>
2. <http://www.leapsecond.com/pdf/an200.pdf>
3. http://academic.amc.edu.au/~hnguyen/JEE326_10/lecture03.pdf
4. <http://www.eng.hmc.edu/NewE80/PDFs/SensorsAndTransducers2012.pdf>
5. http://en.wikipedia.org/wiki/Secondary_ion_mass_spectrometry
6. http://www.casaxps.com/help_manual/XPSInformation/XPSInstr.htm
7. http://en.wikipedia.org/wiki/X-ray_photoelectron_spectroscopy
8. <http://www.eaglabs.com/mc/rbs-instrumentation.html>
9. http://www-pub.iaea.org/MTCD/publications/PDF/te_1190_prn.pdf
10. http://www-odp.tamu.edu/publications/tnotes/tn30/tn30_10.htm
11. http://www.rsc.org/images/CHNS-elemental-analysers-technical-brief-29_tcm18-214833.pdf
12. http://cdn.intechopen.com/pdfs/26275/InTech-Atomic_absorption_spectrometry_aas.pdf
13. <http://www.intechopen.com/books/atomic-absorption-spectroscopy>
14. <http://biomedikal.in/2010/01/short-and-precise-lecture-notes-on-ecg-electrocardiogram/>

P1016 - Nuclear and Particle Physics

Objectives:

1. To provide brief introduction to the various nuclear models and the experimental data supporting the model.
2. To provide an introduction to nuclear interactions and nuclear reactions and to enhance the knowledge about various fundamental particles, their decay and weak interactions of quarks.

Unit– I: Nucleus and Nuclear Models

Basic properties: Nuclear size, shape, charge distribution, spin, parity, binding energy-Magnetic dipole moment-Electric quadrupole moment-Nuclear models: Liquid drop model-Semi-empirical mass formula of Weizsacker-Application-Nuclear stability-Mass parabolas-Shell model-Magic numbers-Spin-Orbit coupling- validity and limitations - Angular momenta and

parities of nuclear ground state- qualitative discussion and estimation of transition rates- Magnetic moments -Collective model of Bohr and Mottelson.

Unit – II: Nuclear Interactions

Nuclear forces-characteristics-Two body problem- Deuteron-properties-Ground state of deuteron using square well potential -Magnetic moment-Quadrupole moment-Tensor forces-Meson theory of nuclear forces-Yukawa potential-Nucleon-nucleon scattering: Low energy npscattering-Effective range theory-Spin dependence, charge independence and charge symmetry of nuclear forces.

Unit – III: Nuclear reactions and fission

Types of nuclear reactions, Quantum mechanical theory, Resonance scattering and reactions — Breit Wigner dispersion relation; Compound nucleus formation and break-up, Statistical theory of nuclear reactions and evaporation probability, nuclear fission: Spontaneous fission- Bohr-Wheeler theory of fission-barrier penetration-statistical model. Elementary ideas about astrophysical reactions, Nucleosynthesis and abundance of elements.

Unit – IV: Nuclear Decay

Elementary ideas of α , β and γ decay -Fermi's theory of beta decay-Fermi-Kurie plot-Fermi and Gamow-Teller selection rules for allowed and forbidden decays-Non-conservation of parity-Decay rates- Theory of electron capture- Theory of neutrino- neutrino detection-Origin of Gamma decay-energetics of gamma decay-Multipole transitions in nuclei-Internal conversion-Nuclear isomerism-Angular correlation in successive gamma emissions.

Unit – V: Particle Physics

Elementary particles- Classification of elementary particles-Types of interactions between elementary particles- Conservation laws – quantum numbers-The problem of mass generation and the need for the Higgs mechanism - Elementary ideas of CP and CPT invariance-Hadrons-Classification of Hadrons- Symmetry-SU(2)-SU(3). Quarks; Colour; Gell-Mann – Okubo mass relation.

Text Books

1. Thyal D.C., Nuclear Physics, Himalaya Publishing house, Mumbai, 2011.
2. Goshal S. N., Nuclear Physics, S. Chand Publications, New Delhi, 2004.
3. S L Kakani Shubra Kakani, Nuclear and Particle Physics, 2nd Edition, VIVA books company India Ltd, 2008.
4. Suresh Chandra and Mohit K Sharma “Nuclear and Particle Physics” Narosa Publishing Company, 2012.

Books for Reference

1. Roy R. R. and Nigam B. P., Nuclear Physics, New Age International Ltd., New Delhi 2005.
2. Devanathan V., Nuclear Physics, Narosa Publishing House Pvt. Ltd, New Delhi, 2006.
3. Hans H. S., Nuclear Physics Experimental and Theoretical, New Age International (P) Limited Publishers, New Delhi, 2001.
4. Bernard L. Cohen, Concepts of Nuclear Physics, Tata McGraw Hill Publishing, New Delhi, 2002.
5. Irving Kaplan, Nuclear Physics, Narosa Publishing House Pvt. Ltd, New Delhi, 2002.
6. Santra A. B., Kailas S and Bhalerao R. S, Mesons and Quarks, Narosa publishing House Pvt., Ltd., New Delhi, 2004.
7. Satya Prakash, Nuclear Physics and Particle Physics, Sultan Chand, 2005.

8. V K Mittal, R C Verma, S C Gupta, Introduction to Nuclear and Particle Physics 3rd Edition - Prentice Hall India Learning P (Ltd.), 2013.

Websites for Reference

1. <http://www.sjsu.edu/faculty/watkins/nuclearstruct.htm>
2. http://en.wikipedia.org/wiki/Nuclear_shell_model
3. <http://www.sjsu.edu/faculty/watkins/semiempirical.htm>
4. http://www.physics.lancs.ac.uk/people/kormos/P235_1b.pdf
5. http://library.thinkquest.org/3471/nuclear_forces.html
6. <http://www.physicsandbook.com/topic/topicn/nuclearf.htm>
7. <https://www2.lbl.gov/abc/wallchart/chapters/03/0.html>
8. <https://www.britannica.com/science/radioactivity>
9. <https://www.quantamagazine.org/a-new-map-of-the-standard-model-of-particle-physics-2021022/>
10. <http://www.ucolick.org/~woosley/ay220-15/lectures/lecture5.4x.pdf>

PP1009 - Modern Physics Practicals (Any 15 Experiments)

1. Michelson Interferometer -Wavelength and separation of wavelengths of sodium light.
2. Hall Effect-Determination $R_{H,n}$, μ and θ_H
3. Molecular Spectra – CN/ALO Bands
4. Susceptibility of a liquid by Quincke’s method.
5. Susceptibility of a liquid by Guoy’s method.
6. Ultrasonic Diffraction - Velocity and Compressibility of a liquid.
7. Ultrasonic Interferometer - Velocity and Compressibility of a liquid.
8. B-H curve using CRO- Coercivity and retentivity
9. Spectral analysis of a salt.
10. Absorption Spectra-Determination of wavelength by Hartmann’s Interpolation formula.
11. Laser diffraction at a straight wire, Thickness determination and verification by air-wedge method.
12. Laser diffraction at a circular aperture, diameter determination and verification using microscope.
13. Determination of dielectric loss using CRO.
14. G.M. counter-Characteristics, inverse square law and Absorption co-efficient.
15. B-H loop using Anchor ring.
16. Specific charge of an electron -Thomson’s method / Magnetron method
17. Michelson Interferometer -Wavelength of laser beam
18. Franck Hertz experiment – Critical potential
19. Study of Zeeman effect — determination of e/m , Lande g-factor of electrons.
20. Millikan’s oil drop experiments – charge of electron.
21. Laser beam - Interference Experiments
 - a. Using an optically plane glass plate
 - b. Using Lloyd’s single mirror method.
22. Determination of strain hardening coefficients

PP1010 - Microprocessor, Microcontroller and C Programming Experiments

(Any 20 out of the given 25)

Microprocessor and Interfacing Programming

1. Number conversion -8 bit: BCD to Binary, Binary to BCD, Hex to ASCII using 8085.
2. Number conversion -16 bit: BCD to Binary(HEX), Binary(HEX) to BCD using 8085
3. Square and square root of BCD and HEX numbers 8 bit 8085.
4. Time delay subroutine and a clock program using 8085
5. Double and Triple precision addition and subtraction subroutine using 8085.
6. Sum of Arithmetic operation using 8085 MPU
7. Switching an array of LEDs by using 8085.
8. ADC and interfacing 0809 with MPU.
9. Analog to digital conversion using a DAC Comparator and MPU system.
10. DAC interface- wave form generation using CRO - ramp, square wave. Rectangular wave, Triangular wave and Step up followed by step down.
11. Interfacing a DC stepper motor to the MPU system - clockwise and anticlockwise - full stepping and half stepping.
12. Serial and parallel communication between two 8085 Microprocessors.
13. Interfacing Traffic controller using 8085 MPU.

Microcontroller 8051

1. Interfacing Traffic controller using 8051.
2. Interfacing seven segment displays with 8051.
3. Interfacing a Stepper motor to 8051.
4. Wave form generation using 8051.
5. Finding the sum of two numbers in decimal using 8051.
6. Addition, Subtraction, Multiplication and Division using 8051.

C Programming

1. Lagrange's interpolation.
2. Numerical integration by Trapezoidal rule.
3. Solution of a polynomial equation by Newton Raphson method.
4. Curve fitting - Least square fitting-Straight line fit.
5. Matrix multiplication
6. Numerical Integration by Simpson's rule.

P1017A - Elective: Modern Optics

Objectives

1. Provide a thorough foundation in the optical physics of both second order and third order nonlinear optical phenomena.
2. Understand nonlinear phenomena from the fundamental perspective of quantum mechanics.
3. To expose the students to the optical fiber communication systems and to explain the importance and advantages of optical fiber communications, basic problems and possible mitigations.
4. To understand the fundamentals of optical properties of materials for various applications.

Unit-I: Principles of Lasers

Emission and absorption of Radiation –Einstein Relations, pumping Mechanisms – Optical feedback - Laser Rate equations for two, three and four level lasers, pumping threshold conditions, Laser modes of rectangular cavity - Laser Systems: Gas, Liquid and Solid Lasers- Gas lasers and Energy level schemes: Argon, CO₂ Gas lasers- Applications. Solid State lasers: Neodymium - Ti-Sapphire Lasers – Dye lasers- Applications.

Unit - II: Non-linear Optics

Linear optics - Wave propagation in isotropic and anisotropic media – Polarization response of materials to light – Nonlinear Wave Propagation – three wave mixing - nonlinear susceptibility - second harmonic generation – Kurtz and Perry method - sum and difference frequency generation – optical parametric oscillation.

Unit - III: Third Order Non Linear Process

Electro-optic (Pockels) effect – Electro optic Modulators - four wave mixing - third harmonic generation - nonlinear index of refraction - self focusing - self phase modulation – cross phase modulation - short pulse generation - z scan – open aperture and closed aperture scans - Quadratic electro-optical (Kerr) effect - stimulated Raman scattering - stimulated Brillouin scattering.

Unit –IV Fiber Optics

Optical fibers – basic structure – light propagation in a step index fiber – conditions – linear effects – attenuation – measuring attenuation – dispersion – inter and intra – fiber modes – V-parameter – mode field diameter - Mitigations to Linear Effects Novel Fibers: Mitigations to attenuation – repeaters – optical amplifier – semiconductor optical amplifier – Erbium doped fiber amplifier – fiber Raman amplifier – mitigations to dispersion – dispersion shifted fiber – nonzero dispersion shifted fiber – dispersion flattened fiber – dispersion compensating fiber. Fiber Bragg grating – Dispersion compensation –Photonic crystal fiber – Photonic Devices.

Unit V: Optoelectronic Materials

Optical and Optoelectronic Materials - Principles of photoconductivity – simple models – effect of impurities – principles of luminescence – types and materials.
Applications: LED materials – binary, ternary photo electronic materials – Optical storage materials – LCD materials – photo detectors – applications of optoelectronic materials.

Books for Study:

1. R. Murugesan, KiruthikaSivaprasath, Modern Physics, S. Chand Publisher, New Delhi, 2016.
2. [Ajoy Ghatak](#) K. Thyagarajan, Fiber Optics and Lasers: The Two Revolutions, Infinity Press, 2016.
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5. G. P. Agarwal, Nonlinear Fiber Optics, 4th Edition, Academic Press, 2007.
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7. Kittel C, Introduction to Solid State Physics, 8th Edition, Wiley Eastern, New International Publishers, 2005.

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1. G.R. Fowles, Introduction to modern optics, Cambridge University Press, 2005.
2. [Ter-Mikirtychev](#), Vartan, Fundamentals of Fiber Lasers and Fiber Amplifiers, Springer press, 2014.
3. Ajoy Ghatak, Optics, McGraw Hill Education India Private Limited, 2017
4. N. Bloembergen, Nonlinear Optics, 4th Edition, World Scientific, 1996.
5. R. L. Sutherland, Handbook of Nonlinear Optics, 2nd Edition, Marcel Dekker press, 2003.
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8. Liang Dong, [Bryce Samson](#), Fiber Lasers Basics, Technology, and Applications, CRC Press, 2016.

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2. <https://www.sciencedirect.com/book/9780123970237/nonlinear-fiber-optics>
3. <https://www.cambridge.org/core/books/elements-of-nonlinearoptics/F6B3C66E6115CD3DE8F615DF16BBB47C>
4. <https://link-springercom.libproxy1.usc.edu/book/10.1007%2F978-3-540-46793-9>
5. <http://jonsson.eu/research/lectures>
6. <https://nptel.ac.in/courses/115101008/>
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10. https://link.springer.com/chapter/10.1007/978-3-319-48933-9_33
11. <http://www.fulviofrisone.com/attachments/article/404/Introduction%20to%20Modern%20Optics.pdf>

P1017B - Elective: Reactor Physics

Objectives

1. To introduce the concepts of nuclear energy, neutron diffusion and neutron moderation.
2. To provide an understanding of construction, kinetics, fuel used, precautions to be taken and applications of reactors.

Unit – I: Chain Reactions

Slow neutron reactions-nuclear reaction cross section-neutron cross section-determination of neutron cross section-attenuation of neutrons-macroscopic cross section and mean free path-neutron flux and reaction rate-energy dependence of neutron cross sections-fission cross section-neutron flux and reaction rate-energy dependence of neutron cross sections-fission cross section.

Unit – II: Thermal Neutrons and Neutron Diffusion

Energy distribution of thermal neutrons-effective cross section for thermal neutrons-the slowing down of reactor neutrons-Diffusion – diffusion Equation- solution of diffusion equation for a point source in an infinite medium and for an infinite plane source in a finite medium -thermal diffusion Length- diffusion Length for a fuel-moderator mixture-fast neutron diffusion and Fermi age equation- Correction for neutron capture

Unit – III: Nuclear fuels and Structural Materials

Nuclear Fuels: Introduction to Uranium, Plutonium and Thorium Fuels: Physical Properties, Ceramic Fuels: Ceramic Uranium Fuels, Uranium Dioxide (Uranium), Uranium Carbide, Uranium Nitride, Plutonium-Bearing Ceramic Fuels, Thorium-Bearing Ceramic Fuels
Fundamentals of iron carbon alloys and phase diagram, time temperature transformation diagram and heat treatments, special steels and their properties for nuclear reactor components, Pressure vessel steels, Nickel-base alloys-stellites.

Unit – IV: Neutron Moderation and Critical Equation

Energy loss in elastic collision - moderation of neutrons in Hydrogen - Space dependent slowing down -Moderation with absorption-Diffusion equation applied to a thermal reactor-thermal neutron source as obtained from the Fermi age equation-critical equation and reactor buckling-the non-leakage factors-criticality of large thermal reactors-critical equation for reactors with heterogeneous moderators-critical size and geometrical buckling- extrapolation length correction-effect of reflector.

Unit – V: Nuclear Reactors

Classification of reactors-Heterogeneous reactors-properties of heterogeneous system-resonance capture and resonance escape probability-calculation of the thermal utilization-resonance escape probability and fast fission factor-Commercial reactors: Pressurized Water Reactor (PWR)-Boiling Water Reactor (BWR)- Heavy Water Reactor (HWR)- Water Moderated Enriched Reactors- The breeder reactor- future of nuclear fission power. Generation-I, II, III, IV Reactors-Nuclear Reactors in India

Text Books:

1. John R. Lamarsh, Introduction to Nuclear Reactor Theory, Addison Wesley, 2002.
2. Samuel Glasstone, Milton C. Edlund, The Elements of Nuclear Reactor Theory, Van Nostrand, 1995.
3. James J Duderstadt, Louis J Hamilton, Nuclear reactor analysis, Wiley India Pvt., Ltd, 2013
4. Robert E. Masterson, "Introduction to Nuclear Reactor Physics" CRC Press, 1st Edition 2018

Books for Reference:

1. Thayer D.C., Nuclear Physics, Himalaya Publishing House, Mumbai, 2007.
2. Goshal S. N., Nuclear Physics, S. Chand Publications, New Delhi, 2004.
3. Bannet D. J. and Thomson J. R, The Elements of Nuclear Power, Longman Scientific and Technical, New York, 1989.
4. Murray R. L., Nuclear Physics, 5th Edition Butterworth, Heineman, 2001.

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2. <http://www.studymode.com/essays/Reactor-Physics>
3. https://en.wikipedia.org/wiki/Chain_reaction
4. www.ans.org/PowerPlants
5. www.world-nuclear.org/info/inf53.html
6. npcil.nic.in/main/AllProjectOperationDisplay.aspx
7. <https://www.amacad.org/sites/default/files/academy/pdfs/nuclearReactors.pdf>
8. <https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-power-reactors/advanced-nuclear-power-reactors.aspx>
9. <https://www.imetllc.com/training-article/phase-diagram/>
10. <https://www.tandfonline.com/doi/abs/10.1080/00223131.2016.1208593>
11. <https://www.coursera.org/lecture/ferrous-technology-2/iron-carbon-system-aUbv1>

P1017C - Elective: Digital Signal Processing

Objectives:

1. To introduce signals, systems, time and frequency domain concepts and the associated mathematical tools those are fundamental to all DSP techniques.
2. To provide a thorough understanding and working knowledge of design, implementation, analysis and comparison of digital filters for processing of discrete time signals.
3. To introduce various sampling techniques and different types of filters.

Unit-I: Introduction to DSP

Signals, systems and signal processing, classification of signals, elements of digital signal processing system, concept of frequency in continuous and discrete time signals, Periodic Sampling, Frequency domain representation of sampling, Reconstructions of band limited signals from its samples.

Unit-II: Discrete-Time Signals and Systems

Z-transform & Inverse z-transform, Linear convolution and its properties, Linear Constant Coefficient Difference equations, Frequency domain representation of Discrete-Time Signals & Systems, Representation of sequences by discrete time Fourier Transform, (DTFT), Properties of discrete time Fourier Transform, and correlation of signals, Fourier Transform Theorems.

Unit-III: Structures for Discrete Time Systems

Block Diagram and signal flow diagram representations of Linear Constant-Coefficient Difference equations, Basic Structures of IIR Systems, lattice and lattice-ladder structures, Transposed forms, Direct and cascade form Structures for FIR Systems, Linear Phase FIR structure, Effects of Co-efficient quantization.

Unit-IV: Filter Design Techniques

Design of Discrete-Time IIR filters from Continuous-Time filters Approximation by derivatives, Impulse invariance and Bilinear Transformation methods; Design of FIR filters by windowing techniques.

Unit-V: Advance DSP Techniques

Multirate Signal Processing: Decimation, Interpolation, Sampling rate conversion by rational factor Adaptive filters: Introduction, Basic principles of Forward Linear Predictive filter and applications such as system identification, echo cancellation, equalization of channels, and beam forming.

Books for Study:

1. John G. Proakis and Dimitris G. Manolakis, "Digital Signal Processing: Principles, Algorithms, and Applications", PHI learning 4th Edition, New Delhi, 2008.
2. Alan V. Oppenheim, Ronald W. Schaffer, and John R. Buck, "Discrete-Time Signal Processing" Pearson Education India, 2nd Edition, 2013
3. P. Ramesh Babu, "Digital Signal processing", Scitech Publications, 2007.

Books for Reference:

1. L. R. Rabiner and B. Gold, "Theory and Application of Digital Signal Processing" PHI Learning, New Delhi, 1998.
2. Mitra, Sanjit K, Digital Signal Processing: A Computer Based Approach, 4th Edition, McGraw-Hill, 2011.
3. KuoSen M, Lee Bob H and Tian Wenshun, Real-Time Digital Signal Processing: Implementations and Applications, 2nd Edition, John Wiley, 2006.
4. Oppenheim Alan V, Schaffer Ronald W, and Buck John R, Discrete-Time Signal Processing, 3rd Edition, Prentice-Hall, 2009.
5. Lapsley Phil, DSP Processor Fundamentals: Architectures and Features, IEEE Press, 1997.
6. Ackenhusen John G, Real Time Signal Processing: Design and Implementation of Signal Processing Systems, Prentice-Hall, 1999.

Websites for Reference

1. https://www.tutorialspoint.com/digital_signal_processing/dsp_signals_definition.htm
2. https://www.tutorialspoint.com/digital_signal_processing/dsp_basic_ct_signals.htm
3. https://www.tutorialspoint.com/digital_signal_processing/dsp_basic_dt_signals.htm
4. https://www.tutorialspoint.com/digital_signal_processing/dsp_classification_ct_signals.htm
5. https://www.youtube.com/watch?v=6dFnpz_AEyA
6. <https://www.youtube.com/watch?v=1mVbZLHLaf0>
7. https://www.tutorialspoint.com/digital_signal_processing/dsp_static_systems.htm
8. https://www.tutorialspoint.com/digital_signal_processing/dsp_dynamic_systems.htm
9. https://www.tutorialspoint.com/digital_signal_processing/dsp_operations_on_signals_differentiation.htm
10. https://www.tutorialspoint.com/digital_signal_processing/dsp_operations_on_signals_integration.htm
11. https://www.tutorialspoint.com/digital_signal_processing/dsp_discrete_fourier_transform_introduction.htm
12. https://www.tutorialspoint.com/digital_signal_processing/dsp_discrete_time_frequency_transform.htm
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14. https://www.tutorialspoint.com/digital_signal_processing/dsp_operations_on_signals_convolution.htm
15. https://www.tutorialspoint.com/digital_signal_processing/digital_signal_processing_pdf_version.htm

Analytical instrumentation and Characterization Techniques

Objectives:

1. To introduce to the students various characterization techniques for scientific research
2. To provide hands-on training to handle the instruments independently so as to make them research ready and to motivate the students towards research.

Learning Outcomes: By undergoing this course, the students will be able to

1. Understand the various characterization techniques and skills required for scientific research.
2. Handle the instruments independently and hence to instill a sense of confidence to pursue research.

Unit - I: Powder XRD

X-ray diffraction-Instrumentation-Data collection-indexing-Interpretation.

Unit - II: UV-Vis spectroscopy

Beer's law-Intensity-double beam UV-Vis spectrophotometer-Instrumentation-Data collection-Interpretation.

Unit - III: FTIR Spectroscopy

Functional groups-Double beam FTIR spectrophotometer-Instrumentation-Data collection-Interpretation.

Unit - IV: Dielectric Spectroscopy

Dielectric constant-Dielectric loss-frequency and temperature dependence of Dielectric constant-Dielectric loss-Instrumentation-Data collection-Interpretation

Unit - V: Photoacoustic Spectroscopy

Thermal diffusivity-thermal emissivity and thermal conductivity-Instrumentation of Photoacoustic spectrometer- data collection-Interpretation

Books for Reference:

1. Skoog, Holler and Crouch, Principles of Instrumental Analysis, Cengage Learning India (P) Ltd., 6th Edition, 2015.
2. S. M. Khopkar, Basic Concepts of Analytical Chemistry, New Age International Publishers, 2nd Edition, 2008.

Website References:

1. [https://en.wikipedia.org/wiki/Characterization_\(materials_science\)](https://en.wikipedia.org/wiki/Characterization_(materials_science))
2. https://en.wikipedia.org/wiki/Ultraviolet%E2%80%93visible_spectroscopy
3. [http://chem.libretexts.org/Textbook_Maps/Analytical_Chemistry_Textbook_Maps/Map%3A_Analytical_Chemistry_2.0_\(Harvey\)/10_Spectroscopic_Methods/10.3%3A_UV%2F%2FVis_and_IR_Spectroscopy](http://chem.libretexts.org/Textbook_Maps/Analytical_Chemistry_Textbook_Maps/Map%3A_Analytical_Chemistry_2.0_(Harvey)/10_Spectroscopic_Methods/10.3%3A_UV%2F%2FVis_and_IR_Spectroscopy)
4. <https://en.wikipedia.org/wiki/Spectrophotometry>
5. <https://chemistry.oregonstate.edu/courses/ch361-464/ch362/irinstrs.htm>
6. https://en.wikipedia.org/wiki/Fourier_transform_infrared_spectroscopy
7. http://www.msi-sensing.com/broadband_dielectrics.htm
8. https://en.wikipedia.org/wiki/Dielectric_thermal_analysis
9. https://en.wikipedia.org/wiki/Photoacoustic_spectroscopy
10. <http://www.rdmag.com/news/2012/08/photoacoustic-technique-hears-sound-dangerous-chemical-agents>.

B. Sc CHEMISTRY

SEM I CH116 Organic Chemistry – I Hrs/week – 3 hours (Credits 3)

Objectives

- Understanding the structure of organic compounds.
- Understanding the fundamentals of acidity and basicity.
- Providing the rudimentaries of stereochemistry.

Unit 1 Electronic structure and bonding

9 Hours

- 1.1 Ionic and covalent bonds, Polar covalent bonds and dipole moment. Introduction to molecular orbital theory, Single, double, and triple bond formation in organic compounds.
- 1.2 Bonds in methyl cation, radical and anion. Bonds in water, ammonia, ammonium ion and hydrogen halides. Hybridization, bond lengths, strengths, and angles. Fischer, Flying wedge, Newmann projection and Sawhorse representations. Rotation about carbon-carbon single bonds, conformational analysis of ethane, butane.
- 1.3 Baeyer strain theory-conformational analysis of cyclohexane

Unit 2 Acidity and basicity of organic compounds

9 Hours

- 2.1 Acids and Bases, pKa and pH, organic acids and bases, Acid-base reaction and position of equilibrium, Effect of structure on the pKa of acids (electronegativity, hybridization, size).
- 2.2 Effect of substituent on the strength of an acid, delocalized electrons. Buffer solutions, Lewis acids and bases.
- 2.3 Effect of pH on the structure of organic compounds.

Unit 3 Stereochemistry 1

9 Hours

- 3.1 Isomerism, constitutional, conformational isomers, stereoisomers, cis-trans isomers from restricted rotation, asymmetric centers and stereocenters.
- 3.2 Isomers with one and two asymmetric centers, configurational isomers, Cahn Ingold Prelog rules and assigning E, Z, R & S to molecules.
- 3.3 Optical activity, measurement of specific rotation, enantiomeric excess, meso compounds with an asymmetric center, reactions of compounds that contain an asymmetric center-Stereoselective, regioselective and stereospecific reactions.

Unit 4 Chemistry of Alkenes

9 Hours

- 4.1 Stereochemistry of electrophilic addition reactions of alkenes. Addition reactions resulting in one and two asymmetric centers: addition reactions forming a cyclic bromonium ion intermediate.
- 4.2 Alkenes, addition of hydrogen halides, stability of carbocations, electrophilic addition reactions and regioselectivity.
- 4.3 Addition of water, alcohols, halogens, peroxy acid and hydrogenation of alkenes. Oxymercuration-reduction and hydroboration-oxidation with mechanism.

Unit 5 Chemistry of Alkynes

9 Hours

- 5.1 Alkynes: Structure and reactivity of alkynes (with mechanism).
- 5.2 Addition of hydrogen halides, halogens, water, hydroboration-oxidation
- 5.3 Addition of hydrogen to an alkyne, acidity of hydrogen bonded to an 'sp' carbon, synthesis using

Reference Books:

Text Book

1. Paula Yurkanis Bruice, *Organic chemistry*, 6th Edition, Prentice Hall, Illinois, 2011.

Further reading

2. R.T. Morrison and R. N. Boyd, *Organic chemistry*, 6th Edition, Prentice-Hall of India, New Delhi, 2008.
3. Leroy. G. Wade, *Organic chemistry*, 6th Edition, Pearson, New York, 2005.
4. Clayden, J Greeves, N and Warren, S, *Organic Chemistry*, 2nd Edition,. Oxford University Press, New York, 2001.
5. Loudon, Marc G, *Organic Chemistry*, 6th Edition,. Oxford University Press, New York, 2016.

Outcomes

- Ability to draw the structure of molecules.
- Assess the acidic, basic and delocalization nature of molecules.

SEM I CH117-Analytical Chemistry – I Hrs/week – 4 (Credits 4)

Objectives

- To learn the basic principles and applications of important analytical techniques
- To develop a sound knowledge in chemistry involved in an analysis

Unit-1. Laboratory hygiene and Safety 12 Hours

- 1.1. Storage and handling of corrosive, flammable, toxic, carcinogenic and poisonous chemicals. Disposal of solid, liquid and fume wastes.
- 1.2. Simple First Aid Procedures: Acids, alkalis, phenols, toxic substances like bromine, benzene, pyridine, glass cuts and poisons. Universal antitodes, tartaremetic and tincture of iodine.
- 1.3 Laboratory Glassware-Cleansing agents-interchangeable ground joints apparatus-description, advantages and precautions to be followed. Safety practices in the laboratory.

Unit - II Separation Techniques 12 Hours

- 2.1 Solvent Extraction-Principle-Extracting from solid-liquid phases-Soxhlet extractor Extraction by chemically active Solvents-Chromatography-types of chromatography.
- 2.2 Principle, techniques and applications of TLC, and Paper. Principle, techniques and applications of Column chromatography.
- 2.3 Gas-Liquid Chromatography-Principle, Instrumentation, and applications.

Unit-III Volumetric analysis 12 Hours

- 3.1 Primary and secondary standards. Requirements of primary standards with examples-classifications of volumetric analysis. Acid-base titrations: Principle-theory of acid-base indicators- Methyl red and phenolphthalein.
- 3.2 Redox titrations: Theory of redox titrations-theory of redox Indicators-Diphenyl amine, Ferroin, and Starch.
- 3.3 Precipitation Titrations: Principle-Estimations of Chloride by Mohr's method and Volhard's Method. Complexometric Titrations: Principle-Estimation of Magnesium using EDTA-Theory of metal-ion indicators.

Unit - IV Gravimetric Analysis and Thermal Analysis 12 Hours

- 4.1 Gravimetric Analysis-Principle-Conditions of precipitation-choice of Precipitants. Inorganic and Organic Precipitants-specific and selective precipitants.
- 4.2 Masking Agents-Precipitation from homogeneous Medium-Post Precipitation-Co-Precipitation-Differences between post and Co-precipitation.
- 4.3 Principles of thermogravimetric analysis and Instrumentation-Derivative thermogravimetry-Factors influencing thermogram. DTA-Principle and Instrumentation-Applications: TGA-Calcium oxalate monohydrate-DTA-Calcium acetate monohydrate.

Unit - V Units of measurement and Error Analysis

12 Hours

- 5.1 Units of measurement-normality, molality, and molarity, examples for this concept. Mole fraction-percentage solution
- 5.2 Significant Figures-Rules-Rounding off figures. Definition of terms in mean, median, and mode. Standard deviation, relative standard deviation.
- 5.3 Precision and Accuracy-absolute error, relative error. Types of error in experimental data, determinate (systematic), indeterminate (or random) and gross.

References

1. Gary D. Christian,; Purnendu K. Dasgupta,; Kevin A. Schug, *Analytical Chemistry*, 7thEdition;Wiley Global Education, 2013.
2. Douglas A. Skoog,; F. James Holler,; Stanley R. Crouch, *Principles of Instrumental Analysis*, 6thEdition;Cengage Learning, 2006.
3. John H Kennedy, *Analytical Chemistry: Principles*, 2ndEdition; Saunders College Pub, 1990.
4. Larry G. Hargis, *Analytical Chemistry: Principles and Techniques*, 1stEdition; Prentice Hall, 1988.
5. Reuben Alexander Day,; Arthur Louis Underwood, *Quantitative Analysis*, 6thEdition;Prentice Hall India Learning Private Limited, 1992.
6. S. M. Khopkar, *Basic Concepts of Analytical Chemistry*, 3rd Rev Edition; New Age Science Ltd, 2008.
7. Frank A. Settle, *Handbook of Instrumental Techniques for Analytical Chemistry*, 1stEdition; Prentice Hall, 1997.
8. R.Gopalan, P. S. Subramanian and K. Rengarajan, *Elements of analytical chemistry*, 3rdEdition, Sultan Chand, New Delhi, 2003
9. A. K. Srivatsava and P. C. Jain, *Chemical Analysis and Instrumental Approach*, 3rdEdition, S.Chand and Company Ltd., New Delhi, 2010.

Learning Outcomes

- Identify the suitable methods for separation; explain chemical analysis of compounds
- Outline the principle behind Volumetric, gravimetric analysis, mass spectrometry, Chromatography and list out their applications

SEM II **CH216-Inorganic Chemistry - I** **Hrs/week – 3 (Credits 3)**

Objectives

- To understand the basic atomic structure of elements their periodic properties and chemical bonding.
- To learn the properties and applications of *s* and *p* block elements.
- To understand the principles and theories of Acids and Bases

Unit-1 Atomic Structure

9 Hours

- 1.1 Electronic configurations of the elements, Aufbau principle, quantum numbers, and Pauli's exclusion principle. Hund's multiplicity rule for filling electrons in various orbitals, Stability of half-filled and completely filled orbitals, effective nuclear charge.
- 1.2 Shapes of *s*, *p*, *d* orbitals - *s*, *p*, *d* and *f* block elements – classification and characteristic properties.
- 1.3 Periodicity of properties – Definition and periodicity of the following properties – Atomic radii – factors affecting atomic radii – ionic radii – factors affecting ionic radii. Ionisation potential – factors affecting ionisation potential – Electron affinity – factors affecting electron affinity – Electronegativity – factors affecting electronegativity – Pauling scale.

Unit-2 Chemical Bonding

9 Hours

- 2.1. Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications.
- 2.2 Polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.
- 2.3. Covalent bonding: Lewis theory, Octet theory, VSEPR theory and applications – geometries of BCl_3 , H_2O , ClF_3 , PCl_5 , IF_7 and XeF_6 molecules.

Unit-3 Alkali and alkaline earth metals

9 Hours

- 3.1 Alkali metals – Comparative study of elements – oxides, halides, hydroxides and carbonates – Exceptional property of Lithium – Diagonal relationship of Li with Mg.
- 3.2. Alkaline earth metals – comparative study of the elements with respect to oxides, hydroxides, halides, sulphates and carbonates – Exceptional property of Beryllium – Diagonal relationship of Be with Al
- 3.3. Comparison of alkaline earth metals with alkali metals – Magnesium acting as bridge element between IIA and IIB groups – Magnesium resembles zinc. Properties and uses of Alkaline earth metals. Biological role of Mg^{2+} and Ca^{2+}

Unit-4 p–block elements, Chemistry of group 13

9 Hours

- 4.1. Main group elements- introduction, general and special characteristics. Group 13: general properties, electronic configuration, oxidation states, inert pair effect, size of atoms and ions, electropositive nature and ionization energy.
- 4.2 Compounds of group 13: Structure and bonding in diborane. Preparation, properties and structure: Borazine, trihalides- Boron and Aluminium.
- 4.3 Compounds of Boron and Oxygen (structure and properties): Sesquioxides-Borates and Borax.

Unit-5 Acids and Bases

9 Hours

- 5.1. Arrhenius concept. Lowry Bronsted concept-conjugate acid-base pairs, relative strengths of acid-base pairs.
- 5.2. Lux-flood concept. Lewis concept, limitations of lewis concept.

5.3. Pearson concept-HSAB principle. Estimation of TDS in water.

Learning Outcomes

- The student can explain the atomic structure and bonding nature present in a molecule along with the applications and importance of s and p block elements
- The students can understand the theories pertaining to the acids and bases.

References

1. R. D. Madan, *Modern Inorganic Chemistry*, Second edition, S. Chand publications, New Delhi, 2000.
2. B. R. Puri, L. R. Sharma and K. C. Kalia, *Principles of Inorganic Chemistry*, 33rd Edition, Vishal Publishing Co, Jalandar, 2004.

(Advanced Reading)

1. C. Chambers and A. K. Holliday, *Modern Inorganic Chemistry*, First edition, Butterworth and Co., Sussex, 1975.
2. Gary L Miessler and Donald A Tarr, *Inorganic Chemistry*, Third edition, Pearson Prentice Hall.
3. B. Murphy, C. Murphy and B. J. Hathway, *Basic Principles of Inorganic Chemistry*, The Royal Society of Chemistry, Cambridge, 1998.

SEM II **CH217-Physical Chemistry – I** **Hrs/week – 4(Credits
4)**

Objectives

- To understand the important behaviour of gases and liquids
- To learn the fundamentals of thermochemistry and thermodynamics

Unit – I Gaseous State -I

12 Hours

- 1.1. Kinetic theory of gases –derivation of kinetic gas equation–Gas laws from the kinetic gas equation.
- 1.2. Maxwell's distribution of-molecular velocities (no derivation)–Experimental verification of velocity distribution – Effect of temperature on velocity distribution.
- 1.3. Kinds of velocities – mean, rms, most probable velocities-Degrees of freedom of a gaseous molecule, equipartition of energy, heat capacity on molecular basis.
- 1.4. Collision diameter-Collision Number-Collision frequency-and mean free path

Unit - II Gaseous State -II

12 Hours

- 2.1 Effect of Temperature and Pressure on mean free path and Collision frequency
- 2.2 ideal gas and real gas-Deviation of real gas from ideal behaviour-Compressibility factor-causes of deviation-Compressibility of various Gases (variation of Z with Pressure)
- 2.3 Derivation of van der Waals Equation for real gases-significance of van der Waals constants-Behaviour of real gas using van der Waals equation-Exceptional behaviour of H and He.
- 2.4 Liquification of gases-Linde's Process and Claude's Process

Unit -III Liquid State

12 Hours

- 3.1 Differences between solids/liquids/gases in terms of structure-Intermolecular forces in liquids –Vapour pressure and Factors affecting them – Determination of Vapour pressure of a liquid -
- 3.2 Surface tension of a liquid-surface energy-liquid rises in a capillary tube-surface active agents Effect of temperature on surface tension-Determination of surface tension-
- 3.3 Capillary Rise and Drop Weight Method-Drop weight methods
- 3.4 Viscosity-factors affecting viscosity-Ostwald Viscometer method

Unit-IV: Thermodynamics -I**12 Hours**

- 4.1. Thermodynamics – Definition and explanation of terms – System, boundary, surroundings – Homogeneous and heterogeneous system – Isolated system – Closed system – Open system. Thermodynamic functions - Intensive and extensive properties – state functions and path functions. Exact differentials
- 4.2. Thermodynamic processes - First law of thermodynamics Concept of internal energy – Energy changes with work –State functions.
- 4.3. Enthalpy (Heat) of the reaction- Factors influencing enthalpy-Measuring the enthalpy of combustion (Bomb Calorimeter)
- 4.4 Heat capacity – at constant pressure and volume – relationship between C_p and C_v

Unit-V: Thermochemistry**12 Hours**

- 5.1 Joule's law – Joule – Thomson effect – Joule – Thomson coefficient and its derivation – inversion temperature, its significance and its derivation.
- 5.2 Endothermic/Exothermic reaction. Enthalpy of formation and standard enthalpy of formation-importance of standard enthalpy of formation- Hess's Law of constant heat summation
- 5.3 Determination of enthalpy of formation – Problems related to Hess's Law Bond enthalpy and application -calculation from thermochemical data
- 5.4 Application of bond dissociation energies - calculation from thermochemical data – Kirchoff's equation and its significance.

Text Books:

1. B. R. Puri, L. R. Sharma and M. S. Pathania, *Principles of Physical Chemistry*, 47th Edition, Vishal Publishing Co, Jalandar, 2016.
2. R.L. Madan, *Physical Chemistry*, Mc Graw Hill Education Pvt. Ltd. 2015.
3. Peter Atkins and Julio de Paula, *Physical Chemistry*, 10th Edition, W. H. Freeman and Company. (Unit IV)
4. Raymond Chang and John W. Thoman, *Physical Chemistry for the chemical science*, Jr.University Science Books (Unit IV)

Reference:

1. Arun Bahl, B.S. Bahl. G.D.Tuli, *Essentials of Physical Chemistry*, S. Chand Publications
2. A.S. Negi and S.C. Anand, *A text book of Physical Chemistry*, Wiley Eastern Ltd, New Delhi, 1984.

Learning Outcome:

- Recognize and relate the properties of ideal and real gases
- Describe the properties of liquids
- Describe the thermodynamic parameters in exo and endothermic process.

Semester - I & II
semester)**PCH209-Volumetric Analysis****3 Hrs/week (3 Credits/****Objectives**

- To learn the methods to estimate chemical substances through various volumetric procedures
- To appreciate the merits and limitations of each type of analysis and acquiring knowledge about the implementation of these procedures for specific ions/species.

Acidimetry

1. Estimation of Borax – Standard Sodium Carbonate
2. Estimation of Sodium Hydroxide – Standard Sodium Carbonate
3. Estimation of HCl – Standard oxalic acid.

Permanganometry

4. Estimation of oxalic acid – Standard FAS
5. Estimation of FeSO_4 – Standard Oxalic acid

Dichrometry

6. Estimation of Ferrous Iron using Diphenyl amine as indicator.
7. Estimation of ferric ion using Diphenyl amine as indicator

Iodimetry

8. Estimation of Arsenious oxide

Iodometry

9. Estimation of Copper - Standard Potassium dichromate

Complexometry

10. Estimation of Magnesium using EDTA
11. Estimation of Zinc using EDTA
12. Estimation of Calcium using EDTA
13. Estimation of total hardness of water.

Cerimetry

14. Estimation of sodium nitrite.

References

1. V. Venkateswaran, R. Veerasamy, A.R. Kulandaisamy, *Basic principles of Practical Chemistry*, S.Chand publications, New Delhi, 2002.
2. A.O, Thomas. *Practical Chemistry*, 6th Revised Edition, Sharada Press, 1995.
3. J. N. Gurtu and R. Kapoor, *Advanced Experimental Chemistry*, Vol. I –III, S. Chand and Co., 1987.

Semester - I ACH110 Allied Chemistry - I (Biochemistry) 4 Hrs/week (2Credits)

Objectives

- To understand the basics of chemistry.
- To learn the role of chemistry in biochemistry

Unit - I: Introduction to Solutions-

12 Hours

- 1.1 Units of measurement-normality, molality, and molarity, examples for this concept. Mole fraction-percentage solution.
- 1.2 Significant figures-Rules-Rounding off figures-Errors-types of errors and rectification of errors.
- 1.3 Solutions-solute-solvent(polar and non-polar)-ideal- non ideal solutions with one example each. Raoult's Law Deviations. Isotonic solution, hypertonic solution and hypotonic solution
- 1.4 Water-Structure of Water-weak interactions of water-Water as a reagent.

Unit - II: Basic Organic Chemistry

12 Hours

- 2.1 Structure of Atom-types of Bonds-Valance of carbon-Bond length and bond energies.
- 2.2 Electronic configuration-Hybridisation, sp^3 , sp^2 , sp - Hybridisation of Hetero atoms
- 2.3 Stereo isomerism-types - causes of optical activity, optical isomerism of lactic acid and tartaric acid-Racemisation-Resolution-Geometrical isomerism-maleic and fumaric acid.
- 2.4 Concept of resonance-Aromaticity in benzene-Huckle's rule-reactions in benzene(Electrophilic substitution reaction, Addition)

Unit - III: Acid-Base Theory and Buffers in Body Fluid System 12 Hours

- 3.1 Acids and bases, Arrhenius, Lowry Bronsted concept, Lewis concept-conjugated pairs. pH, pOH, buffer, buffering capacity, common ion effect and Henderson Hesselbalch equation. Buffers in body fluids, red blood cells and tissues.
- 3.2 Colloids: Types of colloids-lyophilic and lyophobic colloids-Tyndell effect, Brownian movement, Protective colloids-Gold number, coagulation of colloids,
- 3.3 Emulsions-type of emulsions, Gels-types of gels, properties of gels.
- 3.4 Osmosis and its applications and osmotic pressure. Principle of sonication, dialysis and Ultra filtration. Isotonic, Hypotonic and hypertonic Solutions.

Unit - IV: Chemical Kinetics 12 Hours

- 4.1 Kinetics: Rate-Rate equation-order-Molecularity-pseudo first order reaction- First order reaction-Pseudo first order (with examples)- derivation of equation for rate constant, determination of order (half-life method, graphical method).
- 4.2 Factors affecting the reaction rate (pressure, temperature, concentration, solvent and catalyst), Energy of activation.
- 4.3 Catalyst: Characteristics of catalyst - auto catalyst, enzyme catalyst, active center, catalytic poison, promoters (Definitions of these terms with examples only). Homogenous and heterogeneous catalyst-mechanism of heterogeneous catalyst.
- 4.4 Enzyme catalysis- Theory-Lock and Key Model-Induced Fit Model-Michaelis-menton equation-Industrial applications of catalysts.

Unit -V: Anesthetics and Antibiotics 12 Hours

- 5.1 Sulpha Drugs-Introduction-Preparation, uses and mode of action of sulpha drugs. Prontosil, Sulphanilamide, Sulphapyridine, Sulphadiazine, and Sulphaguanidine
- 5.2 Structure and uses of the following antibiotics-Penicillin, chloramphenicol, and streptomycin.
- 5.3 Anesthetics: Classification of anesthetics with examples (Types of Classifications).
- 5.4 Preparation, advantages and disadvantages of the following anesthetics- 1) Diethyl ether, 2) Chloroform, 3) Tri chloroethane, and 4) Thiopental sodium

References

1. R. D. Madan, *Modern Inorganic Chemistry*, Second edition, S. Chand publications, New Delhi, 2000.
2. B. R. Puri, L. R. Sharma and K. C. Kalia, *Principles of Inorganic Chemistry*, 33rd Edition, Vishal Publishing Co, Jalandar, 2004.
3. Jayashree Ghosh, *Textbook of Pharmaceutical chemistry*, Rajendra ravindra printers Pvt. Ltd., New Delhi, 2010
4. Nelson, D. L.; Cox, M. M.; *Lehninger's Principles of Biochemistry*, W H Freeman & Co, 2012.
5. R.T. Morrison and R. N. Boyd, *Organic chemistry*, 6th edition, Prentice-Hall of India, New Delhi, 2004.
6. Paula Yurkanis Bruice, *Organic chemistry*, 6th edition, Pearson Edition, New York, 2006.

Semester - II ACH210 Allied Chemistry - II (Biochemistry) 4 Hrs/week (2Credits)

Objectives

- To understand the basics of chemistry.
- To learn the role of chemistry in biochemistry

Unit - I: Chromatography and Electrophoresis Technique 12 Hours

- 1.1 Principle, Procedure and application of Paper chromatography, partition chromatography.

- 1.2 Principle, Procedure and application of Ion exchange and gel chromatography, partition chromatography.
- 1.3 Principle, Procedure and application of GLC and HPLC.
- 1.4 Electrophoresis: Principle, procedure and application of Free flow and Zone electrophoresis.

Unit - II: Nuclear Chemistry in Biochemistry **12 Hours**

- 2.1 Radioactivity-types of rays-natural and artificial radioactivity
- 2.2 Radioactive disintegration-half life-average life- transmutation of elements-group displacement law-Applications of radioactivity.
- 2.3 Isotopes-important stable isotopes used in biochemistry(Medicinal applications of Isotopes)-Radiation hazards and handling the isotopes.
- 2.4 Measurement of radioactivity GM Counter and Scintillation counter

Unit - III: Carbohydrates **12 Hours**

- 3.1 Fischer's Projection-Classification and nomenclature of carbohydrates -Stereochemistry of monosaccharides-Configuration of glucose-Anomers-mutarotation.
- 3.2 Reactions and characteristics of aldehyde and keto group, action of acids and alkalies on sugars, reactions of sugars due to hydroxyl group.
- 3.3 Properties of glucose-An introduction to mucopolysaccharides (proteoglycan).
- 3.4 Structure and reaction of mono and disaccharides: glucose, fructose, sucrose, maltose lactose, starch, cellulose and glycogen (No elucidation).

Unit - IV: Amino Acids, Peptides and Proteins **12 Hours**

- 4.1 Classification of amino acids- neutral, acidic, basic, essential and non-essential- Properties of glycine (Physical and chemical).
- 4.2 Peptides- N-terminal and C-terminal residues-nomenclature-End group analysis-Reduction method-Sanger's method.
- 4.3 Proteins-classification based on composition, functions, shape and solubility-Primary, Secondary, Tertiary, and quaternary-structure of proteins-Ramachandran Plot.
- 4.4 Denaturation, renaturation and folding of proteins.

Unit -V: Coordination and Bioinorganic Chemistry **12 Hours**

- 5.1 Coordination chemistry- Nomenclature- Werner's theory- bonding nature- EAN rule
- 5.2 Valence bond theory, Crystal field theory- tetrahedral, octahedral, square planar complexes and colour of the complexes.
- 5.3 Isomerism in coordination compounds- Ionization, hydrate, linkage, coordination and coordination position isomerism.
- 5.4 Introduction to porphyrin ring systems-Structure and functions of haemoglobin and Chlorophyll.

References

1. I. L. Finar, *Organic Chemistry Vol I & II*, Pearson Education, New Delhi, 2002.
2. O. P. Agarwal, *Organic Chemistry of Natural Products Vol I & II*, Goel Publishing House, New Delhi, 2002.
3. Nelson, D. L.; Cox, M. M.; *Lehninger's Principles of Biochemistry*, W H Freeman & Co, 2012.
4. J.L. Jain,; J. Sunjay,; J. Nithin, *Fundamentals of Biochemistry*, S.Chand Publications, New Delhi, 2004

Semester - II & IV PACH209/PACH409 Allied Chemistry Lab Work
(Mathematics, Physics and Biochemistry,) 2 Hrs / week (4 Credits)

Objectives

- To learn the basics of analysis involved in estimating the amount of substances.
- To acquire the practical knowledge about the analysis of organic compounds

Volumetric Analysis

Estimation of Hydrochloric acid using std. Oxalic acid.

Estimation of NaOH using std. Na_2CO_3

Estimation of FeSO_4 using std. FAS solution

Estimation of Oxalic acid using std. FAS.

Estimation of Fe^{2+} using diphenylamine as indicator.

Qualitative Organic Analysis

Systematic analysis of organic compounds containing one functional group and characterization by confirmatory tests - Aromatic aldehydes, ketones, carbohydrate, Aromatic carboxylic acid, phenol, aromatic primary amine and amides

References

1. V. Venkateswaran, R. Veerasamy, A.R. Kulandaisamy, *Basic principles of Practical Chemistry*, S.Chand publications, New Delhi, 2002.
2. A.O, Thomas. *Practical Chemistry*, 6th Revised Edition, Sharada Press, 1995
3. J. N. Gurtu And R. Kapoor, *Advanced Experimental Chemistry, Vol. I Physical Chemistry, Vol. II Inorganic Chemistry, Vol. III Organic Chemistry, Organic Reactions & Reagents* [B.Sc., (Hons.)& M.Sc.], Himalayan Publishers, 1974.

SEM III CH316-Organic Chemistry – II Hrs/week – 3(Credits 3)

Objectives

- Understanding substitution and elimination reactions.
- Understanding metal carbon bonds.

Unit 1 Delocalisation

9 hours

- 1.1 Delocalised electrons and benzene's structure, bonding in benzene, resonance contributors and resonance hybrids, stability of resonance contributors, delocalization energy, delocalized electrons and stability, stability of allylic and benzylic cations., molecular orbital description of stability(1,3 Butadiene and 1,4 Penta diene)
- 1.2 Effect of delocalized electrons on pKa values and product of a reaction
- 1.3 Reactions of isolated dienes and conjugated dienes, thermodynamic versus kinetic control of reactions, Diels- alder reaction 1,4 addition, conformations of the diene.

Unit 2 Substitution reactions

9 hours

- 2.1 Alkyl halides- substitution reactions- $\text{S}_{\text{N}}2$, factors affecting $\text{S}_{\text{N}}2$, reversibility of $\text{S}_{\text{N}}2$ reaction.
- 2.2 $\text{S}_{\text{N}}1$, factors affecting $\text{S}_{\text{N}}1$, stereochemistry of $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$
- 2.3 Competition between $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$, role of solvents $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ -Intermolecular versus intramolecular reactions.

Unit 3 Elimination reactions

9 hours

- 3.1 Elimination reactions, E2 reaction regioselectivity. E1 reaction, competition between E2 and E1 reactions.
- 3.2 E2 and E1 reactions stereo selectivity, elimination from substituted cyclohexanes.

3.3 Kinetic isotope effect in mechanism determination, competition between substitution and elimination.

Unit 4 Alcohols and Amines

9 hours

- 4.1 Conversion of alcohols to alkyl halides, alcohols to sulfonate esters, elimination reactions of water from alcohols, oxidation of alcohols.
- 4.2 Nucleophilic substitution reaction of ethers, epoxides.
- 4.3 Substitution or elimination reactions in amines, Elimination reactions of quaternary ammonium hydroxides, phase transfer catalysis(concept only). Reactions of thiols, sulfides and sulfonium salts.

Unit 5 Organometallic compounds

9 hours

- 5.1 Metal carbon bond, Synthesis of Grignard reagents and Organolithium compounds.
- 5.2 Organo metallics by deprotonating alkynes, Ortholithiation. Primary, secondary and tertiary alcohols from aldehydes and ketones.
- 5.3 Reactions of organolithium and Grignard reagents with electrophiles, transmetallation, coupling reactions, palladium catalyzed coupling reactions, alkene metathesis.

Reference Books:

Text Book

1. Paula Yurkanis Bruice, *Organic chemistry*, 6th Edition, Prentice Hall, Illinois, 2011.

Further reading

2. R.T. Morrison and R. N. Boyd, *Organic chemistry*, 6th Edition, Prentice-Hall of India, New Delhi, 2008.
3. Leroy. G. Wade, *Organic chemistry*, 6th Edition, Pearson, New York, 2005.
4. Clayden, J Greeves, N and Warren, S, *Organic Chemistry*, 2nd Edition, Oxford University Press, New York, 2001.
5. Loudon, Marc G, *Organic Chemistry*, 6th Edition,. Oxford University Press, New York, 2016.

Outcomes

- Ability to differentiate elimination and substitution reactions.
- Knowledge on application of intermediates and mechanism.
- Knowledge on the synthetic nature of organometallic compounds.

SEM III**CH317-Inorganic Chemistry – II****Hrs/week – 4(Credits 4)****Objectives**

- To have a sound knowledge about structure and shape using VB and MO theory
- To know about Chemistry of group-14 and 15 and its applications
- To understand the importance of Nuclear chemistry and its applications

Unit-1 VB and MO Theory**12 hours**

- 1.1 Valence bond theory – postulates and limitations – hybridization – explanation with examples.
- 1.2 Concept of resonance and resonating structures in various inorganic and organic compounds. MO Approach: Rules for the LCAO method, bonding and antibonding MOs.
- 1.3 MO treatment of homonuclear diatomic molecules: H₂, N₂, O₂, and F₂ . Heteronuclear diatomic molecules: HF, CO, and NO
- 1.4 Comparison of VB and MO approaches.

Unit-2 Chemistry of Group 14**12 hours**

- 2.1 Group 14: general properties, electronic configuration, metallic character, and oxidation states.
- 2.2 Uniqueness of Carbon and Silicon in comparison to remaining elements. Carbides- Preparation, classification and applications. Allotropes of Carbon- structure, properties and uses. Oxides of carbon (structure and properties):
- 2.3 CO, CO₂ and carbon suboxides. Carbon cycle.
- 2.4 Silicates-classification, properties, structure and uses. Silicones- Polysiloxanes.

Unit-3 Chemistry of Group 15**12 hours**

- 3.1 Group 15: general properties, electronic configuration, oxidation states.
- 3.2 Compounds of group 15: Hydrides of Nitrogen and Phosphorus, Haber's process, Oxides of Nitrogen: NO, NO₂, N₂O, and N₂O₃ (structure, properties and uses).
- 3.3 Oxo-acids of Nitrogen and Phosphorous- preparation and structure.
- 3.4 Polyphosphates-preparation and structure.

Unit-4 Nuclear Chemistry**12 hours**

- 4.1 Fundamental particles of the nucleus- nucleon, nuclides, isotopes, isobars, isotones.
- 4.2 Nuclear radius, nuclear mass, nuclear density, nuclear forces operating between the nucleons, and packing fraction.
- 4.3 Natural radioactivity- nuclear reactions, radioactive decay, group displacement law, N/P ratio, curves, stability belts and rate of radioactive disintegration.
- 4.4 Nuclear binding energy. Mass defect, simple calculations involving mass defect and B.E per nucleon, Q value determination, magic numbers.

Unit-5 Applications of Nuclear Chemistry**12 hours**

- 5.1 Detection and measurement of radioactivity- G. M counter, and scintillation counter. Application of radioisotopes as tracers: Rock and Carbon dating.
- 5.2 Artificial radioactivity: artificial transmutation of elements and Particle accelerators- cyclotron. Induced radioactivity and preparation of transuranic elements.
- 5.3 Nuclear fusion reactions and applications: nuclear fusion in the sun and hydrogen bomb. Safe disposal of radioactive waste.
- 5.4 Preparation of Inorganic Complexes (Any two)

Learning Outcome:

- The student will understand the chemistry of 14 and 15 group.
- The student can know the importance of nuclear chemistry and its applications

- The student can understand the structure and shape of the molecule using VB and MO theory.

References

(Text Book)

1. R. D. Madan, *Modern Inorganic Chemistry*, Second edition, S. Chand publications, New Delhi, 2000.
2. B. R. Puri, L. R. Sharma and K. C. Kalia, *Principles of Inorganic Chemistry*, 33rd Edition, Vishal Publishing Co, Jalandar, 2004.
3. H. J. Arnikaar, *Essentials of nuclear chemistry*, Fourth Edition, New Age International Private Limited, New Delhi, 2011

(Advanced Reading)

1. C. Chambers and A. K. Holliday, *Modern Inorganic Chemistry*, First edition, Butterworth and Co., Sussex, 1975.
2. Gary L Miessler and Donald A Tarr, *Inorganic Chemistry*, Third edition, Pearson Prentice Hall.
3. G. R. Choppin, and J-O. Liljenzin, and J. Rydberg, *Radiochemistry and Nuclear chemistry*, Butterwoth-Heinemann, Woburn, 2002.
4. P. A. C. McPherson, *Principles of Nuclear Chemistry*, World scientific, Singapore, 2017.

SEM IV **CH416-Organic Chemistry – III** **Hrs/week – 3(Credits 3)**

Objectives

- Understanding the fundamentals of organic spectroscopy.
- Understanding Aromatic compounds.
- Understanding the reactivities of carbonyl compounds.
- Learning radical reactions.

Unit 1 Radical reactions

9 hours

- 1.1 Radical reactions of alkanes, poor reactivity of alkanes, chlorination and bromination of alkanes.
- 1.2 Radical stability and alkyl substituents, distribution of products and reactivity selectivity principle, formation of explosive peroxides, addition of radicals to alkenes, stereochemistry of radical substitution and addition reactions
- 1.3 Radical substitution of Benzylic and allylic hydrogens.

Unit 2 Organic Spectroscopy 1

9 hours

- 2.1 Mass spectrometry, mass spectrum and fragmentation, isotopes in mass spectrometry, high resolution mass spectrometry, fragmentation pattern of functional groups.
- 2.2 Infrared spectroscopy, infrared spectrum functional group and fingerprint region, characteristic absorption bands, intensity of absorption bands, position of absorption bands: effect of bond order, delocalization, electron donation, withdrawal and hydrogen bonding. OH and CH absorptions.
- 2.3 Shape of absorption bands and absence of absorption bands, interpreting and IR spectrum.

Unit 3 Aromaticity

9 hours

- 3.1 Aromaticity, unusual stability of aromatic compounds, two criteria for aromaticity, applying the criteria for aromaticity, aromatic heterocyclic compounds, chemical consequences of aromaticity,
- 3.2 Anti-aromaticity, molecular orbital description of aromaticity.

- 3.3 Reactivity of Benzene, electrophilic aromatic substitution reactions: halogenation, sulfonation, nitration, Friedel crafts acylation, alkylation. Reduction of acylated benzene to alkyl benzene.

Unit 4 Substituted Benzenes

9 hours

- 4.1 Reaction of Substituted Benzenes: Chemical conversion of substituents on the benzene ring, effect of substituents on reactivity.
- 4.2 Effect of substituents on orientation of incoming groups, on pKa. Ortho-Para ratio, substituent effects. Synthesis of mono and disubstituted, substituted benzenes using diazonium salts.
- 4.3 Arene diazonium as an electrophile, Reaction of Amines with Nitrous acid, Nucleophilic aromatic substitution an addition elimination reaction and Benzyne reaction. Dyes: Phenolphthalein, Methyl orange and Fluorescein.

Unit 5 Carbonyl compounds 1

9 hours

- 5.1 Carbonyl compounds, Nomenclature of carbonyls, Structure of carboxylic acid and their derivatives, Physical properties of carbonyl compounds.
- 5.2 Reactivity of carbonyls, relative reactivities of carboxylic acids and their derivatives. General mechanism of nucleophilic addition and elimination reaction.
- 5.3 Reaction of acyl halides, anhydrides, esters. Acid and base catalyzed hydrolysis of an ester and transesterification. Hydroxide ion hydrolysis of esters, evidence for nucleophilic addition elimination reaction of carbonyls.

Reference Books:

Text Book

1. Paula Yurkanis Bruice, *Organic chemistry*, 6th Edition, Prentice Hall, Illinois, 2011.

Further reading

2. R.T. Morrison and R. N. Boyd, *Organic chemistry*, 6th Edition, Prentice-Hall of India, New Delhi, 2008.
3. Leroy. G. Wade, *Organic chemistry*, 6th Edition, Pearson, New York, 2005.
4. Clayden, J Greeves, N and Warren, S, *Organic Chemistry*, 2nd Edition,. Oxford University Press, New York, 2001.
5. Loudon, Marc G, *Organic Chemistry*, 6th Edition,. Oxford University Press, New York, 2016.

Outcomes

- Correlate reactants and products using spectroscopy.
- Knowledge on Aromaticity and reactivity.
- Knowledge of the nature of carbonyl compounds.

SEM IV

CH417-Physical Chemistry – II

Hrs/week – 4 (Credits 4)

Objectives

- To understand the important laws of thermodynamics and their implications in chemical systems
- To learn the importance of chemical potential and its significance
- To understand the basic concepts and importance of phase equilibria
- To learn the basics of colloids, surfactants and solutions

Unit – I Thermodynamics - II

12 Hours

- 1.1 Need for second Law-Spontaneous Process- Cyclic Process- Carnot cycle- Concept of entropy-Entropy changes in reversible and irreversible process-

- 1.2 Statement of second law -entropy of mixture of ideal gases, entropy of mixing-physical significance of entropy
- 1.3 Helmholtz and Gibbs free energy- Maxwell relations-Criteria for spontaneity and equilibrium-Gibbs- Helmholtz equation-Chemical potential
- 1.4 Gibbs- Duhem equation- Variation of chemical potential with temperature and pressure - Chemical potential in a system of ideal gas-Third Law- Importance of third law, Testing and validity of third law. Residual entropy

Unit II Chemical Equilibrium:

12 Hours

- 2.1 State of chemical equilibrium - Characteristics and experimental verification of chemical equilibrium. Law of Mass action – Law of chemical equilibrium
- 2.2 Types of equilibrium constants, Relationship between K_p , K_c and K_x – Applications of equilibrium constant with solved problems.
- 2.3 Free energy change - criterion of spontaneity (Problems). Thermodynamic treatment of chemical equilibrium, De Donder's Concept- Chemical affinity. Thermodynamic relations for chemical affinity.
- 2.4 Van't Hoff reaction isotherm (problems)-Van't Hoff equation (Temperature dependence) (problems) – Le Chatelier's principle – Effect of temperature, pressure and concentration and applications

Unit - III Phase Rule

12 Hours

- 3.1 Explanations of terms – Phase, components and Degrees of freedom. Equilibrium – Criteria for equilibrium – Thermal, mechanical and chemical equilibrium. Thermodynamic derivation of Phase rule.
- 3.2 Clausius-Clapeyron Equation and its application in phase transition-Phase diagram - One component system – Water and sulphur with polymorphism.
- 3.3 Two component system– Reduced phase rule, types of two component system involving solid – liquid equilibria - General features of two component system – Colling curve method.
- 3.4 Simple eutectic system: Pb– Ag system. KI – water system – freezing mixture

Unit – IV Phase Equilibria II and Colloids:

12 Hours

- 4.1 Two components with compound formation - Congruent Melting point – Ferric chloride – water system – (Activity – Construction of Mg – Zn system phase diagram) - Incongruent Melting point – Na - K system
- 4.2 Colloids – Types of colloids - Origin of charge on colloids- electrical double layer-Electrokinetic properties (Electrophoresis, electro osmosis)
- 4.3 Surfactants: Classification- Micelle and reverse micelle formation- shape and structure of micelles- critical micelle concentration, aggregation number
- 4.4 Factors affecting CMC in aqueous media- Thermodynamics of Micellization (no derivation)

Unit – V Solutions

12 Hours

- 5.1 Thermodynamics of ideal solutions: Ideal solutions, Henry's law and Raoult's law, deviations from Raoult's law – non-ideal solutions.
- 5.2 Temperature composition diagrams – ideal liquid mixture (Toluene – Benzene)-Non-ideal mixture (water – ethanol and water – hydrogen chloride) – Distillation of immiscible liquids.
- 5.3 Partially miscible liquids: Phenol – Water, Triethylamine – Water and Nicotine – Water systems.
- 5.4 Nernst distribution law – Thermodynamic derivation-limitations, Applications of Nernst distribution law- Solvent extraction and Determination of Hydrolysis constant.

Text Books:

1. B. R. Puri, L. R. Sharma and M. S. Pathania, *Principles of Physical Chemistry*, 47th Edition, Vishal Publishing Co, Jalandar, 2016.
2. R.L. Madan, *Physical Chemistry*, Mc Graw Hill Education Pvt. Ltd. 2015.

Reference:

1. Arun Bahl, B.S. Bahl. G.D.Tuli, *Essentials of Physical Chemistry*, S. Chand Publications
2. A.S. Negi and S.C. Anand, *A text book of Physical Chemistry*, Wiley Eastern Ltd, New Delhi, 1984.

Learning Outcome:

- Relate and interpret the various laws of thermodynamics
- Know the relevance of free energy in chemical reactions
- Discuss the fundamental aspects of chemical equilibrium
- Illustrate the behaviour of chemical mixtures using suitable phase diagrams
- Correlate the type of colloids with its properties
- Identify and distinguish the types of solutions

Semester III & IV PCH408-Qualitative Inorganic Analysis 3 Hrs/week (3 Credits/ sem)

Objectives:

1. To enable the student to systematically identify the cations and anions present in a inorganic mixture
2. To know the appropriate chemical procedures and apply them to prepare some familiar complexes

1. Qualitative Inorganic Mixture Analysis:

- 1.1 Analysis of mixture containing two cations and two anions of which one will be interfering.
- 1.2 Anions: Chloride, Carbonate, Sulphate, Nitrate, Borate, Fluoride, Oxalate, and Phosphate.
- 1.3 Cations: Lead, Copper, Bismuth, Cadmium, Iron, Aluminium, Zinc, Manganese, Cobalt, Nickel, Calcium, Strontium, Barium, Ammonium and Magnesium.

2. Inorganic Preparations

- 2.1 Tetrammine Copper(II) Sulphate
- 2.2 Hexammine Nickel (II) Chloride
- 2.3 Tris (thiourea) Copper(II) Chloride
- 2.4 Potassium trioxalato ferrate (III)

References

1. V. Venkateswaran, R. Veerasamy, A.R. Kulandaisamy, *Basic principles of Practical Chemistry*, S.Chand publications, New Delhi, 2002.
2. V. V. Ramanujam, *Inorganic Semimicro Qualitative Analysis*, 3rd Edition, The National Publishing Company, 2003.
3. A.O, Thomas. *Practical Chemistry*, 6th Revised Edition, Sharada Press, 1995.

Semester – III ACH308-Allied Chemistry-I (Maths and Physics)

4 Hrs/week (2Credits)

Learning Objectives

1. To learn the electronic configuration of atoms, periodicity of elements and Chemical bonding
2. To understand the Structure and bonding of Co-ordination compounds
3. To learn the principles of Organic Chemistry, Organic reactions and mechanism

Unit I Atomic Structure

12 Hours

- 1.1 Electronic configurations of the elements, Aufbau principle, quantum numbers and Pauli's exclusion principle.
- 1.2 Hund's multiplicity rule for filling electrons in various orbitals, Stability of half-filled and completely filled orbitals, effective nuclear charge.
- 1.3 Shapes of s, p, d orbitals - s, p, d and f block elements – classification and characteristic properties.
- 1.4 Periodicity of properties – Definition and periodicity of the following properties – Atomic radii – factors affecting atomic radii – ionic radii – factors affecting ionic radii. Ionisation potential – factors affecting ionisation potential – Electron affinity – factors affecting electron affinity – Electronegativity – factors affecting electronegativity – Pauling scale

Unit II Chemical Bonding

12 Hours

- 2.1 Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds
- 2.2 Born-Haber cycle and its applications, Polarizing power and polarizability Fajan's rules, ionic character in covalent compounds

- 2.3 Covalent bonding: Lewis theory, Octet theory, VSEPR theory and its applications – geometries of BCl_3 , H_2O , ClF_3 , IF_7 and XeF_6 molecules.
- 2.4 VBT-Hybridization CH_4 , C_2H_4 , C_2H_2 - BeCl_2 , BF_3 , NH_3 , H_2O , SF_6

Unit III Co-ordination Chemistry

12 Hours

- 3.1 Double salts and coordination compounds-Definition of terms - Types of ligands -IUPAC Nomenclature of coordination compounds.
- 3.2 Werner's theory –Sidgwick's concept and EAN rule
- 3.3 Valence Bond theory and its applications to $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{Fe}(\text{CN})_6]^{3-}$, $[\text{CoF}_6]^{3-}$, $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$, $\text{Ni}(\text{CO})_4$, $[\text{MnCl}_4]^{2-}$, $[\text{Ni}(\text{CN})_4]^{2-}$, $[\text{Cu}(\text{NH}_3)_4]^{2+}$, limitations of VBT
- 3.4 Chelation and stability of coordination compounds. Structure and functions of Haemoglobin and Chlorophyll

Unit IV Principles of Organic Chemistry

12 Hours

- 4.1 Electronic Displacement Effects: Inductive Effect, Electromeric Effect, mesomeric effect and Hyperconjugation
- 4.2 Strength of organic acids and bases - Inductive Effect & mesomeric effect.
- 4.3 Cleavage of Bonds: Homolysis and Heterolysis, formation of reactive intermediates Carbocations, Carbanions and free radicals
- 4.4 Structure, shape and reactivity of reactive intermediates: Carbocations, Carbanions and freeradicals

Unit V Organic reaction and mechanism

12 Hours

- 5.1 Preparation and properties of alkyl halides
- 5.2 Types of Nucleophilic Substitution reactions in alkyl Halides (SN_1 , SN_2)–Factors influencing SN_1/SN_2
- 5.3 Alcohols- Preparation of alcohols using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters. Reactions of alcohols with sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO_4 , acidic dichromate, conc. HNO_3)
- 5.4 Aromaticity- Criteria for aromaticity- preparation and properties of benzene-Electrophilic substitution in benzene – Mechanism of aromatic nitration, sulphonation, halogenations and Friedel Crafts alkylation and acylation

Learning Outcomes

Students will be able to write the electronic configuration of atoms, able to classify the elements as main group elements, transition elements, and f block elements, able to recognize the type of Chemical bond formed and correlate the properties of molecules with the bond type, able to know the basic principles of organic chemistry, the organic reactions and mechanism.

References:

1. Concise Inorganic Chemistry by J.D. Lee, Wiley publications
2. Principles of Inorganic Chemistry by Puri, Sharma, Vishal Publications
3. Modern Inorganic Chemistry, R.D. Madan, S. Chand publications
4. Concise Coordination Chemistry by R. Gopalan, Vikas publications
5. Organic Chemistry by Robert Thornton Morrison, Robert Neilson Boyd, Pearson publications
6. Organic Chemistry by Jain, Sharma, Vishal Publications
7. Reactions, Rearrangements and Reagents by S N Sanyal, Bharati Bhawan Publications

Learning Objectives

1. To understand the principles of rate of chemical reactions and thermodynamics
2. To understand the basic electrochemistry, pH and buffer solutions
3. To learn the basic nuclear chemistry and its applications
4. To learn the chemistry of carbohydrate, amino acids, proteins and enzymes

Unit I Chemical Kinetics

12 Hours

- 1.1 Introduction to reaction rates - Rate of a Reaction-Rate law-Reactant and Product Concentrations as a Function of Time - Average, Instantaneous rates -Factors affecting rate of a Chemical reaction
- 1.2 Molecularity of a reaction- order of a reaction- Determining the Order of a Reaction by graphical method, Rate equation method and Ostwald isolation method.
- 1.3 Derivations of rate constant for Zero, First, and Second ($2A \rightarrow$ products) order reactions – Half-life Period- Study of kinetics by Volumetric method (Ester hydrolysis) and Polarimetric method (Inversion of Sucrose)
- 1.4 Effect of temperature on reaction rate – temperature coefficient - concept of activation energy- Arrhenius equation.

Unit II Thermodynamics

12 Hours

- 2.1 Scope and limitations of thermodynamics-Terminologies in thermodynamics, types of system, surroundings, types of processes
- 2.2 First law of thermodynamics and internal energy, enthalpy and enthalpy of processes, limitations of first law. Zeroth law of thermodynamics
- 2.3 Second law of thermodynamics, Carnot engine and calculation of efficiency
- 2.4 Concept of entropy, entropy as criteria for spontaneity, statement of Third law of thermodynamics.

Unit III Electro Chemistry and Ionic Equilibria

12 Hours

- 3.1 Electrolytic conduction: Conductors, types of conductors. Specific conductance, equivalent conductance and molar conductance, variation of conductance with concentration, molar or equivalent conductance at infinite dilution, Kohlraush's law
- 3.2 Applications of conductance measurements: Determination of Dissociation constant of weak acids, Solubility of sparingly soluble salt, Conductometric titrations: Strong acid Vs strong base, weak acid Vs strong base, Strong acid Vs weak base, mixture of strong acid and weak acid Vs strong base, Precipitation titration.
- 3.3 pH and pOH: Definition and explanation. Calculation of pH/pOH of weak acids and bases
- 3.4 Buffer solutions: definition and examples- Explanation of buffer action of acid buffer and basic buffer – Henderson - Hasselbalch equation

Unit IV Nuclear Chemistry

12 Hours

- 4.1 Stability of nucleus-N/P ratio, Binding energy-Natural and Artificial Radioactivity-Types of radioactive rays, difference between chemical and nuclear reactions
- 4.2 Rate of disintegration, half life period, and average life period-Representation of nuclear reactions-calculation of nuclear Q value-group displacement law
- 4.3 Nuclear Fission, atom bomb and Nuclear reactor -Nuclear Fusion, hydrogen bomb and stellar energy
- 4.4 Carbon and rock dating -Applications of radioisotopes in agriculture, medicine, and industry

Unit V Bio molecules

12 Hours

- 5.1 Carbohydrates: Classification, Cyclic Structures of Monosaccharides (The Cyclic Hemiacetal Form of Glucose/Fructose)

- 5.2 Epimerization and the Enediol Rearrangement-Reduction of monosaccharides -Oxidation of Monosaccharides-Reactions with Phenylhydrazine- Inter-conversion of glucose to fructose and fructose to glucose
- 5.3 Amino acids: Classification, standard amino acids, physical and chemical properties of glycine, Proteins-classification based on function, primary and secondary structure of protein
- 5.4 Enzymes- classification-Active sites-Lock and Key model-Induced fit model-Conformational selection model- Michaelis Menten equation-Lineweaver-BurK Plot

Learning outcomes

Students will be able to understand the basic principles of Chemical kinetics, Thermodynamics, Electrochemistry, and Ionic equilibria. They will understand the stability of atoms and the rate of disintegration and applications of nuclear chemistry. They will be able to know the functions and structures of biomolecules

References:

1. Principles of Physical Chemistry by Puri , Sharma, Pathania, Vishal Publications
2. Physical Chemistry by Arun Bahl , S. Chand Publications
3. A Textbook of Physical Chemistry by A. S. Negi and S. C. Anand, New age international publications.
4. Organic Chemistry by Jain, Sharma ,Vishal Publications
5. Organic Chemistry by Wade ,Pearson publications
6. Lehninger Principles of Biochemistry Nelson,Cox, WH Freeman publications
7. Organic Chemistry by Paula Yurkanis Bruice, Pearson publications
8. Modern Inorganic Chemistry by R.D. Madan, S.Chand publications
9. Principles of Inorganic Chemistry by Puri, Sharma, Vishal Publications

Semester - II & IV PACH209/PACH409 Allied Chemistry Lab Work
(Mathematics, Physics and Biochemistry,) 2 Hrs / week (4 Credits)

Objectives

- To learn the basics of analysis involved in estimating the amount of substances.
- To acquire the practical knowledge about the analysis of organic compounds

Volumetric Analysis

Estimation of Hydrochloric acid using std. Oxalic acid.

Estimation of NaOH using std. Na_2CO_3

Estimation of FeSO_4 using std. FAS solution

Estimation of Oxalic acid using std. FAS.

Estimation of Fe^{2+} using diphenylamine as indicator.

Qualitative Organic Analysis

Systematic analysis of organic compounds containing one functional group and characterization by confirmatory tests - Aromatic aldehydes, ketones, carbohydrate, Aromatic carboxylic acid, phenol, aromatic primary amine and amides

References

1. V. Venkateswaran, R. Veerasamy, A.R. Kulandaisamy, *Basic principles of Practical Chemistry*, S.Chand publications, New Delhi, 2002.
2. A.O, Thomas. *Practical Chemistry*, 6th Revised Edition, Sharada Press, 1995
3. J. N. Gurtu And R. Kapoor, *Advanced Experimental Chemistry, Vol. I Physical Chemistry, Vol. II Inorganic Chemistry, Vol. III Organic Chemistry, Organic Reactions & Reagents* [B.Sc., (Hons.)& M.Sc.], Himalayan Publishers, 1974.

M.Sc CHEMISTRY

Semester – I

CH716-Organic Chemistry – I

4 Hours / week (4 credits)

Objectives

- To know about the nature of aromaticity in the compounds
- To learn the kinetic and non-kinetic methods of determining organic reaction mechanism.
- To understand the substitution in aromatic and aliphatic reactions.
- To learn the addition and elimination reactions and their mechanisms

Unit - I: Aromaticity

12 Hours

Naming and numbering of alicyclic, bicyclic and tricyclic compounds (Basic skeletal structures only with or without one substituent). Concept of aromaticity and anti-aromaticity, delocalization of electrons - Hückel's rule, criteria for aromaticity, examples of neutral and charged aromatic, non-aromatic, antiaromatic systems.

Aromaticity in charged rings and fused ring systems. - Benzenoid – Non-benzenoid aromatics – annulenes - NMR as a tool for aromaticity - anti- and homo-aromatic systems. Aromatic characterization of azulenes, tropones, annulenes and fullerenes.

Unit - II: Reactive Intermediates and Methods of Determining Reaction Mechanism

12 Hours

Structure, stability, generation and reactions of Carbocations (classical and nonclassical), carbanions, carbenes, nitrenes and free-radicals.

Thermodynamic and Kinetic controlled reactions - Non-kinetic methods - Product analysis and its importance Intermediates and Transition states- Trapping, testing and detection of intermediates-Cross over experiments. Isotopic labeling stereochemical studies.

Kinetic methods- Order-rate and rate constants-Energy of activation-entropy of activation-Influence of solvents, ionic strength, and salt and isotopic effects on the rate of the reaction.

Unit - III: Aromatic and Aliphatic Electrophilic Substitution Reactions

12 Hours

Aromatic – Mechanism – Orientation and reactivity – Reactions: Nitrogen electrophiles: nitration, nitrosation and diazonium coupling - Sulphur electrophiles: sulphonation - Halogen electrophiles: chlorination and bromination - Carbon electrophiles: Friedel-Crafts alkylation, acylation and arylation reactions.

Aliphatic - Mechanisms: S_E2 , S_E1 and S_{Ei} ; Substitution by double bond shifts; other mechanism: addition-elimination and cyclic mechanism. Reactivity; Reactions: Hydrogen as electrophile: Hydrogen exchange; hydro-dehydrogenation; keto-enol tautomerism. - Halogen electrophiles: Halogenation of aldehydes and ketones; carboxylic acids - Nitrogen electrophiles: aliphatic diazonium coupling; direct formation of diazo compounds; direct amination; - sulphur electrophiles: sulphonation, - carbon electrophiles: acylation; alkoxy carbonyl alkylation; alkylation.

Unit - IV: Aromatic and Aliphatic Nucleophilic Substitution Reactions

12 Hours

Aromatic -Mechanisms- S_{NAr} , S_{N1} and Benzyne mechanisms. - Reactivity, Effect of structure, leaving group and attacking nucleophile.

Typical reactions: O and S-nucleophiles, Bucherer and Rosenmund reactions, von Richter, Sommelet-Hauser and Smiles rearrangements.

Aliphatic-Mechanisms- S_{N1} , S_{N2} , S_{Ni} and neighbouring group mechanisms. Nucleophilic substitutions at an allylic carbon, aliphatic trigonal carbon and vinyl carbon.

Reactivity: Effect of substrate, attacking nucleophile, leaving group and the medium - Swain-Scott, Grunwald-Winstein relationship - Ambident nucleophiles.

Unit - V: Addition and Elimination Reactions

12

Hours

Additions-Addition to carbon-carbon multiple bonds-addition mechanisms-electrophilic, nucleophilic and free-radical additions cyclo addition-orientation and reactivity. Selected reactions – Birch reduction- Diels-Alder reaction- Hydroboration- Michael reaction. hydroxylation, 1,3-dipolar additions. -Simon Smith reaction, Mannich, Darzens, Wittig, Wittig-Horner, benzoin reactions and Cope eliminations..Stereochemical aspects of each reaction. E1, E2, and E1cb mechanisms. - Syn Eliminations - E1-E2-E1cb spectrum - Orientation of the double bond: Hoffmann and Saytzeff rules. Reactivity: Effect of substrate, attacking bases, leaving group and medium. -Mechanisms and orientation in pyrolytic eliminations.

References

1. R.O.C.Norman, Chapman, Organic Synthesis Prentice and Hall, NY, 1980.
2. Niel Isaacs, Physical Organic Chemistry, ELBS publications, 1987.
3. S.M.Mukherji and S.P.Singh, Organic Reaction Mechanism, MacMillan India Ltd., Chennai, 1990.
4. Francis A. Carey and Richard Sundberg, Advanced Organic Chemistry, Part A and B, 3rd Edition, Plenum Press, 1990.
5. C Wentrup, Reactive Molecules, John Wiley and Sons, New York, 1984.
6. J.March, Advanced Organic Reaction mechanism and structure, Tata McGraw Hill, 2000.
7. V.K.Ahluwalia, Pooja Bhagat, Intermediates for Organic Synthesis, I.K International, 2005.
8. S.C.Pal, Nomenclature of organic compounds, Revised Edn. Narosa Publications, 2008.
9. Ahluwalia and Parashar, Organic Reaction Mechanisms, 4thEdn., Narosa Publications, 2012
10. P.S.Kalsi, Organic Reaction Mechanism, 3rdEdn. New Age Publications, 1994.

Online Resources:

<http://eacharya.inflibnet.ac.in/> Organic Chemistry- (Reaction Mechanisms-I and Reaction Mechanisms-II)

Learning Outcomes:

- Substitution reactions in aromatic and aliphatic substrates can be understood by the students through test and models
- The fundamental principles in determining organic reaction mechanism and identifying the kinetic and non-kinetic methods in the organic reactions were also learned by them.

CH717-Inorganic Chemistry – I

4 Hours / Week (4 Credits)

Objectives

- To impart the knowledge about the structure of materials and their significance.
- To understand the theories of coordination complexes and their importance.
- To study the basic chemistry of rare earth elements and nano materials

Unit - I: Structure and Bonding – I

12 Hours

Polyacids: Isopolyacids and heteropolyacids of vanadium, chromium, molybdenum and Tungsten. Inorganic Polymers: Silicates, structure – properties – correlation and applications – molecular sieves, polysulphur – nitrogen compounds and poly organophosphazenes.

Unit - II: Structure and Bonding – II

12 Hours

Boron hydrides: Polyhedral boranes, hydroboration, carboranes and metallocarboranes Metal Clusters: Chemistry of low molecularity metal clusters (upto) trinuclear metal Clusters: multiple metal-metal bonds.

Unit - III: Solid State Chemistry – I

12 Hours

Introduction-Single and polycrystalline materials-Solid state Reactions-Co-precipitation as precursor to solid state reactions-Other Precursor Methods-Kinetics of solid-state reactions-Perfect and imperfect crystals. Defects in solids: Point defects-Schottky defects-Frenkel defects. Thermodynamics of Schottky and Frenkel defect formation. Non-stoichiometric defects: metal excess and metal deficiency. Spinel-solid state lasers-inorganic phosphors-Ferrite.

Unit - IV: Solid State Chemistry – II

12 Hours

Colour centres-Vacancies and interstitials in non-stoichiometric crystals. Extended defects – subgrain boundaries and antiphase domains-Solid state transformations-Classification of transformations-Thermal decomposition reactions-Laws governing nucleation-Crystal growth of nuclei-Reaction between two solids-polymorphism-Characterization and properties of polymorphs.

Unit - V: Chemistry of rare earths and nanomaterials

12 Hours

The Chemistry of solid state, lanthanides and actinides, oxidation state spectral, magnetic characteristics, coordination numbers, nuclear and non-nuclear applications.

Nanomaterials: General introduction - Synthesis of nanoparticles of gold and silver - Synthesis of nanoparticle semiconductors (TiO_2 and Fe_2O_3) - Nanowires and nanorods - Self-assembled nanostructures - Self-assembly and bottom-up fabrication – Graphenes, fullerenes and nanotubes - Applications of nanoparticles-application as sensors, biomedical applications, application in optics and electronics.

References

1. K.F. Purcell and J.C. Kotz, Inorganic Chemistry, WB Saunders Co., USA, 1977.
2. J.E. Huheey, Harper and Collins, Inorganic Chemistry, NY, IV Edition, 1993.
3. FA Cotton and G.W. Wilkinson, Advanced Inorganic Chemistry, – A comprehensive Text, John Wiley and Sons, 1988.
4. B.E. Douglas DH McDaniel's and Alexander Concepts and Models of Inorganic Chemistry, Oxford IBH, 1983.
5. S. J. Lippard and J. M. Berg, Principles of Bioinorganic Chemistry, Univ. Science Books, 1994.
6. W. Kaim and B. Schwederski, Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life (An introduction and Guide), John Wiley & Sons, 1994.
7. WU. Mallik, G.D. Tuli, R.D. Madan, Selected topics in Inorganic Chemistry, S. Chand and Co., New Delhi, 1992.
8. A.R. West, Basic solid-state chemistry, John Wiley NY, 1991.

9. W.E. Addison, Structural principles in Inorganic chemistry, Longman, 1961.
10. D.M. Adams, Inorganic solids, John Wiley Sons, 1974.
11. J.N. Gurtu, Solid State Chemistry, Second Edition, PragatiPrakashan Publishers, 2015.
12. Dieter Vollath, Nanomaterials: An Introduction to Synthesis, Properties and Applications, 2nd Edition Wiley, 2013.
13. Zhong Cao G, "Nanostructures and Nanomaterials: Synthesis, Properties and Applications", Imperial College Press, London, United Kingdom, 2004

Online Resources

1. <http://eacharya.inflibnet.ac.in/> (Bioinorganic Chemistry-40 lectures)

Learning Outcomes:

- The knowledge of structures of materials and their significance were imparted to the students through models
- The theories of coordination complexes and their importance were learned by them
- The fundamental concepts of nanomaterials were also studied by them

CH718-Physical Chemistry – I

5 Hours / week (4 Credits)

Objectives

- To study theories and basic concepts of Chemical kinetics - mechanism of acid, base and enzyme catalysed reaction.
- To Study the kinetics of complex reactions
- To understand the chemical applications of group theory.

Unit - I: Chemical Kinetics – I

15 Hours

Collision theory, ARRT - partition function and activated complex - Eyring equation - estimation of free energy, enthalpy and entropy of activation and their significance - Theories of unimolecular gaseous reactions - RRK theory - limitations - RRKM theory. Reactions in solutions - effect of pressure, dielectric constant and ionic strength on reactions in solutions - kinetic isotope effects - linear free energy relationships - Hammett and Taft equations.

Unit - II: Chemical Kinetics – II

15 Hours

Acid - Base catalysis - mechanism of acid - base catalyzed reactions - Bronsted catalysis law. Catalysis by enzymes - rate of enzyme catalyzed reactions - effect of substrate concentration, pH and temperature on enzyme catalyzed reactions - inhibition of enzyme catalyzed reactions, Michaelis-Menton equation - Autocatalysis and oscillatory reactions.

Unit - III: Chemical Kinetics – III

15 Hours

Study of surfaces - Langmuir and BET adsorption isotherms-mechanism of heterogenous catalysis. Kinetics of complex reactions, reversible reactions, consecutive reactions, parallel reactions, chain reactions, general treatment of chain reactions - chain length - Rice Herzfeld mechanism - explosion limits.

Study of fast reactions - relaxation methods - temperature and pressure jump methods-stopped flow and flash photolysis methods.

Unit - IV: Group Theory – I

15 Hours

Symmetry elements and symmetry operation –group multiplication table-subgroups, similarity transformation and classes-identifications of symmetry operations and determination of point groups- Matrix representation of symmetry operations - reducible and irreducible representations – direct product representation-The great orthogonality theorem and its consequences.

Unit - V: Group Theory – II**15 Hours**

Construction of character table for C_{2V} and C_{3V} - Mulliken symbols -application of group theory. -hybrid orbital in nonlinear molecules (CH_4 , XeF_4 , BF_3 , SF_6 and NH_3). Determination of representations of vibrational modes in non-linear molecules (H_2O , CH_4 , XeF_4 , BF_3 , SF_6 and NH_3). Symmetry selection rules for infrared and Raman Spectra-Electronic Spectra of Ethylene and formaldehyde.

References

1. J. Rajaram and J.C. Kuriacose, Kinetics and Mechanism of Chemical Transformations. Mac Millan India Ltd, 1993.
2. R.J. Laidler, Chemical Kinetics, Harper and Row, New York, 1987.
3. K.V. Ramakrishnan and M.S. Gopinath, Group Theory in Chemistry, Vishal Publications, 1998.
4. K.V. Raman, Group Theory and its Applications to Chemistry, Tata Mc Graw Hill Publishing Co., 1990.
5. G.M. Barrow, Physical Chemistry, McGraw Hill, 1988.
6. R.G. Frost and Pearson, Kinetics and Mechanism, Wisely, New York, 1961.
7. F.A. Cotton, Chemical Applications of Group Theory, John Wiley and Sons inc., New York, 1971.
8. B.S. Garg, Chemical Applications of Molecular symmetry and Group Theory, Laxmi Publications/Triniti/Macmillan, 2012
9. S. Swarnalakshmi, Simple Approach to Group Theory in Chemistry, Universities Press, 2008

Online Resources:

1. <http://eacharya.inflibnet.ac.in/> Applications of molecular symmetry and group theory [31 lectures]
2. <http://nptel.ac.in/courses/104104080/>

Learning outcomes:

- The concept of chemical kinetics and its theory were also studied by them
- The enzyme catalysis and kinetics of complex reactions were studied
- The chemical applications of group theory were also understood by them through the online courses like NPTEL

CH719A-Elective – I: Analytical Chemistry**5 Hours / week (5 Credits)****Objectives**

- To study the different types of molecular spectroscopy and NMR spectroscopy and its applications
- To study the analytical techniques, instrumentation and applications.

Unit - I: Polarography and Amperometry**15 Hours**

Polarography – theory, apparatus, DME, Diffusion, Kinetic and catalytic currents, Current-Voltage curves for reversible and irreversible system; Qualitative and quantitative applications to inorganic and organic systems. Principle and Instrumentation of Cyclic Voltammetry. Stripping analysis-Anodic and Cathodic Stripping-Modified electrodes-need- fabrication-applications. Amperometry- principle- curves in amperometric titrations, apparatus, advantages of rotating platinum electrode and advantages of biamperometric titrations.

Unit - II: Chromatographic Techniques**15 Hours**

Gas liquid Chromatography - principle, Retention Volume, Relationship between V_g and K - Effect of mobile phase flow rate. Instrumentation-Carrier gas, sample injection system, column

configurations and column ovens, Detectors systems FID and TCD. Column and stationary Phases-Open and tubular column, packed column, Stationary Phase. Applications of GLC. HPLC – principle, Scope, column efficiency, instrumentation, pumping system, column packing, detectors and applications.

Unit - III: Spectroscopy – I

15 Hours

Electronic spectroscopy -selection rules-types of transition solvent effects.

Spin Resonance spectroscopy-origin of NMR signals, chemical shift-factors affecting chemical shift, spin spin coupling-NMR of simple AX and AMX type molecules-¹³C, ¹⁹F, ³¹P NMR spectra-applications-a brief discussion of Fourier transformation resonance spectroscopy.

Unit - IV: Spectroscopy- II

15 Hours

Interaction of matter with radiation-Rotational spectroscopy of a rigid and non-rigid diatomic rotors-and polyatomic molecules-vibrational spectroscopy of harmonic and anharmonic oscillators and polyatomic molecules-overtone-fermi resonance and combination of bands-group frequencies –Raman spectroscopy- classical and quantum theories-

Rotational and vibrational Raman spectra- spectra of diatomic molecules-frank condon principle- Morse function. Polyatomic molecules, types of transition, solvent effects.

Unit - V: XRD and Microscopic Techniques

15 Hours

X-ray diffraction- The laue method-the rotating crystal method- the powder method – the powder method – determination of grain size/ crystallite size using X-ray line broadening studies (Scherrer's formula) - Determination of crystallite size distribution using X-ray line shape analysis- X-ray diffraction pattern and analysis of some commercially important oxides – small angle X-ray scattering (SAXS).

Electron microscopy- Principle and instrumentation –Applications of scanning electron microscope (SEM)- Energy dispersive X-ray analysis (EDX)- Transmission electron microscope (TEM)- Scanning tunnelling microscope (STM)-Atomic force microscope (AFM).

References

1. D.A.Skoog, D.M. West and F. J. Holler, Analytical Chemistry an Introduction, Saunders College Publishers, 1990.
2. J. Mendham, R.C. Denney, J.D. Barnes and M. Thomas, Vogel's Text book of Quantitative
3. Chemical Analysis, Pearson Education Pvt. Ltd..2004.
4. J.G. Dick, *Analytical Chemistry*. Sir George Williams University, McGraw-Hill
5. Book Company, New. York. 1973.
6. H.H. Willard, L.L. Merritt, J.A. Dean and F.A. Seattle, *Instrumental methods of analysis*, 5th Edn., Harcourt Asia Pvt. Ltd., India, 2001.
7. Fundamentals of Molecular spectroscopy .by C.N.Banwell and E.M.Mccash, IV Edition, Tata McGraw Hill, 2005.
8. Vibrational Spectroscopy, by D.N.Sathyanarayana, New Age International Publishers, 2004.
9. Introduction to Magnetic Resonance by Carington and Ad.Mclachlan, Harper and Row, New York, 1967.

Learning Outcomes:

- Applications of NMR spectroscopy and different types of molecular spectroscopy were studied by the students using available literature packages
- The analytical techniques, instrumentation and applications were also studied by them

Objectives:

- i. To know eco-friendly methods of synthesis.
- ii. Understanding the synthesis of any type of organic compounds with the revolution of Green Chemistry.

Unit - I: Principles & Concept of Green Chemistry**15 Hours**

Introduction –Concept and Principles-development of Green Chemistry- Atom economy reactions –rearrangement reactions, addition reactions- atom uneconomic-sublimation-elimination-Wittig reactions-toxicity measures- Need of Green Chemistry in our day-to-day life.

Unit - II: Measuring and Controlling Environmental Performance**15 Hours**

Importance of measurement – lactic acid production-safer Gasoline – introduction to life cycle assessment-four stages of Life Cycle Assessment (LCA) –Carbon foot printing-green process Matrics-eco labels -Integrated Pollution and Prevention and Control (IPPC)-REACH (Registration, Evaluation, Authorization of Chemicals).

Unit - III: Emerging Green Technology and Alternative Energy Sources**15****Hours**

Design for Energy Efficiency-Photochemical reactions- Advantages-Challenge faced by photochemical process. Microwave technology on Chemistry- Microwave heating –Microwave assisted reactions-Sono chemistry and Green Chemistry –Electrochemical Synthesis-Examples of Electrochemical synthesis.

Unit - IV: Renewable Resources**15 Hours**

Biomass –Renewable energy – Fossil Fuels-Energy from Biomass-Solar Power- Other forms of renewable energy-Fuel Cells-Alternative economics-Syngas economy- hydrogen economy-Bio refinery chemicals from fatty acids-Polymer from Renewable Resources –Some other natural chemical resources.

Unit - V: Industrial Case Studies**15 Hours**

Methyl Methacrylate (MMA)-Greening of Acetic acid manufacture-Vitamin C-Leather manufacture –Types of Leather –Difference between Hide and Skin-Tanning –Reverse tanning –Vegetable tanning –Chrome tanning-Fat liquoring –Dyeing –Application-Polyethylene-Ziegler Natta Catalysis-Metallocene Catalysis-Eco friendly Pesticides-Insecticides.

References

1. Mike Lancaster, Green Chemistry and Introductory text, II Edition,2003.
2. P.T.Anastas and J.C Warner,Green Chemistry theory and Practice, Oxford University press, Oxford, 1988..
3. P.Tundoet. al., Green Chemistry, Wiley –Blackwell, London, 2007.
4. V.K. Ahluwalia, Environmental chemistry, Ane Books, India, 2003.
5. T.E Graedel, Streamlined Life cycle Assessment, Prentice Hall, NewJersey, 1998.
6. V.K. Ahluwalia, Methods and Reagents of Green Chemistry: An Introduction to Green Chemistry, 2013.

Online Resource

1. www.clri.org.

Learning Outcomes:

- Eco-friendly synthesis method was learned
- Synthesis of any type of organic compounds with the revolution of green chemistry was also understood

CH719C-Elective – III:Pharmaceutical Chemistry

5 Hours/week (5 Credits)

Objectives

- To understand the composition and the kinetics of drugs
- To know the different types of drugs and its composition

Unit - I: Introduction

15 Hours

Importance of chemistry in pharmacy, important terminologies used their meaning- molecular pharmacology, pharmacodynamics, pharmacophore, metabolites, virus antimetabolites, bacteria, fungi, actinomycetes.

Mechanism of action of drug types: assay- biological, chemical immunological-statement only. Mechanism: metabolism of drugs and their effect on pharmacological activity. Absorption of drugs. Drug delivery system, sustained release of drugs. Physiological effects of different functional groups in drugs. Testing of potential of drugs and their side effects. Indian medicinal plants and trees-adathode, tulsi, thoothuvalai, shoeflower, fia, neem, mango, kizhanelliocimum,grass and greens. Causes and symptoms of common diseases- tuberculosis, asthma, jaundice, piles,leprosy,epilepsy,typhoid,malaria, cholera, filarial.

Unit - II: Antibiotics and Vitamins

15 Hours

Antibiotics: definition, structure, uses of chloramphenicolampicillin, streptomycin, tetracycline, rifamycin Macrolides-Erythromycin-properties and uses.

Structural features-SAR functional group responsible for drug action, structural modification that changes the potency of the above drugs. Conditions for their use as therapeutic agents. Fields of application.Sulphonamides: substituents in the amide group. General properties and drug action. Preparation and uses of sulphadiazin, sulphapyridine, sulphathiazole, sulphafurazole and prontosil. Vitamins: classification. Role in Chemotherapy. Uses. Deficiency and symptoms. Estimation of vitamins A, B₁, B₂ and C.

Unit - III: Antipyretic, analgesics, anti-inflammatory agents

15 Hours

Classification: action of analgesics. Narcotic analgesics: Morphine and its derivatives. SAR. Synthetic analgesics-pethidine and methadones. Salicylic acid and its derivatives, indolyl derivatives, aryl-acetic acid derivatives, pyrazole, p-aminophenol derivatives-mechanism of action. Antiseptics and disinfectants: definition, standardization of disinfectants. Use of phenols, dyes, chloramines, chlorhexadiene, organomercurials. Dequalinium chloride, formaldehyde, cationic surface-active reagents, chloraminet-nitrofurazone. Distinction between antiseptics and disinfectants. Anaesthetics: definition, classification. Uses of volatile anaesthetics- nitrous oxide, ethers, cyclopropane, chloroform, halothane, trichlorethlene.

Unit - IV: Alkaloids

15 Hours

Alkaloids: sources, isolation and purification, colour reactions and detection general. Quinine and Morphine- sources, extraction, structure, important features and SAR. Tranquilisers, sedatives, hypnotics, psychedelic drugs. Organic pharmaceutical aids:role as preservatives, antioxidants, colouring, flavouring, sweetening, emulsifying agents, stabilizing and suspending agents. Ointment bases. Solvents. Minerals: biological role of salts of Na, K and Ca, trace elements Cu,Zn and I. deficiency. Sources. Diagnostic agents: organic types for different actions, examples.

Unit: V Blood and Haematological agents

15 Hours

Blood: composition.Analysis of blood sample-grouping, Rh factor. Tests for urea, bile carbonyls compounds, serum and protein in a sample. Physiological function of plasma protein. Roel of blood as oxygen carrier. Structure of heme. Clotting mechanisms. Factors involved. Blood pressure-normal, low and high – causes and control, anemia causes, detection. Antianemic drugs.

Haematological agents: coagulants and anticoagulants. Coagulants-vitaminK, Protamine,sulphate, dried thrombin, proteins, amino acids, anti-coagulants- coumarins, indanedioals, citric acid, 2-sulphonyloacids, quinoxaline, thromlodyn,haemostatics, amino-caproic acid, tranexamic acid, anemia: causes, detection, antianemic drugs.

References

1. Charles R. Craig, Robert E. Stitzel, Modern Pharmacology, 3rd edition, little brown and company, Boston, 1990.
2. Saradasubrahmanyam, K. Madhavankuly, Textbook of human physiology, 4th edition, S.Chand and company Ltd., New Delhi, 1995.
3. G.R.Chatwal, pharmaceutical chemistry, Vol.II, 1st edition, Himalaya Publishing House, Bombay, 1991.
4. Harold Varley, Practical clinical biochemistry, 4th edition, Arnold-Heinemann, New Delhi,1976.
Jacques Wallach, Interpretation of Diagnostic Tests, Little Brown and Company, Boston, 1992.

Learning Outcomes:

- The importance of chemistry in the pharmaceutical industry and its terminology were learned by the students
- About antibiotics, vitamins, antipyretics, analgesics, anti-inflammatory agents, alkaloids and hematological agents were also learned by them

Semester – II

CH818-Organic Chemistry – II

4 Hours / week (4 Credits)

Objectives

- To understand the addition, elimination, reduction and oxidation reaction mechanisms
- To learn the concept of bonding, structure and reactivity of organic molecules.

Unit - I: Stereochemistry – I

12 Hours

Introduction to molecular symmetry and chirality – examples from common objects to molecules – axis, plane, center, alternating axis of symmetry. Stereoisomerism – definition based on symmetry and energy criteria – configuration and conformational stereoisomers. Chirality – molecules with C, N, S based chiral centers – absolute configuration - enantiomers – racemic modifications - R and S nomenclature using Cahn-Ingold-Prelog rules – molecules with a chiral center and C_n – molecules with more than one center of chirality – definition of diastereoisomers – constitutionally symmetrical and unsymmetrical chiral molecules - erythro, threo nomenclature – E and Z nomenclature. Asymmetry synthesis - Cram's rule – Optical and geometrical isomerism of disubstituted cycloalkanes- Stereoselective and stereospecific synthesis.

Unit - II: Stereochemistry – II

12 Hours

Axial, planar and helical chirality – examples – stereochemistry and absolute configuration of allenes, biphenyls, trans cyclooctene, transcyclononene and binaphthyls, ansa and cyclophanic compounds, spiranes, exo-cyclic alkylidene cycloalkanes.

Topicity and prostereoisomerism – topicity of ligands and faces, and their nomenclature – NMR distinction of enantiotopic/diastereotopic ligands. Conformational analysis and stereochemical features of acyclic and cyclic systems – substituted n-butanes – cyclohexane and its derivatives – decalins – fused and bridged bicyclic systems – conformation and reactivity - some examples – chemical consequence of conformational equilibrium - Curtin-Hammett principle.

Unit - III: Selected Organic Name Reactions with Mechanism**12 Hours**

Arbuzov reaction, Barmford-stevens reaction, Duff reaction, Claisen condensation, Stork Enamine reaction, Hunsdieker, Ulmann reaction, Swern Oxidation, Kolbe reaction, Meerweinylation, Hofmann-Löffler-Fretag, Peterson olefination, and Chugaev reaction. Wohl-ziegler bromination, Stephen reaction, Schotten-Baumann reaction, Suzuki reaction. Stereochemical aspects of each reaction. Stereochemical aspects of each reaction.

Unit - IV: Oxidation Reactions**12 Hours**

Metal based and non-metal-based oxidations of alcohols to carbonyls (Chromium, Manganese, aluminium, silver, and ruthenium. DMSO, hypervalent iodine and TEMPOL based reagents). Phenols (Fremy's salt, silver carbonate). Alkenes to epoxides: (peroxides/per acids based), Sharpless asymmetric epoxidation, Jacobsen epoxidation, Shi epoxidation. Alkenes to diols: (Manganese, Osmium based), Sharpless asymmetric dihydroxylation, Prevost reaction and Woodward modification. Alkenes to carbonyls with bond cleavage (Manganese, Osmium, Ruthenium and lead based, ozonolysis). Alkenes to alcohols/carbonyls without bond cleavage (hydroboration-oxidation, Wacker oxidation, selenium, chromium based allylic oxidation) - ketones to ester/lactones (Baeyer-Villiger).

Unit - V: Reduction Reactions**12 Hours**

Catalytic hydrogenation (Heterogeneous: Palladium/Platinum/Rhodium/Nickel etc; Homogeneous: Wilkinson). Noyori asymmetric hydrogenation. Metal based reductions using Li/Na/Ca in liquid ammonia, Sodium, Magnesium, Zinc, Titanium and Samarium (Birch, Pinacol formation, McMurry, Acyloin formation, dehalogenation and deoxygenations) - Hydride transfer reagents from Group III and Group IV in reductions. - NaBH_4 triacetoxyborohydride, L-selectride, K-selectride, Luche reduction; LiAlH_4 , DIBAL-H, and Red-Al, Trialkylsilanes and Trialkylstannane, Meerwein-Ponndorff-Verley reduction) - Stereoselective and enantioselective reductions (Chiral Boranes, Corey-Bakshi-Shibata).

References

1. Francis A. Carey and Richard J. Sundberg, Advanced Organic Chemistry – Part B, 3rd Edition 1990.
2. S.M. Mukherji and S.P. Singh, Organic Reaction Mechanism, MacMillan India Ltd., Chennai – 1990.
3. P.S. Kalsi, Stereochemistry and Mechanism through solved problems, Wiley Eastern Ltd., 1994.
4. W. Carruthers, Some Modern Methods of Organic Synthesis, 4th Edn. Edition, Cambridge University Press, 1996.
5. H.O. House, Modern Synthetic Reactions, The Benjamin Cummings Publishing Company, London, 1972.
6. P.S. Kalsi, Stereochemistry, Conformation analysis and Mechanism by 2nd Edition Wiley Eastern Limited, 1993.
7. Ernest Eliel, Stereochemistry of carbon compounds, New Age Publications, 2012.
8. D. Nasipuri, Stereochemistry of Organic compounds, 2nd Edn. New Age Publications, 2008.
9. 2008.
10. J. March, Advanced Organic Reaction mechanism and structure, Tata McGraw Hill, 2000.
11. Ahluwalia and Parashar, Organic Reaction Mechanisms, 4th Edn., Narosa Publications, 2012.
12. P.S. Kalsi, Organic Reaction Mechanism, 3rd Edn. New Age Publications, 1994.

Online resources:

1. [http://eacharya.inflibnet.ac.in/Organic_Chemistry-\(Reaction_Mechanisms-I_and_Reaction_Mechanisms-I\)](http://eacharya.inflibnet.ac.in/Organic_Chemistry-(Reaction_Mechanisms-I_and_Reaction_Mechanisms-I))

Learning Outcomes:

- Advanced concept of bonding, structure and reactivity of organic molecules was understood by them through test and models
- Fundamental principles of addition, elimination, reduction and oxidation reaction mechanisms were also understood by them

CH819-Inorganic Chemistry – II

4 Hours / Week (4 Credits)

Objectives

- To study the concept of coordination Chemistry, stability of the complexes and stereochemistry of complexes.
- To study about structure and bonding in coordination complexes.
- To learn the use of Inorganic Compounds in Biological systems
- To study the electron transfer processes and substitution reactions in Coordination complexes

Unit - I: Coordination Chemistry – I

12 Hours

Thermodynamic aspects of complex formation; Stability of complexes, factors affecting stability, Determination of stability constants by spectrophotometric, polarographic and potentiometric methods. Electronic spectroscopic studies of coordination complexes.

Unit - II: Coordination Chemistry – II

12 Hours

Stereochemical aspects; Stereoisomerism in inorganic complexes; isomerism arising out of ligand and ligand conformation; chirality and nomenclature of chiral complexes; optical rotatory dispersion and circular dichroism, Absolute configuration, Cotton effect. Macrocyclic. Ligands; types; porphyrins; corrins, Schiff bases; crown ethers; cryptates

Unit - III: Bio-Inorganic Chemistry – I

12 Hours

Transition elements in biology - their occurrence and function, active-site structure and function of metalloproteins and metalloenzymes with various transition metal ions (carbonic anhydrase and carboxy peptidase) and ligand systems; O₂ binding properties of heme (haemoglobin and myoglobin) and non-heme proteins hemocyanin & hemerythrin, their coordination geometry and electronic structure, co-operativity effect, Hill coefficient and Bohr Effect. Na-K pump.

Unit - IV: Coordination Chemistry – III

12 Hours

Electron transfer reactions, outer and inner sphere processes, atom transfer reaction, formation and rearrangement of precursor complexes, the binding ligand, successor complexes, Marcus Theory. Complementary, non-complementary and two electron transfer reactions.

Unit - V: Coordination Chemistry - IV

12 Hours

Substitution Reaction: Substitution in square planar complexes, reactivity of platinum complexes, influences of entering, leaving and other groups. The trans effect, Theories of trans effect and its applications. Substitution of octahedral complexes of cobalt and chromium, replacement of coordinated water, solvolytic (acids and bases) reaction applications in synthesis (Platinum and cobalt complexes only).

References

1. J.E. Huheey, Inorganic Chemistry – Principles, Structure and Reactivity, Harper Collins, New York, IV Edition, 1993.
2. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry – A Comprehensive Text, John Wiley and Sons, V Edition, 1988.

3. K.F. Purcell and J.C. Kotz, Inorganic Chemistry – WB Saunders Co., USA, 1977.
4. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., New York, 1974.
5. D.F. Shriver, P.W. Atkins and C.H. Langford, Inorganic Chemistry, OUP, 1990,
6. S.F.A. Kettle, Coordination Chemistry, EIBS, 1973.
7. K. Burger, Coordination Chemistry, Butterworths, 1973.
8. F. Basolo and R.G. Pearson, Mechanism of Inorganic Reaction, Wiley NY, 1967.

Online Resource:

<http://nptel.ac.in/courses/104105033/> Coordination chemistry (Chemistry of transition elements)

Learning Outcomes:

- The concept of coordination chemistry, stability of the complexes and stereochemistry of the complexes were studied by the students through models
- The theories of coordination complexes and their importance in biosystems were learned by them
- Structure and bonding in coordination complexes were also studied by them

CH820-Physical Chemistry – II

5 Hours / week (4 Credits)

Objectives

- To study the fundamentals and applications of quantum mechanics in chemistry
- To study the partial molar property, fugacity and its significance.
- To learn the fundamentals and applications of statistical thermodynamics.

Unit - I: Introduction to Quantum Chemistry

15 Hours

Need for quantum mechanics. Black body radiation, photoelectric effect, Wave -particle dualism, Compton effect- Bohr's theory for hydrogen atom - Radius of Stationary Orbits- Energy of Electron in a Stationary Orbit-Heisenberg uncertainty principle and its applications Solving One-dimensional wave equation for a standing wave-Separation of variables- Interpretation of results-Schrodinger's wave equation-Eigen value-Eigen function.

Postulates of Quantum mechanics –Normalization of wave functions, orthogonality of wave functions - Operators – Algebra of operators – commutative property – Linear operator and Hermitian property -Properties of Hermitian Operator– momentum operator, KE operator, Hamiltonian operator.

Solution of Schrodinger's wave equation for simple systems: Free particle- Particle in one dimensional box (Origin of quantization)

Unit - II: Quantum mechanics to simple systems in chemistry

15 Hours

Particle in one dimensional box (Expectation Values for momentum and position meaning of $\langle x \rangle$, $\langle p \rangle$, Verification of Heisenberg's Uncertainty Principle) -Applications of particle in a box -and particle in three-dimensional (3D) box.

Harmonic oscillator-interpretation of results, Rigid rotor-interpretation of result-angular momentum operator

Hydrogen atom-Hydrogen atomic orbitals-Analytical and graphical representations

Radial probability distribution function-Orthogonality of 1s, 2s, 2p orbitals

Pauli's exclusion principle, Slater's determinant. Introduction to perturbation and Variational method (Qualitative)

Unit - III: Thermodynamics**15 Hours**

Partial molar properties – Partial molar free energy (Chemical potential) – Partial molar volume and partial molar heat content – their significance and determination of these quantities. Gibbs-Duhem equation- variation of chemical potential with temperature and pressure.

Thermodynamics of real gases – gas mixture – fugacity definition Gibbs-Duhem-Marghules equation– determination of fugacity by graphical and equation of state – variation of fugacity with temperature and pressure – thermodynamics of ideal and non - ideal binary solutions-dilute solutions- the concepts of activity and activity coefficients-determination of standard free energies. Choice of standard states – determination of activity and activity coefficients for non-electrolytes.

Unit IV: Statistical thermodynamics – I**15 Hours**

Statistical mechanics of a system of independent particles – Bose – Einstein system and Fermi Dirac systems. Distribution laws – Boltzmann Distribution law – Partition function and its significance. Bose – Einstein and Fermi Dirac Distribution law.

Limit of applicability of distribution law. Relationship between partition and thermodynamic functions – Internal energy, Heat capacity, Entropy, Pressure and Chemical potential.

Distribution law of distinguishable and indistinguishable molecules or particles – Thermodynamic quantities in terms of partition function. Evaluation of independent molecular function – Translational, rotational and vibrational – the law of equipartition energy – Heat capacity.

Unit V: Application of Statistical and Irreversible thermodynamics:**15 Hours**

Application of statistical to ideal monoatomic and Diatomic ideal gases. Heat capacity and the residual entropies of gases. Heat capacity of solids. Maxwell-Boltzmann probability distribution of molecular velocities and speeds. The concept of ensemble, Treatment of canonical ensemble, expression of entropy, enthalpy, Helmholtz free energy.

Near equilibrium process: General theory- Conservation of mass and energy- Entropy production in open system by (i) heat (ii) matter and (iii) current flow. Onsager theory: Validity and verification. Thermoelectricity-Electro kinetic and thermo mechanical effects. Application of irreversible thermodynamics to biological and non-linear systems.

References

1. Donald A McQuarrie, Quantum chemistry, Indian Edition, Viva Books Private Limited 2005
2. K.L. Kapoor, A text book of Physical Chemistry, Vol 4, Mac Millan India Ltd., 2001.
3. Prasad R.K. Quantum Chemistry, 1st Edition, New Delhi, Wiley Eastern Ltd, 1992.
4. M.C.Gupta, Statistical thermodynamics Second edition, Wiley Easter, New Delhi, 1990.
5. S. Glasstone, Thermodynamics for chemists, Affiliated East West Press, New Delhi, 1960
6. Francis W. Sears, Gerhard L. Salinger. Thermodynamics, Kinetic theory and Statistical thermodynamics. Addison Wesley (1975)
7. J. Rajaram and J.C. Kuriacose, Thermodynamics for students of chemistry, Lal Nagin Chand, New Delhi, 1986
8. K.L. Kapoor, A text book of Physical Chemistry, Vol 5, Mac Millan India Ltd., 2015.

Online Resources

[http://eacharya.inflibnet.ac.in/Physical Chemistry-I \(Quantum Chemistry\) \[32 lectures\]](http://eacharya.inflibnet.ac.in/Physical%20Chemistry-I%20(Quantum%20Chemistry))

Learning Outcomes:

- The quantum mechanics fundamentals and its applications were also studied by the students through online courses like NPTEL
- The significance of fugacity, and partial molar properties were studied by the students

- The fundamentals of statistical thermodynamics and its applications were also learned by them.

CH821A-Elective –I Research Methodology

5 Hours/week (5 Credits)

Objectives:

- To learn the purpose and methods of research
- To study the interpretation of knowledge of e-sources in literature search
- To write a scientific report based on the research done

Unit – I Introduction

15 Hours

Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India

Unit – IISurvey of literature

15 Hours

Survey of literature including patents: Chemical nomenclature and literature-primary sources secondary sources including reviews, treatises, and monographs, -literature searching-review of work relevant to the chosen problems. Reviews: Annual and quarterly reviews, general reviews.

Unit III – Computers and web-based research

15 Hours

Introduction, The Computer and Computer Technology, The Computer System, Important Characteristics Computer Applications Computers and Researcher, Web sources for literature, Scifinder and other search engines Abbreviations used in scientific writing, ASAP Alerts, CA Alerts, SciFinder, ChemPort, Science Direct, STN International. Google, scholar, Scopus-Journal home pages

Unit - IV:Data Analysis

15 Hours

Data Analysis: Frequency distributions, the binomial distribution, the Poisson distribution and normal distribution – describing Data, population and sample, mean, variance, standard deviation.

Usage of data / graphical processing softwares (freeware)

Hypothesis testing, levels of confidence and significance, test for an outlier, testing variances, means t-Test, paired t-Test – Analysis – of variance (ANOVA) – Correlation and Regression – Curve fitting, Fitting of linear equations, simple linear cases. General polynomial fitting, linearizing transformations, exponential function fit – r and its abuse – Basic aspects of multiple linear regression analysis.

Unit – V - Writing a scientific paper and thesis

15 Hours

Meaning of Interpretation, Why Interpretation, Technique of Interpretation: Precaution in Interpretation Significance of Report Writing Different Steps in Writing Report Layout of the Research Report Types of Reports Oral Presentation Mechanics of Writing a Research Report Precautions for Writing Research Reports

References

1. C.R Kothari, Research Methodology, New Age International publishers, 2ndEdn; 2009.
2. Goode, William J., and Natt, Paul K.Methods in social research, International Student edition, McGraw-Hill Co, and Kogakusha Ltd., 1995.
3. Bates, R.N and Schoofer, J.P., Research Techniques in Organic Chemistry, Prentice Hall
4. B. E. Cain, The Basis of Technical Communicating, ACS.,Washington, D.C., 1988.

5. J. W. Best, Research in Education, 4th ed. Prentice Hall of India, New Delhi, 1981.
6. H. F. Ebel, C. Bliefert and W.E. Russey, The Art of Scientific Writing, VCH, Weinheim, 1988.
7. J. Gibaldi, and W.S. Achtert, Handbook for writers of Research Papers; 2nd ed.; Wiley Eastern, 1987.
8. Joseph, Methodology for Research; Theological Publications, Bangalore, 1986.
9. R. L. Dominoswki, Research Methods, Prentice Hall, 1981.
10. H. M. Kanare, Writing the Laboratory Notebook; American Chemical Society: Washington, DC, 1985.

Learning Outcomes:

- The research methods, survey of literature and data analysis were understood by the students
- Thesis writing method was also learned by them through the available packages

CH821B-Elective-II Heterocyclic Chemistry

5 Hours / week (5 Credits)

Objectives

- To learn the nature and reactions of heterocyclic compounds
- To understand the classification and significance of heterocyclic compounds

Unit - I: Nomenclature of Heterocycles

15 Hours

Replacement and systematic nomenclature (Hantzsch-Widman system) for monocyclic fused and bridged heterocycles. Aromatic Heterocycles General chemical behaviour of aromatic heterocycles, classification (structural type), criteria of aromaticity (bond lengths, ring current and chemical shifts in ¹H NMR-spectra. Empirical resonance energy, delocalization energy and Dewar resonance energy, diamagnetic susceptibility exaltations). Heteroaromatic reactivity and tautomerism in aromatic heterocycles.

Unit - II: Non-Aromatic Heterocycles

15 Hours

Strain-bond angle and torsional strains and their consequences in small ring heterocycles. Conformation of six-membered heterocycles with reference to molecular geometry, barrier to ring inversion, pyramidal inversion and 1,3-diaxial interaction. Stereo-electronic effects anomeric and related effects, Attractive interactions-hydrogen bonding and intermolecular nucleophilic, electrophilic interactions. Heterocyclic Synthesis. Principles of heterocyclic synthesis involving cyclization reactions and cycloaddition reactions.

Unit - III: Small Ring Heterocycles

15 Hours

Three-membered and four-membered heterocycles-synthesis and reactions of aziridines, oxiranes, thiranes, azetidines, oxetanes and thietanes. Benzo-Fused Five-Membered Heterocycles Synthesis and reactions including medicinal applications of benzopyrroles, benzofurans and benzothiophenes.

Unit - IV: Meso-Ionic Heterocycles

15 Hours

General classification, chemistry of some important meso-ionic heterocycles of type-A and B and their applications. Six-membered Heterocycles with one Heteroatom. Synthesis and reactions of pyrylium salts and pyrones and their comparison with pyridinium & thiopyrylium salts and phridones. Synthesis and reactions of quionlizinium and benzopyrylium salts, coumarins and chromones.

Unit - V: Higher Heterocycles

15 Hours

Six membered Heterocycles with two or more Heteroatoms. Synthesis and reactions of diazoles, triazines, tetrazines and thiazines. Seven-and Large-membered Heterocycles.

Synthesis and reactions of azepines, oxepines, thiepinines, diazepinesthiazepines, azocines, diazocines, dioxocines and dithiocines.

References

1. G. K. Chatwal, Organic Chemistry on Natural Products, Vol. 1, Himalaya Publishing House, Mumbai, 2009.
2. G. K. Chatwal, Organic Chemistry on Natural Products, Vol. 2, Himalaya Publishing House, Mumbai, 2009.
3. O. P. Agarwal, Chemistry of Organic Natural Products, Vol. 1, Goel Publishing House, Meerut, 1997.
4. O. P. Agarwal, Chemistry of Organic Natural Products, Vol. 2, Goel Publishing House, Meerut, 1997.
5. L. Finar, Organic Chemistry Vol-2, 5th ed., Pearson Education Asia, 1975.
6. T. L. Gilchrist, Heterocyclic Chemistry, Longman Press, 1989.
7. J. A. Joule and K. Mills, Heterocyclic Chemistry, 4th ed., John-Wiley, 2010.
8. Raj K Bansal Heterocyclic chemistry, fourth edition, New Age International Publishers, 2005.

Learning Outcomes:

- The reactions of heterocyclic compounds and its nature were learned
- The classifications of heterocyclic compounds and its significance were understood

CH821C Elective – III Bio - Organic Chemistry

(5 Hours/ 5 Credits)

Objectives

- To enable the student to understand and appreciate the importance of biomolecules.
- To understand the techniques involved in the extraction and methods of determination of structure of natural products.

Unit - I: Carbohydrates

15 Hours

Configuration and conformations of monosaccharides, anomeric effect, epimerization and mutarotation. Determination of ring size of monosaccharides. Synthesis, industrial and biological importance of glycosides, amino sugars, sucrose and maltose. Industrial and biological importance of cellulose, starch, glycogen, dextran, hemicellulose, pectin, agar-agar, cytosine, crysin. Glycolysis and its reversal; TCA cycle. Relation between glycolysis and respiration.

Unit - II: Proteins and Nucleic Acids

15 Hours

Classification – properties - 3D structure of protein; Determination of C and N-terminal amino acid sequence – denaturation and renaturation of proteins. Separation and purification of proteins – dialysis – gel filtration - electrophoresis. Catabolism of amino acids: transamination, oxidative deamination, decarboxylation and urea cycle. Introduction, structure and synthesis of nucleosides and nucleotides, protecting groups for hydroxy group in sugar, amino group in the base and phosphate functions. Methods of formation of internucleotide bonds: Structure of RNA and DNA, Crick-Watson model. Solid phase synthesis of oligonucleotides. Role of nucleic acids in the biosynthesis of proteins.

Unit - III: Alkaloids and Terpenoids

15 Hours

General methods of structural elucidation of alkaloids. Structural elucidation of apaverine and cocaine; synthesis and functions of atropine, heptaphylline, morphine. General methods of determination of structure of terpenoids. Structural elucidation of cadinene, vitamin A, abietic acid; synthesis and functions of gibberelic acid, zingiberine and squalene

Unit - IV: Steroids**15 Hours**

Conformations of steroids - molecular rearrangements (acid, base catalysed, and photochemical). Synthesis of steroids – ring forming reaction and control of ring junction stereochemistry. Synthesis and functions of cholesterol, androgens, oestrone, progesterone and cortisone.

Unit - V: Anthocyanins and flavonoids**15 Hours**

General nature and structure of anthocyanins. General methods of synthesizing anthocyanidins. Structural elucidation of cyanidin chloride, pelargonidin chloride, Hirsutidin chloride. Flavones – flavonols – isoflavones. Biosynthesis of flavonoids.

References

1. T. K Lindhorst, Essentials of Carbohydrate Chemistry and Biochemistry, Wiley VCH, 2007.
2. G. K. Chatwal, Organic Chemistry on Natural Products, Vol. 1, Himalaya Publishing House, Mumbai, 2009.
3. G. K. Chatwal, Organic Chemistry on Natural Products, Vol. 2, Himalaya Publishing House, Mumbai, 2009.
4. O. P. Agarwal, Chemistry of Organic Natural Products, Vol. 1, Goel Publishing House, Meerut, 1997.
5. O. P. Agarwal, Chemistry of Organic Natural Products, Vol. 2, Goel Publishing House, Meerut, 1997.
6. L. Finar, Organic Chemistry Vol-2, 5th ed., Pearson Education Asia, 1975.
7. L. Finar, Organic Chemistry Vol-1, 6th ed., Pearson Education Asia, 2004.
8. Pelletier, Chemistry of alkaloids, Van Nostrand Reinhold Co, 2000.

Learning Outcomes:

- The importance of biomolecules was understood by the students
- The techniques involved in the extraction and methods of determination of the structure of natural products were also understood by them through the test and models

PCH813-Organic Chemistry Practical – I**4 Hours / week (4 Credits)****Objectives**

1. To learn the separation of an organic compound from the mixture and identify them using various chemical tests.
 2. To enable the student to learn the methods of preparation for some organic compounds.
- **Separation and identification of components in a two-component mixture and preparation of their derivatives.**
 - **Any Six preparations from the following:**
 - p-Nitrobenzoic acid from p-nitrotoluene
 - Anthroquinone from anthracene
 - Benzhydrol from benzophenone
 - m-Nitroaniline from m-dinitrobenzene
 - 1,2,3,4 - Tetrahydrocarbazole from cyclohexanone
 - p-Chlorotoluene from p-toluidine
 - 2,3 - Dimethylindole from phenyl hydrazine and 2 - butanone
 - Methyl orange from sulphanilic acid
 - Diphenyl methane from benzyl chloride

Reference Books:

1. Arthur I. Vogel, "A Textbook of Practical Organic Chemistry", ELBS, 1969.

2. N.S. Gnanapragasam and B. Ramamoorthy, "Organic Chemistry Lab Manual", S. Visvanathan Printers & Publishers, 2006.

Semester- II

PCH814-Inorganic Chemistry Practicals – I credits)

4 Hours / week (4

Objectives

1. To learn the basic principles of qualitative analysis of an inorganic mixture
2. To understand and apply the principles of complexometric titrations.

Semimicro qualitative analysis of mixture containing two common and two rare cations. The following are the rare cations to be included. W, Ti, Te, Se, Ce, Th, Zr, V, U, Li, Mo, Be.

Complexometric Titrations (EDTA) - Estimation of Ca, Mg and Zn.

- Preparation of the followings:
- Potassium tris (oxalate) aluminate (III) trihydrate
- Tris (thiourea) copper (I) chloride
- Potassium tris (oxalato) chromate (III) trihydrate
- Sodium bis(thiosulphato) cuprate (I)
- Tris (thiourea) copper (I) sulphate
- Sodium hexanitrocobaltate (III)
- Chloropentammine cobalt (III) chloride
- Bis (acetylacetonato) copper (II)
- Hexamminenickel (II) chloride
- Bis (thiocyanato) pyridine manganese (II)

Text Books

1. V. V. Ramanujam, Inorganic Semimicro Qualitative Analysis; 3rd ed., The National Publishing Company, Chennai, 1974.
2. Vogel's Text book of Inorganic Qualitative Analysis, 4 th Ed, ELBS, London, 1974.

Objective

- To learn various physical and electrochemical methods to perform chemical measurements
1. Experiments in Thermodynamics, colligative properties, phase rule, chemical equilibrium and chemical kinetics. Typical examples are given and a list of experiments is also provided from which suitable experiments can be selected as convenient.
 2. Heat of solution from Solubility measurements
 3. Determination of molecular weight
 4. Determination of activity and activity coefficient
 5. Phase diagram construction involving two/three component systems
 6. Determination of partial molar quantities
 7. Adsorption isotherm
 8. Reaction rate and evaluation of other kinetic parameters using polarimetry, analytical techniques, conductometry, dilatometry
 9. Verification of Beer Lambert law.
 10. Detailed list of Experiments for Physical Chemistry Practical I
 11. Typical list of possible experiments is given. Experiments of similar nature and other experiments may also be given. The list given is only a guideline. Any 15 experiments have to be performed in a year.
 12. Determine the temperature coefficient and energy activation of hydrolysis of ethyl acetate.
 13. Study the kinetics of the reaction between acetone in iodine and - acidic medium by half-life method and determine the order with respect to iodine and acetone.
 14. Study the effect of solvent (DSMO-water, acetone-water system). On the rate of acid catalyzed hydrolysis of acetal by dilatometry.
 15. Study the Saponification of ethyl acetate with sodium hydroxide by conductometrically and determine the order of the reaction.
 16. Determine the order with respect to Silver (I) in the oxidation by spt and rate constant and for uncatalysed reaction.
 17. Study the inversion of cane sugar in the presence of acid using Polari meter.
 18. Determine the rate constant and order of the reaction between potassium persulphate and potassium iodide and determine the temperature coefficient and energy of activation of the reaction.
 19. Study the effect of ionic strength on the rate constant for the saponification of an ester.
 20. Study the salt effect on the reaction between acetone and iodine.
 21. Study the kinetics of the decomposition of sodium thiosulphate by mineral acid (0.5M HCl).
 22. Study the primary salt effect on the kinetics of ionic reactions and test the Bronsted relationship (iodide ion is oxidized by persulphate ion).
 23. Study the kinetics of enzyme catalysed reactions (Activity of tyrosinase upon tyrosine spectrophotometrically).
 24. Study the salt effect, the solvent effect on the rate law of alkaline hydrolysis of crystal violet.
 25. Study the reduction of aqueous solution of ferric chloride by stannous chloride.
 26. Determine the molecular weight of benzoic acid in benzene and find the degree of association.
 27. Determine the activity coefficient of an electrolyte by freezing point depression method.
 28. Study the phase diagram form-toluidine and glycerine system.
 29. Construct the phase diagram for a simple binary system naphthalene - phenantherene and benzophenone-diphenyl amine.

30. Construct the boiling point composition diagram for a mixture having maximum boiling point and minimum boiling point.
31. Study the complex formation between copper sulphate and ammonia solution by partition method.
32. Study the simultaneous equilibria in benzoic acid - benzene water system.
33. Determine the degree of hydrolysis and hydrolysis constant of aniline hydrochloride by partition method.
34. Determine the molecular weight of a polymer by viscosity method.
35. Determine the viscosities of mixtures of different compositions of liquids and find the composition of a given mixture.
36. Determine the partial molal volume of glycine/methonal/formic acid/sulphuric acid by graphical method and by determining the densities of the solutions of different compositions.
37. Study the temperature dependence of the solubility of a compound in two solvents having similar inter molecular interactions (benzoic acid in water and in DMSO water mixture) and calculate the partial molar heat of solution.
38. Determine the polar molar volume of glycine/methonal/formic acid /sulphuric acid by graphical method and by determining the densities of solutions of different concentrations.
39. Construct the phase diagram of the three component of partially immiscible liquid system (DMSO-water-benzene; acetone-chloroform -water; chloroform-acetic acid-water)
40. Construct the phase diagram of a ternary aqueous system of glucose -potassium chloride and water
41. Study the surface tension - concentration relationship for solutions(Gibb's equation)
42. Study the absorption of acetic acid by charcoal(Freundlich isotherm)
43. Study the complex formation and find the formula of silver-ammonia complex by distribution method.
44. Determine the dissociation constant of picric acid using distribution law.

Text books

1. B. Viswanathan and P.S.Raghavan, Practical Physical Chemistry, Viva Books, New Delhi, 2009.
2. K. Sundaram, Practical Chemistry, S. Viswanathan Co. Pvt., 1996.

CH918-Organic Chemistry – III

4 Hours / week (4 Credits)

Objectives

- To learn photochemical reactions, pericyclic reactions and their importance.
- To learn the synthetic application of Organometallic compounds.

Unit - I: Molecular Rearrangements

12 Hours

Types of rearrangements: Nucleophilic; free radical and electrophilic reactions. Mechanisms: Nature of migration; migratory aptitude and memory effects, ring enlargement and ring contraction rearrangements Reactions: Wagner-Meerwin and related reactions, Benzil-benzilic acid, Favorskii, Hofmann and related rearrangements, Beckmann, Neber, Baeyer-Williger, Stevens, boron-carbon migration, Non-1,2-rearrangements, Fischer-indole synthesis, Arndt-Eistert synthesis

Unit - II: Reagents in Organic Synthesis

12 Hours

Enamine chemistry and its synthetic applications, aluminium isopropoxide, DCC, *n*-BuSnH, baker yeast, Woodward and Prevost dihydroxylations, NBS, DDQ, LTA, LDA, Wilkinson's catalyst, and Diazomethane, Wittig reagent, Gilman reagent, Corey's reagent, Merrifield reagent.

Unit - III: Synthetic Applications of Organometallic Compounds

12 Hours

Synthesis and applications of organoboranes – Grignard reagents - organomercury compounds – aromatic mercuration, organolithium compounds - organothallium compounds - organocopper compounds, organolead compounds and organoaluminium compounds.

Unit - IV: Organic Photochemistry

12 Hours

Introduction- Photochemical laws-electronic transitions- photochemistry of excited molecule- physical processes- photochemistry of carbonyl compounds- Norrish type I and II reactions- Hydrogen abstraction- photocycloaddition- Paterno – Buchi reactions- photorearrangement of cyclopentenone, cyclohexenone-Lumiketone rearrangement- photorearrangement of β,γ -unsaturated ketones-di- π -methane rearrangement-Aza- di- π -methane rearrangements-Analysis of cis-trans isomerisations

Unit - V: Pericyclic Reactions

12 Hours

Introduction to pericyclic reaction - Characteristics-types-applications of FMO and MO correlation diagram methods to electrocyclic and cycloaddition reactions- Woodward-Hoffmann rules and their applications to simple systems-cycloadditions involving hydrogen transfer- Analysis of Cycloaddition and Diels –Alder reactions, Detail study of Sigmatropic reactions- Cope and Claisen rearrangements, Chelotropic reaction, Group transfer reactions, Ene and retro enone reactions, Coarctate reaction.

References

1. Clayden, Greeves, Warren and Wothers, Organic chemistry, Oxford University press, 2001.
2. Francis A Carey and Richard J. Sundberg, Advanced organic chemistry, 4th Edn., part B, 2001.
3. I.L. Finar, Organic Chemistry V Edition, Vol :II ELBS Publication, 1986.
4. J. March, Advanced Organic Reaction mechanism and structure, Tata McGraw Hill, 2000.
5. Jagadamba Singh and Jaya Singh, Photochemistry and Pericyclic reactions, 3rd edn., New Academic Science, 2012.
6. K. K. Rohatji Mukherjee, Fundamentals of photochemistry, 1st, edn., New Age Publications, 2008.
7. S. H. Pine, *Organic Chemistry*, 5th edn, McGraw Hill International Edition, 1987.
8. L. F. Fieser and M. Fieser, *Organic Chemistry*, Asia Publishing House, Bombay, 2000.

9. E.S. Gould, *Mechanism and structure in organic chemistry*, Holt, Rinehart and Winston Inc., 1959.

Online Resources

<http://eacharya.inflibnet.ac.in/> Organic chemistry and pericyclic reactions [40 lectures]

Learning Outcomes:

- Importance of photochemical and pericyclic reactions was learned by them through test and models
- Organometallic compounds and its synthetic applications were also learned by them

CH919-Inorganic Chemistry – III

4 Hours / Week (4 Credits)

Objectives

- To study about the basic concepts of Inorganic spectroscopy
- To study the magnetic and superconductivity behaviour in the materials
- To learn the fundamentals concepts of Nanomaterials

Unit - I: Inorganic Spectroscopy - I and Magnetic Susceptibility

12 Hours

Applications to inorganic systems of the following: ultra violet, visible, infra-red and Raman spectra of metal complexes, organometallic and simple inorganic compounds with special reference to coordination sites, isomerism. Magnetic Susceptibility and measurements - Guoy method, Faraday method; applications.

Unit - II: Magnetic Properties and Superconductivity

12 Hours

Magnetic properties – classification - diamagnetic, paramagnetic, antiferromagnetic, ferro and ferri magnetic — magnetic susceptibility, Variation with temperature – Curie-Wiess law, Curie temperature and Neel temperature. Permanent and temporary magnets. Superconductivity – introduction, Meissner effect – mention of Bardeen, Cooper and Schrieffer theory and Cooper pairs – examples of superconducting oxides.

Unit - III: Inorganic Spectroscopy – II

12 Hours

Application to Inorganic systems of the following: NMR, NMR of ^{31}P , ^{19}F , NMR shift reagents, NQR introduction and NQR - Nitrosyl compounds. Mossbauer spectra – Theory and Mossbauer spectra of Fe and Sn systems.

Unit - IV: Inorganic Spectroscopy – III

12 Hours

ESR Introduction - Zeeman equation, g-value, nuclear hyperfine splitting, interpretations of the spectrum, simple carbon centered free radicals. Anisotropy - g-value and hyperfine splitting constant. McConnell's equation, Kramer's theorem. ESR of transition metal complexes of copper, manganese and vanadyl complex. Applications of ESR spectroscopy.

Photoelectron spectroscopy (UV and X-ray) - photo electron spectra - Koopman's theorem, time structure in PES, chemical shift and correlation with electronic charges.

Unit - V: AAS and ICP –AES

12 Hours

Atomic absorption spectroscopy- principle- Advantages and disadvantages of AAS. Instrumentation of AAS, Interferences in AAS - Applications of AAS – Determination of Mg in water and Lead in Petrol- principle of plasma spectroscopy - ICP-AES instrumentation - limitations of flame emission spectroscopy - applications of plasma spectroscopy - comparison of ICP-AES with AAS.

References

1. C.N.R. Rao, I.R. Ferraro, Spectroscopy in Inorganic Chemistry, Vol. I and Vol. II, Academic Press, 1970.
2. G. Aruldas, Molecular Structure and Spectroscopy – Prentice Hall, 1986.
3. D. A. Skoog and D.M. West, Principles of Instrumental Methods of analysis, Saunderson's College Publ. III Edition, 1985.
4. E. A. V. Ebsworth, D. W. H. Rankin and S. Craddock, Structural Methods in Inorganic Chemistry, II Edition, Blackwell Scientific Publications, Oxford, London 1991.
5. G.D. Christian and J.E.G. Reily, Instrumental Analysis, Allyn and Bacon, II Edition, 1986.
6. H.A. Strobel, Chemical Instrumentation, Addison - Wesley Pub. Co., 1976.
7. R. S. Drago, Physical Methods for Chemists, Saunders College Publishing, Philadelphia 1992.
8. R.S. Drago, Physical methods in inorganic Chemistry, Reinhold, NY, 1968.
9. Willard Merritt, Dean and Settle, Instrumental methods of analysis, CBS Publ. VI edition, 1986.
10. A.I Vogel, Text books of qualitative analysis, ELBS Editions, 1976 and IV Edition 1985.

Learning Outcomes:

- Inorganic spectroscopy's basic concepts and its role in determining metal complexes were studied by the students using the packages available in the literatures
- Magnetic Properties and Superconductivity of materials were studied.

CH920-Spectroscopy

5 Hours / week (4 Credits)

Objectives

- To understand the concepts of spectral techniques
- To apply these techniques for the quantitative and structural analysis of organic compounds.

Unit - I: Elemental Analysis and Mass Spectra

15 Hours

Calculation of empirical and molecular formula-Mass Spectroscopy – Principles – measurement techniques – (EI, CI, FD, FAB, SIMS) Molecular ions – isotope ions – fragmentations of odd and even electron types – rearrangement ions – factors affecting cleavage patterns – simple and multicentre fragmentation – McLafferty rearrangement. Mass spectra for various organic compounds- nitrogen rule.

Unit - II: UV –Visible Spectroscopy

15 Hours

Ultraviolet – Visible spectroscopy – Instrumentation-single and double beam instruments– types of electronic transitions – chromophores and auxochromes – factors influencing positions and intensity of absorption bands – absorption spectra of dienes, polyenes and unsaturated carbonyl compounds – Woodward – Fisher rules. Applications to simple systems.

Unit - III: Infra-Red Spectroscopy

15 Hours

IR Spectroscopy – Selection rule- Instrumentation-Sample preparation-FTIR- vibrational frequencies and factors affecting them – identification of functional groups – intra and inter molecular hydrogen bonding – finger print region – Far IR region – metal ligand stretching vibrations.

Unit - IV: NMR

15 Hours

Theory, Relaxation processes, spin – spin splitting Theory of Chemical Shift – Chemical exchange, Double Resonance techniques. Instrumentation - application to organic systems. Nuclear spin – magnetic movement of a nucleus – nuclear energy levels in the presence of magnetic field relative populations of energy levels – macroscopic magnetization – basic

principles of NMR experiments – CW and FT NMR –¹H NMR – Chemical shift and coupling constant – factors influencing proton chemical shift and vicinal proton – proton coupling constant - ¹H NMR spectra of simple organic molecules such as CH₃CH₂Cl, CH₃CHO etc. AX and AB spin system – spin decoupling – nuclear overhauser effect – chemical exchange.

Unit - V: ¹³C NMR, ORD and CD

15 Hours

¹³C NMR – proton decoupled and off – resonance ¹³C NMR spectra – factors affecting ¹³C chemical shift - ¹³C NMR spectra of simple organic molecules- elementary idea about 2D NMR- COSY-NOSEY-DEPT90 and 135. (Combined problem)

Optical rotatory dispersion and circular dichroism: Introduction to theory and terminology – cotton effect – ORD curves – axial haloketone rule and its applications – octant rule – its applications – applications of ORD to determine absolute configuration of monocyclic ketones – comparison between ORD and CD – their inter relationships.

References

- J. Dyer, Application of absorption spectroscopy of organic compounds, Prentice and Hall of India, Pvt., New Delhi.1991.
- R.M. Silverstein, G.d. Bassler and Monsu. Johr, Spectrometric identification of organic compounds by Wiley and Sons, New York. 2000.
- Douglass, Introduction to the spectroscopic methods for the identification organic compounds – II, Oxford publications, 2009.
- William Kemp, Organic Spectroscopy, 3rdEdn.McMillan, 1991.
- Y.R.Sharma, Elementary Organic Spectroscopy 3rd., S.Chand, 1999.
- R.M. Silverstein, G.D. Bassler and Monsu, Spectrometric identification of Organic compounds, Sixth Edn. John Willey and Sons, New York, 2005.
- Carington and Ad.Mclachlan, Introduction to Magnetic Resonance, Harper and Row, New York, 1967.
- P.S.Kalsi, Spectroscopy of Organic Compounds, 4thEdn., New Age International publishers, 2001.

Learning Outcomes:

- The concept of spectral techniques was understood
- The quantitative and structural analysis of organic compounds was also learned by them through available literature packages

CH921A-Elective-III: Inorganic Photochemistry & Materials Science

5 Hours / week (5 Credits)

Objectives

- To provide the students with basic information on matter radiation interactions and their consequences excited state formation modes, photophysical and photochemical deactivation pathways, and application of theoretical knowledge.
- Students are equipped with the knowledge on composition, molecular and electronic structures of inorganic compounds.
- Students will know to identify and quantify the course of photophysical and photochemical processes.

Unit - I: Basics of Photochemistry

15 Hours

Principle-Light Dual nature-Basic Laws of Photochemistry-Quantum Yield. Selection rule-Notation for excited state Organic Compounds-Energy level for Inorganic Complexes.Absorption Spectra-Emission Spectra-Frank Condon Principle-Energy Dissipation by radiative and non radiative transfers. Quantum yield measurement-Actinometers-types of actinometers.Excited states of metal complexes-Charge transfer spectra, metal-centered transitions, charge transfer excitations, emission spectra. Photophysical Kinetics of Unimolecular reaction. Stern-Volm equation.

Unit - II: Photochemistry of Transition Metal Complexes and Its Applications 15 Hours

Electron transfer reactions in transition Metal Complexes-Photo physical and photochemical implications of transition metal complexes. Weak Interactions and Strong interactions(Excited state as redox Reactants-redox Properties of bpy and Phencomplexes (Fe, Ru and Os). Energy and electron transfer-Application of redox processes of electronically excited states for catalytic purposes. Transformation of low energy reactants into high energy products, chemical energy into light. Storage of light energy-EndoergonicProcess(Honda's cell)-Photo electrochemical cell

Unit – III: Photochemical Applications of Inorganic Systems 15 Hours

Metal complex sensitizer(Fe and Ru Systems) Metal Colloid systems, semiconductor supported metal or oxide systems (TiO₂ supported systems). Photoproduction of Hydrogen and Oxygen-Water photolysis. Spectra of Organometallics-Metal Carbonyl compounds, Organometallic compounds with metal-metal bonding. Photochemistry in the solid state.

Unit - IV: Preparative Techniques 15 Hours

Principles of solid-state synthesis- ceramic methods, solid solution and compound precursors (nitrates, carbonates, hydroxides, cyanides and organometallics), sol-gel, spray pyrolysis, combustion, hydrothermal, electrosynthetic techniques -

New Materials: Fullerenes and fullerides: structure, synthesis, functionalization approaches, conducting properties of fullerides-applications. NASICON and alumina-structure and conducting properties. High-Tc Oxides - structure, perovskite A & B, structure and synthesis of La, Sr and Ba cuprates-applications.

Unit V 15 Hours**Crystal imperfections, Diffusion in solids, phase transformations, elastic, inelastic and visco elastic behavior.**

Point Imperfections, The Geometry of Dislocations, Other Properties of Dislocations, Surface Imperfections. Fick's Laws of Diffusion, Solution to Fick's Second Law, Applications Based on the Second Law Solution, The Kirkendall Effect, The Atomic Model of Diffusion, Other Diffusion Processes. Phase Transformations, Time Scale for Phase Changes, nucleation and growth, The Nucleation Kinetics, The Growth and the Overall Transformation Kinetics. Elastic Behaviour-Atomic Model of Elastic Behaviour, The Modulus as a Parameter in Design, Rubber-like Elasticity. Anelastic behaviour, Relaxation Processes. Viscoelastic behaviour, Spring-Dashpot Models.

References

1. Gerald B. Porter, J.Chem.Edu,1983, 60, 785.
2. K. K. Rohatgi-Mukerjee, Fundamentals of Photochemistry,New Age International Publishers, Calcutta.
3. Balzani, V.; Bolletta, F.; Scandola, F.; Ballardini. R.Pure and Appl. Chem.,1979, 51, 299.
4. John S. Connolly, Photochemical ConversionAnd Storage Of Solar Energy,Academic Press, New York,1981.
5. Balzani, V.; Cassarati, V.Photophysics and Photochemistry of coordination compounds, Academic Press, Newyork, 1970.
6. R. S. Becker, Theory and Interpretation of fluorescence and phosphorescence, JohnWiley and Sons, Newyork, 1969.
7. S. Arunachalam, Inorganic photochemistry, Kala publications, Trichy, 2002.
8. D. M. Roundhill, Photochemistry and Photophysics of Metal complexes, Springer; Edition, 1994.
9. Lesley Smart and Elaine Moore, Solid State Chemistry-An Introduction by Chapman Hall, London, 1992.
10. A.R. West, Solid State Chemistry and its Applications , John Wiley & Sons.1989.
11. M. G. Arora, Solid State Chemistry by Anmol Publications, New Delhi, 2001.
12. P. K. Palanisamy, Materials Science, Scitech Publications, Chennai, 2003

13. Geoffrey A Ozin and Andre C Arsenault, Nanochemistry, A chemical approach to Nanomaterials, RSC, 2006.
14. Harry R Allcock, Introduction to materials chemistry, Wiley NY, 2008
15. Gurtu and Gurtu, Solid state Chemistry, Pragathi prakashan, 2015.
16. V. Raghavan, material Science and Engineering, Eastern Economic Edition, New Delhi, 2011.
17. Dr. Elangoven, Solid State Physics

Learning Outcomes:

- Theoretical knowledge on matter radiations, interactions, excited state formation modes, photo physical, and photochemical deactivation pathways were learned by the students
- Molecular composition, and electronic structures of inorganic compounds were also learned by them
- Different types of materials and their preparation and properties were learned

CH921B-Elective – II: Polymer Chemistry

5 Hours / week (5 Credits)

Objectives

- To gain knowledge in the preparation, properties, characterization and uses of polymers.
- To appreciate the role and applications of polymer substances.

Unit - I: Basic Concepts

15 Hours

Classification: natural, synthetic, organic, inorganic, elastomers, fibers, resins, and plastics: thermoplastic and thermosetting. -Nomenclature and isomerism-polymerization-functionality-Molecular forces and chemical bonding in polymers-Molecular Weight-Linear, branched, and cross-linked polymers. Techniques of polymerization–emulsion, bulk, solution and suspension.

Unit - II: Reaction, Mechanism and Kinetics

15 Hours

Reaction of polymers (Addition, Hydrogenation, Hydrolysis Cyclisation and Cross linking) Kinetics and Mechanism of polymerization-free radical, cationic, anionic and co-ordination polymerization (Ziegler-Natta Catalyst). Copolymerization-Kinetics (Detailed Study). General characterization–Kinetic chain length–degree of polymerization, chain transfer-initiators-inhibitors-retarders.

Unit - III: Structure, Properties, Polymer Characterization and Analysis

15 Hours

Structure –Physical Property-Morphology (configurations-crystal structure-morphology-crystallization and melting)-Rheology (Viscoelasticity-glassy state and glass transition) Factors affecting Glass transition temperature-crystallinity and melting point-related to structure. Crystalline nature determination-X-Ray diffraction- Thermo Gravimetric Analysis-molecular weight determination-Osmometry(membrane), Ultra centrifuge, and Gel Permeation Chromatography.

Unit - IV: Industrial and Natural Polymers

15 Hours

Important industrial polymers-preparation and application of polyethylene, polyvinylchloride, poly urethanes, polytetrafluoro ethylene (TEFLON), Nafion and ion-exchange resins. Importance of natural polymers-application and structures of starch, cellulose, chitin and chitosan derivatives.

Unit - V: Novel Polymers

15 Hours

Polymers in Medicine-Ionomers-Electronically conducting polymers-Interpenetrating polymer networks-Inorganic Polymers-Polymer liquid Crystals-High temperature and fire-retardant polymers-polymer nanocomposites- Electroluminescent polymers.

References

1. F. W. Bill Meyer. Text book of polymer science, III Edition, John Wiley and sons, New York, 1973.
2. V. R. Gowarikar, B. Viswanathan, J. Sridhar, Polymer Science, Wiley Eastern, 1986.
3. G. S. Misra, Introduction to Polymer Chemistry, New Age Publishers Ltd. 2008,
4. C. E. H. Brawn, The Chemistry of High Polymers, Butter worth & Co., London, 1948.
5. G. Odian, Principles of Polymerization, McGraw Hill Book Company, New York, 1973.
6. E. A. Coolins, J. Bares and E. W. Billmeyer, Experiments in Polymer Science, Wiley Interscience, New York, 1973.
7. Jagdamba Singh, R. C. Dubey, Organic Polymer Chemistry, PragathiPrakashan, 3rdEdn., 2011.
8. Rudin, The Elements of Polymer Science and Engineering. Academic Press, New York, 1973.
9. G. S. Krishenbaum, Polymer Science Study Guide, Gordon Breach Science publishing, New York, 1973.

Online Source

1. <https://hackr.io/tutorials/learn-polymer>

Learning Outcomes:

- Knowledge of polymers, preparation, properties and characterization were gained
- Polymer substance role and its application were also learned by the students

CH921C-Elective III Chemoinformatics

5Hrs/week 5 Credits

Objectives

- To study the fundamentals principles of the various computational methods
- To interpret the various methods of representing molecules in a chemical database
- To learn to analyse the data available in various databases
- To learn to apply the datamining tools on datasets and interpret the results

Unit – I: Introduction to Chemoinformatics

15 Hours

History and evolution of Chemoinformatics, Use of Chemoinformatics, Prospects of Chemoinformatics, Molecular modelling, and structure elucidation.

Nomenclature: IUPAC names, trade names, common names., Representing the molecules: Older systems – Connection tables, Line notation – INCHI, SMILES, WLN canolications. (Activity – Create a SMILES notation of simple molecules using the software)

Line notation versus connection tables. Query languages - SMARTS, SMILES coding, Matrix representations, Introduction to chemical structure file formats - Molfiles and Sdfiles

Unit – II: Structure Searching

15 Hours

Structure searching:2D-Fingerprints-Structural Keys – Hashed fingerprints, Exact structure searching, Substructure search, Sub structure searching - screening methods- algorithms for sub graph isomorphism – practical aspects of structure searching - Ways to measure Similarity - 2D topology, 3D configuration, Tanimotto Coefficient – Euclidean distance – Dice Coefficient – Cosine Coefficient – Tversky similarity Coefficient.Basics of computation of physical and chemical data and structure descriptors, data visualization.

Unit – III: Databases and Datamining

15 Hours

Introduction-Database concepts-**types**-chemical, proteomic, genomic and literature databases-source, content and design, applications.

Chemical databases-Chembank, ChemPDB, Combichem, NCI- Pubchem (Compounds, Substances, Bioassay), PubMed, Drug Bank, ChemSpider (Activity - Search the simple molecules and predict their physico – chemical properties using Pubchem database)

Introduction-Aspects of Data mining – Techniques of Data mining – Multi dimensional models – cube – star – snowflakes – classification techniques – K-nearest neighbour – Decision tree – Bayesian classifier – Introduction to neural network- Applications of Data mining

Unit IV: Molecular Modelling and Docking:

15 Hours

Molecular descriptors – ID, 2D & 3D – Deriving a simple QSAR equation – Hansch analysis – Free Wilson analysis – Application of Hansch equation – Hydrophobic & Steric factors – Influence of electronic factors – Ionisation constants, QSPR - Toxicity relationship
Ligand based drug design – Structure based drug design – Docking & Scoring functions – Active site characterization, building a molecule and energy optimization using ARGUSLAB (Activity), Docking of small molecules using ARGUSLAB (Activity)

Unit V: Computational chemistry

15 Hours

Fundamental principles - Ab initio methods – HartreeFock approximations – semi empirical methods – density functional theory – Basic theory – Linear scaling techniques – molecular mechanics - Basic theory – existing force fields – molecular dynamics and Monte Carlo simulations.

Reference Books:

1. Andrew R. Leach, Valerie J. Gillet. An Introduction to Chemoinformatics, revised edition, Springer, Netherland, 2007.
2. Larsen et al (ed), Textbook of Drug Design and Discovery, 3rd edition, Taylor and Francis, London and NewYork, 2004.
3. Leach A.R, Molecular Modelling: Principles and applications, 2nd edition, Prentice Hall, New Delhi, 2001.
4. K.V. Raman, Computer Applications in Chemistry, Tata McGraw Hill, New Delhi, 2008.
5. Vikas Gupta, Computer Course Kit, Dream Tech Press, 2010

Web sources:

1. <https://open-babel.readthedocs.io/en/latest/Cheminf101/index.html>
2. <https://open-babel.readthedocs.io/en/latest/Cheminf101/represent.html#iupac-names-trade-names-common-names>
3. <https://open-babel.readthedocs.io/en/latest/Cheminf101/similarity.html>
4. <http://insideinformatics.cambridgesoft.com/webinars/info/Default.aspx?webinarID=632>
5. <http://www.acdlabs.com/resources/freeware/chemsketch/>
6. http://www.acdlabs.com/download/technotes/2016/technote_chemsketch_advanced.pdf
7. accelrys.com/products/pdf/isis-draw.pdf
8. <http://www.originlab.com/doc/Tutorial>
9. <http://www.inflibnet.ac.in/>
10. <https://www.khanacademy.org/>

Learning Outcomes:

- Describe the various methods of representing molecules in a chemical database
- Analyze the data available in various databases
- Apply the datamining tools on datasets and interpret the results
- Explain the fundamentals principles of the various computational methods
- Chemical calculations using computer programs and docking process were learned.

Semester-IV

CH1017-Organic Chemistry – IV

4 Hours / week (4 Credits)

Objectives

- To know modern synthetic methods and synthetic strategies. This help in planning the synthesis of any types of organic compounds.
- To learn the synthesis and bio-synthesis of heterocyclic products.

Unit - I: Retrosynthetic Analysis-I

12 Hours

Basic guidelines and terminology of retrosynthesis (synthons, FGI, disconnection approach), Important functional group interconversions synthesis of aromatic compounds-, one group C-X disconnections and two group C-X disconnections, one group C-C disconnections and two group C-C disconnections, important strategies of retrosynthesis.

Unit - II: Retrosynthetic Analysis-II and Protecting Functional Groups

12 Hours

Amine and alkene synthesis, umpolung carbonyl group reactivity in synthesis, Protection and deprotection of hydroxy, carbonyl, amine and carbon-carbon multiple bonds; chemo- and regioselective protection and deprotection; illustration of protection and deprotection in synthesis.

Unit - III: Chemistry of heterocyclic compounds

12 Hours

Numbering of heterocyclic compounds, structure, preparation and reactions of heterocyclic compounds (pyrrole, furan, thiophene, 1,2- and 1,3-azoles, triazoles, pyridine, pyryliums, diazines, triazine), Fused heterocycles containing one or more heteroatoms (indoles, benzofurans, benzothiophene, benzenellated azoles, quinolines, isoquinolines, benzopyrones).

Unit - IV: Green chemistry and Natural Products Chemistry

12 Hours

Green chemistry: Importance and synthetic reactions of green solvents as reaction medium (water, ScCO₂, Polyethylene glycol)- Ionic liquids (alkylation and coupling reactions)- microwave assisted organic synthesis.

Steroids: Sterols and bile acids, estrogens, androgens: **Alkaloids:** Structure, synthesis Reserpine, Morphine. **Terpenoids:** Zingiberene, Squalene. Natural Pigments: structural confirmations of flavones, flavanones, isoflavones, xanthenes, quinones.

Unit - V: Bioorganic Molecules

12 Hours

Molecular structure and numbering of Purines (Uric acid, Cytosine, Adenine, Guanine) & Pyrimidines (Uracil, thymine & Cytosine). Nucleic acids-Functions of nucleic acids- Structural features of nucleosides and nucleosides- structure and biological implications of DNA and RNA (m-RNA, t-RNA and r-RNA) - replication of DNA - Genetic code and informational theory. Proteins – standard amino acids - peptide synthesis-End group analysis (Sanger's method, Edmon's degradation) - primary, secondary, tertiary structure and quaternary structure of proteins and their determination.

References

1. William Caruthers and Iain coldham, Modern methods of organic synthesis, IV Edition, Cambridge university press, 2004.
2. Michael B Smith, Organic Synthesis, Tata Mc Graw Hill, 1994.
3. Stuart warren, Organic synthesis the disconnection approach, Wiley India edition, 2004.
4. V K Ahluwalia and Renuagarwal Organic synthesis special techniques, second edition, Narosa Publishing House, 2007.
5. J. March, Advanced Organic Chemistry, 4th Edn, Wiley Publications, 1992.
6. Gurdeep R Chatwal, Organic Chemistry of Natural Products, Vol 1 & 2, revised Edn., Himalaya Publications, 2009.
7. O.P Agarwal, Chemistry of Organic Natural Products, Vol 1 & 2, Goel Publications, 28th Edn., 2002.
8. S.P. Bhutani, Chemistry of Biomolecules, Ane Books, 2009.
9. George S. Zweifel, Michael H Nantz, Modern Organic Synthesis – an introduction, W.H. Freeman and Company, 2007.

10. Raj K Bansal, Heterocyclic chemistry, fourth edition, New Age International Publishers, 2005.

Learning Outcomes:

- Any types of organic compounds synthesis were learned by the students, through modern synthetic methods and strategies.
- Synthesis and bio-synthesis of heterocyclic products were also learned by the students

CH1018-Inorganic Chemistry – IV

4 Hours / Week (4 Credits)

Objectives:

- To understand the structural aspects and applications of Organometallic compounds.
- To study the electron transfer processes and substitution reactions in Coordination complexes
- To study the fundamentals of nuclear chemistry.
- To learn the use of Inorganic Compounds in Biological systems

Unit - I: Organometallic Chemistry – I

12 Hours

Carbon donors: Alkyls and aryls metalation, bonding in carbonyls and nitrosyls, chain and cyclic donors, olefins, acetylene and allyl system synthesis structure and bonding Metallocenes. Reactions: Association substitution, addition and elimination ligand promotion, electrophilic and nucleophilic attack on ligands. Carbonylation. Decarboxylation, oxidative addition and fluxionality.

Unit - II: Organometallic Chemistry – II

12 Hours

Catalysis: Hydrogenation of olefins (Wilkinson's catalyst), hydroformylation of olefins using cobalt or rhodium catalysts (oxo process), oxidation of olefins to aldehydes and ketones (Wacker process) polymerization (Ziegler – Natta Catalyst); cyclooligomerisation of acetylene using nickel catalyst (Repep's catalyst); polymer-bound catalysts.

Unit - III: Nuclear Chemistry – I

12 Hours

Nuclear Reactions: Types, reactions, cross section, Q-value, threshold energy, compound nucleus theory: high energy nuclear reactions, nuclear fission and fusion reactions as energy sources - comparison between nuclear fission and fusion - Liquid drop and the shell models of the nucleus. photonuclear and thermo nuclear reactions.

Stellar energy: synthesis of elements, hydrogen burning, carbon burning. Nuclear Reactors: fast breeder reactors, particle accelerators, linear accelerators, cyclotron and synchrotron. Radiation chemistry - interaction of radiation with matter - linear energy transfer (LET) - Bethe's equation - Chernkov radiation - absorption coefficient - linear and mass absorption coefficient.

Unit - IV: Coordination Chemistry

12 Hours

Molecular orbital theory and energy level diagrams, Evidence for metal-ligand orbital overlap, Jahn-Teller distortion, charge - transfer spectra.

Term states for "d" - ions, energy diagrams, concept of weak and strong field ligands d-d transitions, Orgel and Sugano - Tanabe diagrams, spin orbit coupling, nephelauxetic effect, spectral and magnetic characteristics of transition metal complexes.

Unit - V: Bio-Inorganic Chemistry – II

12 Hours

Characterization of O₂ bound species by Raman and infrared spectroscopic methods; representative synthetic models of heme and non-heme systems. Electron transfer proteins - active site structure and functions of ferredoxin, rubridoxin and cytochromes, and their

comparisons. Vitamin B₁₂ and cytochrome P₄₅₀ and their mechanisms of action. Metals in medicine - therapeutic applications of cis-platin, radio-isotopes (e.g., Tc & I₂) and MRI agents.

References

1. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry, John Wiley and Sons 5th Edition, 1988.
2. K.F. Purcel and J.C. Kotz, Inorganic Chemistry, W.Saunders Co., 1977.
3. EAV. Epsworth, D.W.H. Rankin and S. Cradock, Structural methods in Inorganic Chemistry, Blackwell Scientific Publ. 1987.
4. G. Coates M.I. Green and K. Wade. Principles of Organo metallic chemistry, Methven Co., London 1988.
5. R.B. Jordon, Reaction mechanism of Inorganic and Organo metallic system, OUP, 1991.
6. P. Powell, Principles of Organo metallic chemistry, Chappmanan Han. 1998.
7. R.C. Mehrothra, A. Singh, Organo Metallic Chemistry, Wiley Eastern Co., 1992.
8. R.B. Heslop and K. Jones, Inorganic Chemistry, Elsevier Scientific Publ. 1976.
9. H.A. O Hill and P. Day, Practical methods in advanced inorganic chemistry, John Wiley, 1968.
10. G. Frieland, J.w. Kennedy and J.M. Miller, Nuclear and Radiochemistry, John Wiley and Sons, 1981.
11. HariJeevanArnikar , Essentials of Nuclear Chemistry, New Age International (P) Ltd., 2005.
12. S. J. Lippard and J. M. Berg, Principles of Bioinorganic Chemistry, Univ. Science Books, 1994.
13. W. Kaim and B. Schwederski, Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life (An introduction and Guide), John Wiley & Sons, 1994.

Online Resources

1. <http://nptel.ac.in/courses/104101079/>
2. [http://eacharya.inflibnet.ac.in/ Inorganic Chemistry \(I/II/III\)](http://eacharya.inflibnet.ac.in/Inorganic%20Chemistry%20(I/II/III))

Learning Outcomes:

- Organometallic compounds applications and structural aspects were understood by the students through models
- The basics of nuclear reactions and nuclear reactor were studied.
- The role of inorganic elements in the biological systems were learned

CH1019-Physical Chemistry – III

5 Hours / week (4 credits)

Objectives

1. To study the ionic conductance, Electrode - Electrolytic interface, electrochemical kinetics, over potential, corrosions and fuel cells
2. To appreciate the applications of quantum chemistry.

Unit - I: Electro Chemistry – I

15 Hours

The nature of electrolytes –ion-ion and ion-solvent interactions. The Debye- Huckel theory of ion -ion interaction. Mean ionic activity and mean ionic activity coefficient - activity coefficient of strong electrolytes - determination of activity coefficient by electrochemical method. Debye Huckel limiting law derivation and verification - limitation of Debye Huckel limiting law at appreciable concentrations of electrolytes - Debye - Huckel – Onsager equation derivation and validity. Conductivity at high frequency (Debye-Falkenhagen effect) and at high field strength (Wien effect).

Unit - II: Electro Chemistry – II

15 Hours

Electrode - electrolyte interface - adsorption at electrified interface - electrical double layer - electro capillary phenomenon - Lippmann equation - Structure of double layers - Helmholtz - Perrin, Guoy - Chapman and Stern model of electrical double layers.

Mechanism of electrode reactions - polarization and over-potential - the Butler-Volmer equation for one step and multistep electron transfer reactions - significance of electron exchange current density and symmetry factors - transfer coefficient and its significance.

Unit - III: Electro Chemistry – III

15 Hours

Mechanism of the hydrogen and oxygen evolution reactions. Diffusion - Fick's law of diffusion - Effect of ionic association on conductance- Electro-kinetic phenomena – Electro-osmosis. Streaming potential – electrophoresis.

Corrosion and passivation of metals - Pourbaix diagram - Evan's diagram - Modern Batteries – Nickel-metal hydride batteries, lithium secondary batteries. Fuel cells – History – Types of fuel cells – H₂ / O₂ fuel cells – Direct methanol fuel cells– Alkaline fuel cells – phosphoric acid fuel cells - Molten carbonate fuel cells (High temperature fuel cell) – Proton exchange membrane fuel cells (PEM Cells). electrodeposition - principle and applications.

Unit - IV: Applications of Quantum Chemistry – III

15 Hours

Approximation methods - Need for approximation – Perturbation Theory – Time independent Perturbation (First order only) - Application of Perturbation theory to particle in one dimensional box, anharmonic oscillator and helium atom – Variation method – principle – methodology and its applications to hydrogen and helium atoms. Semi - empirical methods - Slater orbital and HFSCF methods.

Unit - V: Applications of Quantum Chemistry – IV

15 Hours

The Born - Oppenheimer approximation – VB and MO theories as applied to hydrogen molecular ion (H₂⁺) and hydrogen molecule – coulomb integral an exchange integral and an overlap integral. Construction of sp, sp² and sp³ hybrid orbitals - Huckel molecular orbital theory – principles and applications to ethylene, butadiene and benzene. Huckel calculation of pi- electron energies.

Reference books

- S. Glasstone, Introduction to Electrochemistry, Affiliated East West Press, New Delhi 1960.
- J.O.M. Bokris and A. K. N. Reddy, Electrochemistry, Vol. 1, 2A and 2B, Plenum, New York, 1977
- D.R.Crow, Principles and Applications to Electrochemistry, Chapman and Hall 1991
- ViswanathanB.,M.AuliceScibioh, Fuel Cells-Principles and Applications, Universities Press, Hyderabad, India, 2006
- J. Robbins, Ions in Solution - An Introduction of Electrochemistry, Clarendon Press, Oxford, 1972
- B.K.Sharma, Electrochemistry, Krishna Education publication, 2019.
- Donald A McQuarrie, Quantum chemistry, Indian Edition, Viva Books Private Limited 2005.
- R.K. Prasad, Quantum Chemistry, 1st Edition, New Delhi, Wiley Eastern Ltd, 1992.
- Anderson J. M. Mathematics of Quantum Chemistry, I Edition, Massachusetts, A.Benjamin Inc.,1966

Online resource:

1. <http://eacharya.inflibnet.ac.in/> Physical Chemistry-I (Quantum Chemistry) [32 lectures]

Learning Outcomes:

- The ionic conductance, electrode-electrolyte interface, electrochemical kinetics, over potential, corrossions and fuel cells were studied by the students

Approximation methods and quantum treatment of bonding in chemistry were also studied by them through online courses like NPTEL and university of Cambridge

Semester – IV
PCH1013-Organic Chemistry Practical – II

4 Hours / Week (4 Credits)

Objectives

1. To learn practical skills about the estimation of some organic compounds using chemical procedures

Estimations

2. Estimation of phenol
3. Estimation of Aniline
4. Estimation of Ketone
5. Estimation of Glucose
6. Saponification value of oil
7. Iodination value of oil

Preparations (double stage)

1. Sym. tribromo benzene from Aniline
2. Benzanilide from benzophenone
3. m-nitro benzoic acid from methyl benzoate
4. 2,4- dinitro phenyl hydrazine from p-nitro chlorobenzene

SPECIAL INTERPRETATION OF ORGANIC COMPOUNDS UV, IR, PMR AND MASS SPECTRA OF THE FOLLOWING 15 COMPOUNDS (any 10 may be chosen)

5. 1,3,5- Trimethyl benzene
6. Pinacolane
7. n-Propylamine
8. p-Methoxy benzyl alcohol
9. Benzyl bromide
10. Phenylacetone
11. 2-Methoxyethyl acetate
12. Acetone
13. Isoopropyl alcohol
14. Acetaldehyde diacetate
15. 2-N,N-Dimethylamino ethanol
16. Pyridine
17. 4-Picoline
18. 1,3-dibromo - 1, 1- dichloropropene
19. Cinnamaldehyde

References

1. N.S. Gnanapragasam and B. Ramamoorthy, "Organic Chemistry Lab Manual", S. Visvanathan Printers & Publishers, 2006.
2. Arthur I. Vogel, "A Textbook of Practical Organic Chemistry", ELBS, 1985.

Objective

To learn the methods and techniques to estimate inorganic metals.

Quantitative Analysis of Complex Materials**Analysis of Ores**

Determination of percentage of calcium and Magnesium in dolomite.

Determination of percentage of MnO₂ in pyrolusite.

Determination of percentage of lead in galena.

Analysis of Alloys

Estimation of tin and lead in solder.

Estimation of copper and zinc in brass.

Estimation of chromium and nickel in stainless steel.

Analysis of Inorganic Complex Compounds

Preparation of cis and trans potassium bis (oxalato) diaquochromate (III) and analysis of each of these for chromium.

Preparation of potassium tris (oxalato) ferrate (III) and analysis for iron and oxalate.

Quantitative Analysis

Quantitative analysis of mixtures of iron -magnesium; iron - nickel; copper - nickel and copper - zinc.

Colorimetric Analysis

(Using) Photoelectric method: Estimation of iron, nickel, manganese and copper.

Spectral interpretation

Explain high resolution I H NMR spectra of (N-propylisonitrosoacetylacetonato) (acetylacetonato) Nickel (II)

ESR Spectra of the aqueous $\text{ON}(\text{SO}_3)^{2-}$ ion.

ESR Spectra of the H atoms in CaF_2 .

ESR Spectra of the $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$.

ESR Spectra of the bis (salicylaldiminato) copper (II)

IR Spectra of the sulphato ligand.

IR Spectra of the dimethylglyoxime ligand and its Nickel (II) complex.

IR Spectra of carbonyls

Mossbauer spectra of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

Mossbauer spectra of FeCl_3 .

Mossbauer spectra of $[\text{Fe}(\text{CN})_6]^{3-}$

Mossbauer spectra of $[\text{Fe}(\text{CN})_6]^{4-}$

Text Books

1. V. V. Ramanujam, Inorganic Semimicro Qualitative Analysis; 3rdEdn., The National Publishing Company, Chennai, 1974.
2. Vogel's Text book of Inorganic Qualitative Analysis, 4thEdn., ELBS, London, 1974.

PCH1015-Physical Chemistry Practical- II

4 Hours / week (4 Credits)

Objectives

To understand the principles that govern the basic electrochemical experiments

To learn the physical methods used in determination of parameters such as pH, conductance and EMF etc.

Experiments in electrochemistry: conductometry, potentiometry, pH metry and spectroscopy.

Conductivity Measurements

1. Determination of equivalent conductance of a strong electrolyte and verification of Debye - Huckel - Onsager Equation
2. Verification of Debye-Huckel limiting law
3. Verification of Ostwald's Dilution law for a weak electrolyte. Determination of PK values of weak acids and weak bases.
4. Conductometric titrations between acid (simple and mixture of strong and weak acids) - base, precipitation titrations including mixture of halides.

E.M.F Measurements

5. Determination of standard potentials (Copper & Zinc)
6. Determination of thermodynamic quantities from EMF measurements - potentiometric titrations.
7. Determination of pH and calculation of pKa.
8. Determination of stability constant of a complex.
9. Determination of solubility product of a sparingly soluble salt. Redox titrations.
10. Precipitation titration of mixture of halides by EMF measurements.

Spectroscopy

11. Experiments given only to familiarize the interpretation of spectra provided. Interpretation of simple UV-Visible spectra of simple molecules for the calculation of molecular data and identification of functional groups (5 typical spectra will be provided).
12. IR and NMR spectral calculations of force constant - identification and interpretation of a Compound.

List of Experiments Suggested for Physical Chemistry Practical - II

Typical list of possible experiments is given. Experiments of similar nature and other experiments may also be given. The list given is only a guideline. Any 15 experiments have to be performed in a year.

1. Determination of the equivalent conductance of a weak acid at different concentrations and verify Ostwald's dilution law and calculate the dissociation constant of the acid.
2. Determination of equivalent conductance of a strong electrolyte at different concentrations and examine the validity of the Onsager 's theory as limiting law at high dilutions.
3. Determination of the activity co-efficient of Zinc ions in the solution of 0.002M Zinc sulphate using Debye-Huckel limiting law.
4. Determination of the solubility product of silver bromate and calculate its solubility in water and in 0.01 M KBrO_3 using Debye-Huckel limiting law.
5. Conductometric titrations of a mixture of HCl , CH_3COOH and NaOH .
6. Determination of the dissociation constant of an acid at different dilution.
7. Determination of the solubility of the lead iodide in water, 0.04 M KI and 0.04 M $\text{Pb}(\text{NO}_3)_2$ at 298 K
8. Determination of the solubility product of lead iodide at 298 K and 308 K and calculate the molar heat of solution of lead iodide.

9. Compare the relative strength of acetic acid and mono chloroacetic acid by conductance method.
10. Determine the basicity of organic acids (oxalic /benzoic).
11. Determine the electrode potentials of Zn and Ag electrodes in 0.1M and 0.001M solutions at 298 K and find the standard potentials for these electrodes and test the validity of Nernst equation.
12. Determine the activity co-efficient of an electrolyte at different molalities by EMF measurements.
13. Determine the dissociation constant of acetic acid titrating it with sodium hydroxide using quinhydrone as an indicator electrode and calomel as a reference electrode.
14. Study of the electrolytic separation of metals (Ag, Cu, Cd and Zn)
15. Determine the strength of a given solution of KCl using differential potentiometric titration technique.
16. Determine the dissociation constant of acetic acid in DMSO, DMF, acetone and dioxane by titrating it with KOH.
17. Determine the transport number of Ag ions and nitrate ions by Hittorf's method.
18. Determine the transport number of cadmium ions and sulphate ions by measuring emf of concentration cells with and without transference.
19. Determine the dissociation constant of monobasic or dibasic acid by all the Alber-Serjeant method.
20. Determine the pH of the given solution with the help of indicators using buffer solutions and by colorimetric method.
21. Perform acid-base titration in a non-aqueous medium.
22. Determine the pH of a given solution by EMF method using glass and calomel electrodes and evaluate pKa value of an acid.
23. Determine the pH of a given solution by emf methods using hydrogen electrode and quinhydrone electrode.
24. Estimate the concentration of cadmium and lead ions by successive reduction in polarography.
25. Verify Ilkovic equation.
26. Determine lead ion by amperometric titrations with potassium dichromate.
27. Determine ferric ion by amperometric titration.
28. Determine pH value of an acid-base indicator (methyl red) by colorimetry.
29. Determine the composition and instability constant of a complex by mole ratio method.
30. By colorimetry, determine simultaneously Mn and Cr in solution.
31. Study the effect of solvent on the conductivity of AgNO_3 /acetic acid and determine the degree of dissociation and equilibrium constant in different degree of dissociation and mixtures (DMSO, DMF, dioxane, acetone, water) and test the validity of Debye-Huckel Onsager's equation.
32. Determine the solubility of $\text{Ca}(\text{TiO}_3)_2$ in deionized water and in dilute solution of KCl at 298 K. Determine the solubility product graphically.
33. Determine the equivalent conductivity of a Ca electrolyte and dissociation constant of the electrolyte.
34. Determine the equivalent dissociation constant of a polybasic acid.
35. Calculate the thermodynamic parameters for the reaction $\text{Zn} + \text{H}_2\text{SO}_4 \rightleftharpoons \text{ZnSO}_4 + \text{H}_2$ by EMF method.
36. Determine the formation constant of silver-ammonia complex and stoichiometry of the complex potentiometrically.
37. Determine the stability constant of a complex by polarographic method.
38. Determine the g value from a given ESR spectrum.

Text books

1. B. Viswanathan and P.S. Raghavan, Practical Physical Chemistry, Viva Books, New Delhi, 2009.

2. K. Sundaram, Practical Chemistry, S. Viswanathan Co. Pvt., 1996.

B.Sc COMPUTER SCIENCE

CS120 - PROBLEM SOLVING TECHNIQUES

1. Learning Objectives

- To develop problem solving skills with top down design principles.
- To become competent in algorithm design and program implementation.
- To develop skills to apply appropriate standard methods in problem solving

2. Blue Print of the Question Paper

| Section | Unit-I | Unit-II | Unit-III | Unit-IV | Unit-V |
|-----------|----------------------|-----------------------|-----------------------|-----------------------|----------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11. a)Theory (or) | 12. a) Theory (or) | 13. a) Theory (or) | 14. a) Theory (or) | 15.a) Theory (or) |
| | b) Theory | b) Theory | b) Algorithm | b) Algorithm | b) Algorithm |
| Section-C | 16. Theory | 17. Theory | 18. Theory | 19. Theory | 20. Theory |
| | | | | (or) Program | (or) Program |

3. Course Outline

UNIT – I: INTRODUCTION TO COMPUTER PROBLEM SOLVING

Introduction – Problem Solving Aspect – Implementation of Algorithms – Program verification – Efficiency of Algorithms – Analysis of Algorithms.

UNIT – II: FUNDAMENTAL ALGORITHMS

Exchanging the Values of Two Variables – Counting – Summation of a Set of Numbers – Factorial Computation – Generation of The Fibonacci Sequence – Base Conversion

UNIT – III: FACTORING METHODS

Finding the Square Root of a Number – Smallest Divisor of an Integer – GCD of Two Integer – Generating Prime Numbers – Generation of Pseudo-Random Numbers

UNIT – IV: ARRAY TECHNIQUES

Array Order Reversal – Finding Maximum Number in a Set – Removal of Duplicates from an Ordered Array

UNIT – V: MERGING, SORTING AND SEARCHING

Two-way Merge, Sorting by Exchange, Binary Search, Hash Searching.

4. Teaching Resources

i. Text

1. Dromey R G, “How to Solve it by Computer”, Dorling Kindersley India Pvt.Ltd, Pearson Education, 2007.

Unit - I: Ch. 1.1, 1.2, 1.4, 1.5, 1.6, 1.7

Unit - II : Ch. 2.1, 2.2, 2.3, 2.4, 2.6, 2.8.

Unit - III: Ch. 3.1, 3.2, 3.3, 3.4, 3.6.

Unit - IV: Ch. 4.1, 4.3, 4.4.

Unit - V: Ch. 5.1, 5.3, 5.7, 5.8

ii. References

1. Michael Schneider, Steven W. Weingart, David M. Perlman, “An Introduction to Programming and Problem Solving with Pascal”, Wiley Eastern Limited, New Delhi, 1982.
2. Harold Abelson and Gerald Sussman with Julie Sussman, “Structure and Interpretation of Computer Programs”, MIT Press, 1985.
3. Ronald A. Pasko, “Problem Solving Basics and Computer Programming”, Jones And Bartlett Publishers, 2nd Edition, 2001.

iii. Web references

Online Tutorial

1. <http://nptel.ac.in/courses/106104074/>
2. <http://javahungry.blogspot.com/2014/06/algorithm-problem-solving-techniques-or-approaches-for-software-programmer.html>

Online Quiz

1. https://www.tutorialspoint.com/cplusplus/cpp_online_quiz.htm
2. <http://www.withoutbook.com/OnlineTestStart.php?quizId=11>

Online Compiler

1. https://www.tutorialspoint.com/compile_cpp11_online.php
2. <https://www.codechef.com/ide>

5. Learning Outcomes

Upon Completing the Course, Students will be able to:

- Develop programming techniques required to solve a given problem.

- Develop problem solving skill using top – down design principles.
- Design an algorithm for a problem.
- Develop techniques to handle array structure
- Develop techniques such as searching and sorting

[SEMESTER I]

[4:0:4-50:50]

CS121 - Web Development Using HTML

1. Learning Objectives

- To provide a comprehensive overview of the two largest Web technologies, Hyper Text Markup Language (HTML), and Cascading Style.
- To learn through hands-on, practical instruction that will assist the students to tackle the real-world problems they face in building websites today—with a specific focus on HTML and CSS
- To develop an ability to design and implement a web site

2. Extension of the Course:

Practical : Web Development using HTML

3. Blue Print of the QuestionPaper

| Section | I-Unit | II-Unit | III-Unit | IV-Unit | V-Unit |
|------------------|------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a) Theory (OR) b) Program | 12.a)Theory (OR) b) Program | 13.a)Theory (OR) b) Program | 14.a)Theory (OR) b) Program | 15.a) Theory (OR) b) Program |
| Section-C | 16.Program | 17.Theory/P rogram | 18.Program | 19.Theory/ Program | 20.Theory/ Program |

4. Course Outline

Unit - I: HTML Basics, Formatting Tags and Lists

HTML Introduction – Web page: Static & Dynamic Page - Web Browsers - HTML Editors - Tags – Elements – Attributes - HTML Page Structure - HTML Basic tags: Head – Title – Body. Basic text formatting: Heading tags – Paragraph tag – hr tag - Line break – Pre formatted. Presentational Element - Phrase Elements. List Tags: Ordered List – Unordered List – Definition List.

Unit – II: Links, Images and Tables

Link: Basic link – creating links. Image and Object: Adding images in a website – Adding other objects – Using images as links.

Tables: Basic table elements and attributes – Advanced tables.

Unit – III: Frames and Forms

Frames: The Frameset, No Frame Element - Creating Link between Frames - Nested Frameset. Form: Text Fields - Password Field - Radio Button – Checkbox - Submit Button – Reset Button – Button – Select – option – text area.

Unit – IV: Cascading Style Sheet-I

Introduction – syntax – ID selector - Class selector – External CSS – Internal CSS – Inline CSS – font property: font family - font size – font weight - font style - font variant - font stretch - font size adjust. Text Formatting: Color, text-align, vertical-align, decoration – indent- shadow –transform- letter spacing –word pacing- white space - direction.

Unit - V: Cascading Style Sheet-II

Background: color – image – repeat – position – attachment. List: style type – style position – style image – marker offset. Table: table specific – border collapse – border spacing – caption side – empty cell – table layout. Outlines: outline width – outline style – outline color.

5.Teaching Resources TextBook

i. Text

1. Jon Ducktt. “Web Programming with HTML, CSS andJAVA SCRIPT”, Wiley Publishing, 2005.

Unit– I :Ch.1

Unit– II : Ch. 2, 3 &4

Unit- III : Ch.5,6

Unit– IV :Ch.7

Unit- V :Ch.8

ii. References

1. Joel Skylar. “Principles of Web Design”. Singapore : Thomson Asia Pvt. Ltd 2000
2. Powell , Thomas A. “Web Design – The Complete Reference”, Tata McGraw Hill Edition2000
3. Alexis Goldstein, Louis Lazaris, Estelle Weyl. “HTML5 & CSS3 for the RealWorld”.

iii. Web References

(i) OnlineTutorial

1. <http://www.w3schools.com/css>
2. <http://www.tutorialspoint.com/css>

(ii) OnlineQuiz

1. <Http://www.Indiabix.com/online-test/>

6. Learning Outcomes

Upon Completing the Course, Students will able to:

- Use knowledge of HTML and CSS code and an HTML editor to create personal and/or business websites following current professional and/or industry standards.
- Use critical thinking skills to design and create websites.

[SEMESTER I]

[0:3:2-50:50]

PCS108 - PRACTICAL - I: Web Development Using HTML

HTML

1. Heading Elements
2. Phrase Tags
3. Presentational Tags
4. Lists
5. Links
6. Images
7. Tables
8. Forms
9. Frames

CSS

10. Cascading Style Sheet

[SEMESTER-II] [3:0:3-50:50]

CS221 - DIGITAL COMPUTER FUNDAMENTALS

1. LearningObjectives

- To explore the Number System, Number Conversion from one Base to another Base andComplements.
- To understand the Logic Gates, Boolean Algebra and to design the Logical

Circuits.

- To simplify the Boolean Functions using K-Map Method
- To Learn Combinational circuits as Adders and Subtractors, Encoders and Decoders.
- To Learn the different types of Flip-Flops such as SR Flip flop, JK Flip flop, T Flip flop and D Flip flop .

2. Blue Print of the Question Paper

| Section | I-Unit | II-Unit | III-Unit | IV-Unit | V-Unit |
|------------------|----------------------------------|----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (OR) b) Theory | 12.a)Theory (OR) b) Theory | 13.a)Theor y (OR) b) Theory | 14.a)Theory (OR) b) Theory | 15.a) Theory (OR) b) Theory |
| Section-C | 16.Theory | 17. Theory | 18. Theory | 19.Theory | 20. Theory |

3. CourseOutline

Unit – I: Number System and Binary Arithmetic’s

Digital Computer and Digital System - Number Systems: Number Systems - Decimal, Binary, Octal, Hexadecimal - Conversion from one to another.

Characters and Codes: BCD, ASCII, 2421 Code, Excess-3 Code, Gray Code.

Binary Arithmetic’s: Binary Addition, Subtraction, Multiplication, Division.

Complements: n’s and n-1’s Complements.

Unit – II: Logic Gates and Boolean Algebra

Logic Gates: AND, OR, NOT, NOR, NAND, XOR, XNOR Gates - Logic Circuits.

Boolean Algebra and Boolean Laws and Theorems - De Morgan’s Theorems – Duality Theorem.

Unit – III: Map Simplification

Simplification of Sum of Product and Product of Sum Expressions - Karnaugh Map and Simplifications: Three Variable Maps, Four Variable Maps - Don’t Care Condition.

Unit – IV: Combinational Circuits

Combinational Circuits: Half and Full Adders – Half Subtractor and Full Subtractor
- Encoders and Decoders – Multiplexers – De-multiplexers.

Unit – V: Flip Flops and Sequential Circuits

Sequential Logic Design: Flip-Flops - SR, JK, D and T Flip-Flops – Edge Triggered Flip-Flop – Master-Slave Flip-Flop – Flip-flop Excitation table.

4. Teaching Resources

i. TextBooks

1. Morris M Mano, “Digital Logic and Computer Design”, Prentice Hall of India Pvt. Lmt., New Delhi 2001.

Unit - I : Chap. 1.1 to 1.8

Unit - II : Chap. 2.1 to 2.7

Unit - III : Chap. 3.1 to 3.3, 3.5, 3.8

Unit - IV: Chap. 4.3, 4.4, 5.5, 5.6

Unit - V : Chap. 6.1 to 6.3 & 6.6

ii. References

1. Morris M Mano, “Computer System Architecture”, Prentice Hall of India Pvt.Lmt., New Delhi, 1991.
2. Donald P. Leach and Albert Paul Malvino, “Digital Principles and Application”, Fifth Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2003.
3. Thomas C. Bartee, “Computer Architecture and Logic Design”, McGraw Hill International Edition, New Delhi, 1991.

iii. Web References

i) Online Tutorial

1. <https://www.geeksforgeeks.org/introduction-of-logic-gates/>
2. https://www.tutorialspoint.com/computer_logical_organization/logic_gates.htm

ii) Online Quiz:

1. <https://www.avatto.com/computer-science/test/mcqs/digital-electronics/questions/90/1.html>
2. <https://www.geeksforgeeks.org/digital-logic-number-representation-gg/>

5. Learning Outcomes

- Perform conversions among different number systems, to be familiar with basic logic gates,
- Draw the Logic circuits and truth table for Boolean functions
- Simplify Boolean functions by using k-map method and Boolean Laws and Theorems.
- Design of combinational circuits such as Adder, Subtractor, Multiplexer, Encoder and Decoder etc.
- Understand the design of sequential Circuits such as Flip-Flops, Edge-trigger and master slave flip flops.

[SEMESTER II]

[4:0:4-50:50]

CS222 - Programming Using C

1. Learning Objectives

- To enhance analyzing and problem-solving skills and use the same for writing programs in C.
- To develop logics which will help them to create programs, applications in C.
- To use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
- To enter the program on a computer, edit, compile, debug, correct, recompile and run it.

2. Extension of the Course:

Practical: Programming using C

3. Blue Print of the Question Paper

| Section | I-Unit | II-Unit | III-Unit | IV-Unit | V-Unit |
|-----------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a) Theory (OR) b) Program | 12.a) Theory (OR) b) Program | 13.a) Theory (OR) b) Program | 14.a) Theory (OR) b) Program | 15.a) Theory (OR) b) Program |
| Section-C | 16.Theory/ Program | 17.Program | 18.Program | 19.Theory / Program | 20.Program |

4. Course Outline

Unit – I: Data types, Operators and Structures

History of C - Structure of a C program – Constants and Variables - Basic data types (int, float, char, double, void) – operators and expressions (arithmetic operators, relational operators, logical operators, assignment operator, Increment and decrement operator, conditional operator, bitwise operators, mapping input output operator) – Control Constructs (if, if/else, switch, while, do...while, for), break and continue, exit() function, goto and label, The ?:operator.

Unit – II: Arrays and Functions

Arrays (declaration, one and two dimensional arrays) - Character Arrays and Strings. Function Fundamentals (General form, Function Definition, Function arguments, return value) – Parameter passing: call-by-value and call-by-reference – Recursion – Passing Arrays to Function – Passing Strings to Function.

Unit – III: Storage Classes, Structures and Unions

Scope rules (Local variables and global variables, scope rules of functions) -Type modifiers and storage class specifiers.

Structures – Basics of Structure – Declaring of Structure – Referencing Structure elements - Array of Structures – Nesting of Structures - Passing Structures to function – Pointers and Structures - Unions.

Unit – IV: Pointers

Understanding Pointers – Accessing the Address of a Variable – Declaring the Pointer Variables – Initialization of Pointer Variables – Accessing a Variable through its Pointer – Pointer Expressions – Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments – Functions returning Pointers – Pointers to Functions.

Unit – V: File Management in C

Introduction – Defining and Opening a File – Closing a File – Input / Output Operations on Files –

5. Teaching Resources

i. Text

1. E.Balagurusamy, “Programming in ANSI C”, Seventh Edition, McGraw Hill Education Private Limited, NewDelhi:2016.

Unit - I: Chap. 2to 7

Unit - II: Chap. 8 to 10

Unit - III: Chap. 12

Unit - IV: Chap. 10& 11

Unit - V: Chap. 13

ii. References

1. Yashavant Kanetkar, "Let us C", BPB Publications, Tenth Edition - New Delhi:2010
2. Ashok N. Kamthane, "Programming in C", Second Impression, Pearson:2012.

iii. Web References

(i) Online Tutorial

1. <http://www.c4learn.com/?gclid=COK1y6nHk7wCFcUA4godmlgAKA/>
2. <http://www.cprogramming.com/tutorial/c-tutorial.html/>
3. <http://www.tutorialspoint.com/cprogramming/>

(ii) Online Quiz

1. <http://www.indiabix.com/online-test/c-programming-test/>
2. <http://www.pskills.org/c.jsp/>

(iii) Online Compiler

1. https://www.tutorialspoint.com/compile_c_online.php

6. Learning Outcomes

After course completion the students will have the following learning outcomes:

- Understanding a functional hierarchical code organization.
- Ability to define and manage data structures based on problem subject domain.
- Ability to work with textual information, characters and strings.
- Ability to work with arrays, structures, pointers and files.

[SEMESTER II]

[0:3:2-50:50]

PCS212 - PRACTICAL - II: PROGRAMMING USING C

1. Control Structures
2. Linear Array
3. Two Dimensional Arrays

4. Functions
5. Functions using Arrays
6. Structures
7. Pointers
8. Structures using Pointers
9. Data file Handling
10. Text File Handling

1. Learning Objectives

- To understand the basics of Computer Organization.
- To know the relationship between computer instruction and the Machine code execution.
- To know about the various types of CPU Organization and Addressing Modes.
- To recognize the need of interface between CPU and Input / Output devices.
- To think critically, independently, and quantitatively about Computer Memory.

2. Blue Print of the Question Paper

| Section | I-Unit | II-Unit | III-Unit | IV-Unit | V-Unit |
|-----------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a) Theory (OR) b) Theory | 12.a) Theory (OR) b) Theory | 13.a) Theory (OR) b) Theory | 14.a) Theory (OR) b) Theory | 15.a) Theory (OR) b) Theory |
| Section-C | 16. Theory | 17. Theory | 18. Theory | 19. Theory | 20. Theory |

3. Course Outline

Unit I. Computer Organization and Design

Instruction Codes - Computer Registers - Computer Instructions – Timing and Control – Instruction Cycle - Memory Reference Instructions.

Unit II. Programming the Basic Computer

Introduction - Machine language - Assembly language - The assembler - Program loops - Programming arithmetic and logical operation – Subroutines - Input-output programming.

Unit III. Central Processor Unit

Introduction – General Register Organization – Stack Organization – Instruction Formats – Addressing Modes.

Unit - IV: Input / Output Organization

Peripheral Devices – I/O interface – Asynchronous Data Transfer – Modes of Transfer - Direct Memory Access .

Unit - V: Memory Organization

Memory Hierarchy – Main Memory - Associative Memory – Cache Memory – Virtual Memory.

4. Teaching Resources

i. Text

1. Morris Mano M. “Computer System Architecture”. New Delhi: Prentice Hall of India Private Limited, 2011

Unit- I : Ch. 5.1 –5.6

Unit- II : Ch. 6.1 –6.8

Unit- III : Ch. 8.1 –8.5

Unit- IV : Ch. 11.1 – 11.4 & 11.6

Unit- V : Ch. 12.1, 12.2 & 12.4 -12.6

ii. References

1. William Stallings. “Computer Organization and Architecture”. 8th edition. Pearson Publication, 2010

2. Morris Mano. “Digital Logic and Computer Design”. New Delhi: Prentice Hall of India Private Limited, 2001.

iii. Web References

(i) Online Tutorial

1. www.onlinevideolecture.com/computer.../computer-architecture

2. www.computer-pdf.com/architecture/

3. www.tutorialspoint.com/computer_logical_organization

(ii) Online Quiz

1. <https://www.pritee.org/index.php/knowledge-base-articles/computer-organisation-and-architecture/30-computer-organization-and-architecture-quiz-1>

2. <https://www.geeksforgeeks.org/computer-organization-and-architecture-gq/>

3. <https://www.sanfoundry.com/1000-computer-organization-architecture-questions-answers/>

5. Learning Outcomes

- Study basic computer organization, design and micro-operations.

- Prepare machine code from the instructions
- Understand CPU organization and different types of addressing modes.
- Understand how the Input/ Output devices communicate with the computer
- Learn various methods and techniques of memory organization.

[SEMESTER III]

[4:0:4-50:50]

CS323 - Data Structures and Algorithms Using C

1. Learning Objective

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.
3. To develop skills to apply appropriate data structures in problem solving

2. Blue Print of the Question Paper

| | I-Unit | II-Unit | III-Unit | IV-Unit | V-Unit |
|------------------|------------------------------|------------------------------|---------------------------|------------------------------|------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.Theory (OR) Theory | 12.Theory (OR) Theory | 13.Theory (OR) Theory | 14.Theory (OR) Program | 15.Theory (OR) Program |
| Section-C | 16.Theory (OR) Program | 17.Theory (OR) Program | 18.Theory (OR) Program | 19.Theory (OR) Theory | 20.Theory (OR) Theory |

3. Course Outline

Unit - I: Arrays and Linked List

Arrays: Characteristics of Array-One dimensional Array-Operation with Array: Insertion, Deletion and Sorting-Manipulation of using pointer-Representation of Sparse matrix

Linked list: Important terms-Implementation of linked List-Memory allocation and De-allocation-Operation on linked list-Singly Linked list: Insertion, concatenation, Splitting- Circular linked list-Doubly linked list.

Unit - II: Stack and Queue

Stack: Related terms-stack implementation-Operation on stack-Pointer and Stack-Representation of Arithmetic expression: Infix, Prefix, and Postfix notations-Application of Stack.

Queue: Various positions of Queue-Queue implementation-Operation on Queue-Disadvantages of Simple Queues-Dynamic implementation (Pointer),Insertion and Deletion operation-Types of Queues-Application of Queues.

Unit - III: Trees

Trees:Basic Terms-Binary Trees-Binary Tree Representation-Operation on Binary Tree-Traversal of a Binary Tree-Binary Search Tree.

Unit - IV: Searching and Sorting

Searching Techniques: Searching- Linear (Sequential) Search-Binary Search.

Sorting Techniques: Sorting-Insertion sort-Selection sort-Bubble Sort-Quick sort.

Unit - V: Graph

Graphs:Terminologies of Graphs-Graphs Representation-Traversal of Graphs-Breadth First Search-Depth First Search.

4. Teaching Resources

i. Text

1. Ashok N.Kamthne, “ Introduction to Data Structure in C “ Pearson Education:2005(Singapore)

Unit-I: Ch. 2.1-2.5, 2.10, 2.11-2.16, 6.1-6.4, 6.6, 6.12-6.24, 6.26, 6.27

Unit-II: Ch. 4.1-4.10, 5.1-5.9

Unit-III: Ch. 8.1-8.3, 8.7-8.12

Unit-IV:Ch.11.1-11.4, 10.1-10.6

Unit-V: Ch. 9.1-9.6

ii. References

1. SeymourLipshutz. “Theory problems of Data structure”. Schaum’s outline series, New Delhi:McGraw Hill Book Company,1986

2. Horowitz E and Shani S. “Fundamentals of Data structure in C”, Hyderabad: UNIVERSITIES Press(India)Pvt.Ltd.,2008

iii. Web References

(i) Online Tutorial

1. <http://www.Cprogramming.com/algorithms-and-data-structures.html>
2. <http://www.Tutorialspoint.com>
3. <http://www.ece.uwaterloo.ca/~dwharder/aads/Lecture materials/>

(ii) Online Quiz

1. <http://www.tcyonline.com/tests/data-structure-test>

2. <http://www.pskills.org/c.jsp>

(iii) Online Compiler

1. <https://www.onlinegdb.com/Sy-fU7gJW>

5. Learning outcomes

Upon Completing the Course, Students will able to:

1. Learn the basic types for data structure, implementation and application.
2. Know the strength and weakness of different data structures.
3. Use the appropriate data structure for a given problem.
4. Develop programming skills required to solve a given problem.

[SEMESTER III][0:3:2-50:50]

PCS309 - PRACTICAL - III: DATA STRUCTURES AND ALGORITHMS USING C

1. Matrix representation and Manipulation
2. Sparse Matrix representation and Transpose
3. Stack Representation and Manipulation
4. Queue Representation and Manipulation
5. Linked List Representation and Manipulation
6. Doubly Linked List Representation and Manipulation
7. Binary Tree Representation and Manipulation.
8. Sorting Algorithms
9. Searching Algorithms
10. Graph Representation and Traversals

[SEMESTER IV]

[3:0:3-50:50]

CS422 - SOFTWARE ENGINEERING

1. Learning Objectives

Upon completion of this course, students should be able to:

- Understand the principles of large scale software systems, and the processes that are used to build them.
- Acquire ability to the software-development process, including requirements analysis, design, programming, testing and maintenance.
- Understand the Communication issues in large, complex software projects.
- Understand purpose and importance of the project management from the perspective of planning, tracking and completion of project.

2. Course Outline

Unit - I: Software Process

The Software Engineering – Software Process – Process Model – Prescriptive Models – Specialized Models – Unified Process – Personal Software Process – Team Software Process – Agile Process – Extreme Programming.

Unit - II: Modeling I

Requirement Engineering – Establishing –Eliciting Requirements – Developing use cases – Building Requirements Model – Negotiating and Validating Requirements – Requirement Analysis- Scenario Based Modeling – UML Models – Data Modeling concept – Class Based Modeling – Requirement Modeling – Flow oriented Modeling – Behavioral Model – Design Process – Design Models.

Unit - III: Modeling II

Software Architecture – Architecture Styles – Architectural Design – Architectural Mapping using Data Flow – Component – Designing class based component – Using traditional components – User Interface Design – The Golden Rules - User interface Analysis and Design – Interface Analysis – Design Steps.

Unit - IV: Quality Management

Software Quality – Achieving software Quality – Software Quality Assurance, Tasks, Goals and Metrics – Software Reliability – Software Testing Strategies: A Strategic Approach – Strategic Issues – Test Strategies for Conventional Software – System Testing- Validation Testing – The Art of Debugging – Software testing fundamentals – White box testing: Basis Path Testing – Control structure Testing – Black box testing – Model based testing.

Unit - V: Managing Software Projects

The Management Spectrum - People – The Product – Process – The Project – The W5HH Principle – Critical Practices – Basic Concepts – Project Scheduling – Defining a Task Network Scheduling – Software Risk – Risk Identification – Risk Projection – Risk Refinement – Risk Mitigation, Monitoring and Management – The RMMM Plan.

3. Teaching Resources

i. Text

1. Pressman, Roger S. Software Engineering a practitioner's Approach 7th Edition. New York: McGraw Hill International Edition, 2010.
Unit-I : Ch. 1.1-1.6, 2.1-2.6, 3.1-3.4.
Unit-I :Ch 5, 6, 7, 8.2, 8.4.
Unit-III: Ch. 9, 10.1-10.3, 10.5-10.7, 11.1-11.4.
Unit-IV: Ch. 14, 16.1-16.3, 16.6, 17.1-17.3, 17.6-17.8, 18.1-18.7.
Unit-V: Ch. 24, 27, 28.

ii. References

1. Rajib Mall. Fundamentals of Software Engineering. New Delhi PHI Learning Pvt Ltd., 2009
2. James K.L Software Engineering New Delhi: PHI Learning Pvt Ltd., 2009.

iii. Web References

(i) Online Tutorial

1. <http://www.scribd.com/doc/27252883/Software-Engineering-Notes>
2. <http://www.People.cs.missouri.edu/~duanye/cs4320/lectures.html>
3. <http://www.Engineeringppt.blogspot.in/2011/12/pressman-software-engineering-ppt-pdf.html>.

4. Learning Outcomes.

Upon completion of this course, students should be able to:

- Plan and deliver an effective software engineering process, based on knowledge of widely used development lifecycle models.
- Employ group working skills including general organization, planning and time management and inter-group negotiation.

- Capture, document and analyze requirements.
- Translate a requirements specification into an implementable design, following a structured and organized process.
- Make effective use of UML, along with design strategies such as defining a software architecture, separation of concerns and design patterns.
- Formulate a testing strategy for a software system, employing techniques such as unit testing, test driven development and functional testing.
- Evaluate the quality of the requirements, analysis and design work done during the module.

[SEMESTER-IV] [4:0:0:4-50:50]

CS423 - RELATIONAL DATABASE MANAGEMENT SYSTEMS

1. Learning Objectives

- To understand the basic principles of Databases and Data Models.
- To know about the Relational Data Structures and Relational Algebra.
- To understand the concepts of Functional Dependency and Normalization.
- To learn the features and to write Queries using SQL.
- To explore the organization and to acquire skills in developing programs using PL/SQL.

2. Blue Print of the Question Paper

| Section | I-Unit | II-Unit | III-Unit | IV-Unit | V-Unit |
|------------------|-----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|---------------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a) Theory (OR) b) Theory | 12.a) Theory (OR) b) Theory | 13.a) Theory (OR) b) Theory | 14.a) Program (OR) b) Theory | 15.a) Program (OR) b) Theory |
| Section-C | 16.Theory | 17.Theory | 18.Theory | 19.Program | 20.Program |

3. Course Outline

Unit - I: Basic Concepts and Data Models

Basic concepts and definition – Data Dictionary – Database System – Database Administrator – File Oriented System Vs Database System: Advantage and Disadvantage. Three level Database Architecture – Data Independence – Data Model: Physical Data model - Hierarchical Data model – Network Data Model.

Unit - II: Relational Model

Structure of Relational Model – Relational Algebra - Entity Relationship Model: Basic E-R Concepts - ER Diagram Symbols.

Unit - III: Relational Database Design

Functional Dependency: Functional Dependency Diagram and Example – Full Functional Dependency. Decomposition: Lossy-Join Decomposition – Lossless-Join Decomposition. Normalization: Normalization - First Normal Form – Second Normal Form –Third Normal Form – Boyce Codd Normal Form.

Unit - IV: Structured Query Language (SQL)

Creating, Dropping and Altering Tables – Create Table – Drop Table – Alter Table – Inserting Rows – Querying the Database – Simple Select Statement Sub-Selects – Aggregate Functions – String, Number and Date Functions – SET Operations – Views – Create View – Drop View – Modifying the Database – Insert – Update – Delete Statements.

Unit - V: Procedural Language – SQL (PL/SQL)

Data Types and Variables – Program Control Statements – Null Statement – Assignment Statement – Conditional Statements – Loops – Program Structure – Anonymous Blocks – Procedures and Functions – Stored Procedures and Functions – Packages – Triggers – Database Access using Cursors.

4. Teaching Resources

i. Text

1. S.K. Singh, “Database Systems - Concept, Design and Applications”, Dorling Kindersley (India) Pvt. Ltd., Second Impression, 2008.

Unit - I: 1.1 – 1.8_(1.8.1, 1.8.2, 1.8.5, 1.8.6) & 2.3 – 2.7_(2.7.3, 2.7.4, 2.7.5)

Unit - II: 4.1- 4.4 & 6.1 - 6.5

Unit - III: 9.1 - 9.3 & 10.1 – 10.4

2. Rajeshkhar Sunderraman. Oracle 8 Programming A Primer. New Delhi :Addition - Wesley publication, 2000.

Unit - IV: 2.1 – 2.6

Unit -V: 4.1 – 4.8

ii. References

1. Bipin C Desai, “An Introduction to Database Systems”, Galgotia Publications, New Delhi, 1999.
2. Abraham Siberscha, et al. Database System Concepts. McGraw Hill.
3. Ramez Elmasri and Navathe, Shamkant B. Fundamentals of Database Systems. Pearson Education.

iii. Web References

i) Online Tutorial

1. <https://www.javatpoint.com/dbms-tutorial>
2. <https://www.tutorialspoint.com/dbms/index.htm>
3. <http://www.w3schools.com/sql/>

ii) Online Quiz

1. <https://www.avatto.com/computer-science/test/mcqs/questions-answers/database/71/1.html>
2. <https://www.geeksforgeeks.org/dbms-gg/er-and-relational-models-gg/>
3. <https://www.geeksforgeeks.org/dbms-gg/sql-gg/>
4. <https://www.geeksforgeeks.org/dbms-gg/database-design-normal-forms-gg/>

5. Learning Outcomes

- Gain a good understanding of the architecture functioning of database management systems as well as associated tools and techniques.
- Implement the Entity Relationship Diagram using various E-R Diagram Symbol.
- Develop a good database design using normalization techniques.
- Understand the use of structured query language & PL/SQL, its syntax, its working and its scope.
- Acquire a good understanding of database systems concepts and to be in a position to use and design databases for different applications.

[SEMESTER IV]

[0:3:2-50:50]

PCS412 - PRACTICAL - IV: RELATIONAL DATABASE MANAGEMENT SYSTEMS

SQL

1. Creating, Altering and Dropping a Table.
2. Manipulating a Table with Selection, Projection and Ordering.
3. Manipulating a Table with Aggregate, Numeric, String and Date Functions.
4. Creating, Manipulating and Dropping with Views.
5. Manipulation of Nested Queries and Sub-Queries.

PL/SQL

6. Program Control Statements.
7. Functions and Procedures.
8. Triggers.
9. Packages.

10. Cursors.

M.Sc COMPUTER SCIENCE

SKILL DEVELOPMENT COURSE: BLOCKCHAIN TECHNOLOGY

LEARNING OBJECTIVES

- To Know next generation of internet and technology.
- To know the basic concepts of compilers.
- To create smart contract (dAPP).
- To deploy the smart contracts in blockchain.

Unit - I: BlockChain - Prerequisites (5 Hrs)

Basics of Cryptography – Basics of Hashing and SHA256 – Encryption and Decryption – Public Key and Private key – Symmetric Cryptography – Asymmetric Cryptography – Digital Signature – Zero knowledge proof – Decentralized vs Centralized system – Transparency – P2P Concepts – Overview of LibP2P.

Unit - II: Introduction to BlockChain (5 Hrs)

Problems with current system – Importance of BlockChain – History of BlockChain – Node – Real Time BlockChain Usecases – Transactions – Merkle Tree – Consensus Algorithm – POW – POS – POA & POH – Miners - Genesis of Block – Block Creation – Workflow of BlockChain – Public BlockChain – Introduction to BitCoin – Introduction to Bitcoin – Cryptocurrency use cases – Overview of other public networks (Ethereum, Solana, Wallet) – MetaMask Wallet Demo.

Unit - III: Ethereum (6 Hrs)

Alt Coins – Trading – Crypto Government Regulations – Ethereum differentiation – Ethereum Architecture – Ethereum Forks – Ethereum Gas – Ethereum transactions – Ethereum Wallets & Types – Multi Signature – Ethereum EVM – Ethereum Clients – Introduction to Smart Contract – Smart Contract Challenges – DApps – Ethereum Accounts & Creation – Ethereum Merge – Ethereum POS

Unit – IV: Smart Contracts (8 Hrs)

Introduction to Solidity – Smart Contract IDE – Test Networks – Solidity Syntax – Solidity data types & access specifier – Interface – Constructor – Event – Enum – Inheritance – Functions – Storage & Memory

Unit – V: Tokens and Private BlockChain (6 Hrs)

Token – Token usecases – ERC-20 Token Creation – ERC-721 Token Creation – NFT Types – NFT Marketplace – NFT Usecases – OpenZapplin – Polygon – IPFS – Private BlockChain Usecases – BlockChain Opprtunities.

Textbook

Chris Dannen, “Introducing Ethereum And Solidity: Foundations Of Cryptocurrency And Blockchain Programming For Beginners”, Apress , 2018

References

1. Lorne Lantz, Daniel Cawrey, “Mastering Blockchain: Unlocking the Power of Cryptocurrencies, Smart Contracts, and Decentralized Applications”, O’Reilly Publications, Edition 1, 2020
2. Chandramouli Subramanian, Asha A George, Abhilash K A and Meena Karthikeyan, “BlockChain Technology”, Universities Press (India) Pvt. Ltd., , Edition 1, 2020.

Web References

1. <https://www.coindesk.com/learn/what-is-blockchain-technology/>
2. <https://www.simplilearn.com/tutorials/blockchain-tutorial/blockchain-technology>

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Know next generation of internet and technology.
- Understand the basic concepts of blockchain.
- Create smart contract (dAPP).
- Deploy the smart contracts in blockchain

Evaluation Pattern: Total - 100 Marks

Online Quiz (5 X 10 = 50 Marks)

Assignment (4 X 5 = 20 Marks)

BlockChain Development (30 Marks)

Industrial Exposure:

LeSoftTech, Salem

Ratio of Hours in Offline and Online Mode

70% Offline

30% Online

Course offered for

M.Sc., CS and MCA

SKILL DEVELOPMENT COURSE: DATA SCIENCE WITH PYTHON

LEARNING OBJECTIVES

- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.

- To define Python functions and call them.
- To use Python data structures – lists, tuples, dictionaries.
- To document and transfer the results and effectively communicate the findings using visualization techniques.

UNIT - I: INTRODUCTION TO PYTHON (5 Hrs)

Features of Python - How to Run Python – Identifiers - Reserved Keywords - Variables - Comments in Python - Indentation in Python - Multi-Line Statements - Multiple Statement Group (Suite) – Quotes in Python - Input, Output and Import Functions - Operators. Data Types and Operations: Numbers-Strings-List-Tuple-Set-Dictionary-Data type conversion

UNIT - II: FLOW CONTROL & FUNCTIONS (5 Hrs)

Flow Control: Decision Making-Loops-Nested Loops-Types of Loops. Functions: Function Definition-Function Calling - Function Arguments - Recursive Functions - Function with more than one return value.

UNIT - III: MODULES, PACKAGES AND INTRODUCTION TO DATASCIENCE (5 Hrs)

Modules and Packages: Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules. Python for Data Analysis.

UNIT - IV: NUMPY AND UNIVERSAL FUNCTIONS (7 Hrs)

NumPy Basics: Arrays and Vectorized Computation -The NumPyndarray: A Multidimensional Array Object - Universal Functions: Fast Element-wise Array Functions - File Input and Output with Arrays - Linear Algebra - Random Number Generation.

UNIT - V: PANDAS AND VISUALIZATION (8 Hrs)

Getting started with pandas: Introduction to pandas Data Structures - Essential Functionality - Summarizing and Computing Descriptive Statistics - Handling Missing Data -Hierarchical Indexing - Other pandas Topics- Plotting and Visualization: A Brief matplotlib API Primer.

Textbooks

1. Jeeva Jose and P. SojanLal, “Introduction to Computing and Problem Solving with Python”, Khanna Book Publishing Co. (P) Ltd., 2016.
2. Wes McKinney, “Python for Data Analysis”, Published by O’Reilly Media, 2012.
3. Jake Vander Plas, “Python Data Science Handbook”, O’Reilly Media Publishers, 2016.

References

1. Wesley J. Chun, “Core Python Programming”, Second Edition, Prentice Hall Publication, 2006.
2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, “Practical Data Science Cookbook”, Packt Publishing Ltd., 2014.
3. Nathan Yau, “Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics”, Wiley, 2011.

Web References

www.learnpython.org/
<https://www.codecademy.com/learn/python>
<https://www.Codementor.io>
<https://www.Python.org>
<http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction>
<https://www.datacamp.com/>
<https://www.dataquest.io/>

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Preparing and pre-processing data
- Visualizing the results of analytics effectively
- Basic understanding of NumPy and Pandas
- Ability to use conditional loops and list by python
- Learn the Visualization through Matplotlib

Evaluation Pattern: Total - 100 Marks

Online Quiz (5 X 10 = 50 Marks)

Assignment (4 X 5 = 20 Marks)

Application Development (2X15=30 Marks)

Industrial Exposure:

Diggibyte Technologies, Bangalore

Ratio of Hours in Offline and Online Mode

50% Offline

50% Online

Course offered for

All UG & PG –Science Departments (Non Computing)

OBE FRAMEWORK FOR THE M.SC., COMPUTER SCIENCE

| Programme: M.Sc Computer Science | | SEM | I |
|----------------------------------|---|-------|---------|
| Course Code | PRINCIPLES OF COMPILER DESIGN | Hours | Credits |
| MCS170T | | 4 | 3 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To know the basic concepts of compilers. • To explore the phases of a compiler | | |

| | | | | | | | | | |
|--|---|------------------------|--------------|---------------------------------|----------------|-----------------|----------------|---------------|------------------------|
| | <ul style="list-style-type: none"> • To know how the source program is executed in the compiler. • To bring in the types of grammar • To develop opcode for the code generation phase. | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | INTRODUCTION Generation of Programming Languages - Language processing systems -Introduction to Compiling – Compilers - Analysis of the source program - The phases -The grouping of phases - Compiler construction tools- Token- Pattern- Lexeme- The role of the lexical analyzer –Two methods used in input buffering. | | | | | | | | 10 |
| II | LEXICAL ANALYSIS C program to detect tokens in a C program - Specification of tokens – Strings and languages- Operations on languages- Regular Expressions- Definitions- Design of lexical analyzer- Recognition of tokens- A language for specifying lexical analyzer. | | | | | | | | 10 |
| III | SYNTAX ANALYSIS Syntax Analysis - The role of the parser – Error Recovery Strategies- Grammars- Context - free grammars -Writing a grammar – Derivations- Ambiguity- Top-down parsing – Bottom - up Parsing. | | | | | | | | 15 |
| IV | INTERMEDIATE CODE GENERATION Intermediate languages – Declarations - Assignment statements - | | | | | | | | 10 |

| | | |
|---------------------------|---|-----------|
| | Boolean expressions - Case statements –Backpatching - Procedure calls. | |
| V | CODE GENERATION AND OPTIMIZATION Issues in the design of a code generator - The target machine - Run-time storage management -Basic blocks and flow graphs - Next-use information- Principal sources of Optimization. | 15 |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. Alfred V. Aho, Ravi Sethi Jeffrey D. Ullman, “Compilers- Principles, Techniques, and Tools”, Pearson Education Asia, 2006 2. S. GodfreyWinster, S. Aruna Devi, R. Sujatha, “Compiler Design”, Yes Dee Publishing, 2018. <p>ii. References</p> <ol style="list-style-type: none"> 1. David Galles, “Modern Compiler Design”, Pearson Education Asia, 2007 2. Steven S. Muchnick, “Advanced Compiler Design & Implementation”, Morgan Kaufmann Publishers, 2000. 3. C.N.Fisher and R.J.LeBlanc, “Crafting a Compiler with C”, Pearson Education, 2000. <p>iii. Web References</p> <p>(i) Online Tutorial</p> <ol style="list-style-type: none"> i. http://www.dreamincode.net/forums/topic/268945-an-introduction-to-compiler-design-part-ii-parsing ii. https://ideone.com/ <p>(ii) Online Quiz</p> <ol style="list-style-type: none"> 1. http://www.avatto.com/computer-science/test/mcqs/compiler- Questions/131/1.html | |

| | | | |
|---|----------------------------------|--------------|----------------|
| Programme: M.Sc Computer Science | | SEM | I |
| Course Code | ADVANCED JAVA PROGRAMMING | Hours | Credits |
| MCS171T | | 5 | 3 |

| | | | | | | | | | |
|--|---|------------------------|--------------|---------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------------------|
| Learning Objectives | The Course aims to <ul style="list-style-type: none"> • To introduce programming with Applet and AWT. • To give an overview of database access and details for managing information using the JDBC API. • To examine the use of networking and collections. • To learn how to program Servlet and JSP. • To understand the web programming concepts in the perspective of Client and Server. | | | | | | | | • |
| Blueprint of the Programming Course | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | ANSWER ALL | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | EITHER OR TYPE | 7 | Theory or Theory | Theory or Program | Theory or Program | Program or Program | Program or Program | 5 Pairs |
| | C | ANY THREE | 15 | Theory | Theory or Program | Program | Program | Theory or Program | 5 |
| TOTAL NUMBER OF QUESTIONS | | | 4 | 4 | 4 | 4 | 4 | 20 | |
| UNIT | CONTENTS | | | | | | | HOURS | |
| I | APPLETS AND GUI Applet Fundamentals- Applet Class - Applet lifecycle- Steps for Developing Applet Programs- Passing Values through Parameters- Graphics in Applets; GUI Application - Dialog Boxes - Creating Windows - Layout Managers – AWT Component classes – Swing component classes- Borders – Event handling with AWT components - AWT Graphics classes –Other Swing Controls: File Choosers - Color Choosers – Tree – Table –Tabbed pane–Option pane - Progressive bar - Sliders. | | | | | | | 17 | |
| II | JDBC AND JAVA NETWORKING | | | | | | | 13 | |

| | | |
|---------------------------|---|-----------|
| | JDBC -Introduction - JDBC Architecture - JDBC Classes and Interfaces – Database Access with MySQL -Steps in Developing JDBC application - Creating a New Database and Table with JDBC - Working with Database Metadata; Java Networking-Basics of Networking - Networking in Java- Socket Program using TCP/IP - Socket Program using UDP- URL and InetAddressclasses. | |
| III | <p>COLLECTIONS AND DESIGN PATTERNS</p> <p>Collection Framework - ArrayList class - LinkedList class - ArrayListvs Linked List - ListIterator interface - HashSet class, LinkedHashSet class, TreeSet class PriorityQueue class - Map interface, HashMap class, LinkedHashMap class ,TreeMap class - Comparable interface , Comparator interface, Comparable vs Comparator; Design Patterns: Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Singleton Pattern, Adapter Pattern, Proxy Pattern, Decorator Pattern, Command Pattern, Template Pattern, Mediator Pattern;</p> | 14 |
| IV | <p>SERVLET AND JSP</p> <p>Servlet: Advantages over Applets - Servlet Alternatives - Servlet Strengths - Servlet Architecture - Servlet Life Cycle – GenericServlet,HttpServlet - First Servlet - Invoking Servlet - Passing Parameters to Servlets - Retrieving Parameters - Server-Side Include – Cookies; JSP : JSP Engines Working with JSP - JSP and Servlet – Java Bean Component - Anatomy of a JSP Page.</p> | 16 |
| V | <p>WEB PROGRAMMING</p> <p>Client-Side Programming: Client-side programming technologies - Form design using HTML and CSS, XHTML and DHTML - Client side validation Using JavaScript - Content Structuring using XML - Adding Interactivity with AJAX -JQuery Framework; Server-side Programming: Web Servers - Handling request and response - Handling Form data - Session management - Database Access- Multimedia: Images- Animation.</p> | 15 |
| Teaching Resources | <p>i. Textbook</p> <p>1. S. Sagayaraj, R. Denis, P.Karthik& D. Gajalakshmi “Java Programming”, Universities Press, 2018.</p> | |

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| | <p>ii. References</p> <ol style="list-style-type: none"> 1. Patrick Naughton & Herbert Schildt, "The Complete Reference: Java 2", Tata McGraw Hill, 1999. 2. Deitel & Deitel, "Java How to Program", Prentice Hall, 5th Edition, 2002 3. Peter Hagggar, "Practical Java: Programming Language Guide", Addison-Wesley Pub Co, 1st Edition, 2000. 4. C.Muthu, "Programming with Java", McGraw Hill, Second Edition, 2008 <p>iii. Web References</p> <ol style="list-style-type: none"> 1. http://math.hws.edu/javanotes/c6/index.html 2. http://www.tutorialspoint.com/awt/ 3. www.studytonight.com 4. www.javatpoint.com 5. www.learnjavaonline.org 6. www.codingbat.com |
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| Programme: M.Sc Computer Science | | | | SEM | I | | | | |
|--|---|------------------------|--------------|---------------------------------|----------------|-----------------|----------------|---------------|------------------------|
| Course Code | WINDOWS APPLICATIONS | | | Hours | Credits | | | | |
| MCS172T | | | | 5 | 3 | | | | |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To know the differences between desktop and web application. • To construct classes, methods, and accessor and instantiate objects. • To create and manipulate GUI components in C#. • To code solutions and compile C# projects within the .NET framework. • To build own desktop application with Database | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |

| | | | | | | | | | |
|-------------|--|-----------------------|-----------|------------------------|-------------------------|-------------------------|--------------------------|--------------------------|----------------|
| | B | Either or Type | 7 | Theory or Theory | Theory or Program | Theory or Program | Program or Program | Program or Program | 5 Pairs |
| | C | Any Three | 15 | Theory | Theory or Program | Program | Program | Theory or Program | 5 |
| | Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | <p>INTRODUCTION TO C#</p> <p>Introduction to .NET – Features of C# - Data Types – Value Types – Reference Types - Variables and Constants – Declaring – Assigning values – variables of nullable types – Operators – Type Conversions – Implicit and Explicit Type Conversions – Arrays – Single Dimensional and Multidimensional – Control Flow Statements – Selection – Iteration and Jump – Classes and Objects – Access Modifiers – Defining a Class – Variables – Properties and Methods – Creating Objects – Constructor and Destructors.</p> | | | | | | | | 20 |
| II | <p>WINDOWS FORMS</p> <p>Windows Forms – Form Class – Common Operations on Forms – Creating a Message Box – Handling Events – Mouse Events – Keyboard Events – Common Controls in Windows Forms – Label – TextBox – Button – Combo Box – List Box – Check Box – Radio Button – Group Box – Picture Box – Timer – Open File Dialog – Save File Dialog – Font Dialog – Color Dialog – Print Dialog – Tree View – Menu.</p> | | | | | | | | 15 |
| III | <p>REFLECTION AND REMOTING</p> <p>Life Cycle of threads-Using Reflection – Reflecting the Members of a Class - Dynamic Loading and Reflection - .NET Remoting – Architecture – Hosting of Objects – Single Ton and Single Call – Remoting Server – Remoting Client.</p> | | | | | | | | 15 |
| IV | <p>WINDOWS PRESENTATION FOUNDATION (WPF)</p> <p>Introduction – Architecture of WPF – Common Controls: Grid Control –</p> | | | | | | | | 10 |

| | | |
|---------------------------|--|-----------|
| | Button Control – TextBox Control – PasswordBox Control – TextBlock Control – Border Control – Grid Splitter Control – Canvas Control – StackPanel Control. | |
| v | DATABASE Creating Connection String – Creating a Connection to a Database – Creating a Command Object – Working with Data Adapters – Using Data Reader to work with Databases – Using Dataset. | 15 |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. Vikas Gupta , “Comdex .NET Programming “ , Dream Tech Press, New Delhi, 2011 2. Kogent Solutions, “ C# 2008 Programming Black Book”, Dream Tech Press, New Delhi, Platinum Edition, 2009 <p>ii. References</p> <ol style="list-style-type: none"> 1. Rebecca M.Riordon, “Microsoft ADO .Net 2.0 Step by Step”, Prentice Hall of India Private Limited, New Delhi, 2007 2. David S.Platt , “Introducing Microsoft .Net”, Prentice Hall of India(Private) Limited, Third Edition, New Delhi, 2006 <p>iii. Web References</p> <p>(i) Online Tutorial</p> <ol style="list-style-type: none"> 1. http://csharp.net-tutorials.com/index.php 2. http://csharp.net-tutorials.com/classes/introduction/ 3. http://www.homeandlearn.co.uk/csharp/csharp.html <p>(ii) Online Quiz</p> <ol style="list-style-type: none"> 1. http://www.indiabix.com/c-sharp-programming/questions-and-answers/ 2. https://www.wiziq.com/online-tests/43860-c-basic-quiz 3. http://www.withoutbook.com/OnlineTestStart.php?quizId=71 <p>(iii) Online Compiler</p> <ol style="list-style-type: none"> 1. http://www.compileonline.com/compile_csharp_online.php 2. http://www.ideone.com | |

| Programme: M.Sc Computer Science | | SEM | I |
|---|---|--------------|----------------|
| Course Code | OPEN-SOURCE TECHNOLOGIES | Hours | Credits |
| MCS173T | | 4 | 3 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To learn designing webpage using HTML & CSS • To understand the concept of Database | | |

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|--|--|------------------------|--------------|---------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------------------|
| | <ul style="list-style-type: none"> To learn Server-side scripting language To introduce applications using PHP with MYSQL | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | Theory or Theory | Theory or Program | Theory or Program | Program or Program | Program or Program | 5 Pairs |
| | C | Any Three | 15 | Theory | Theory or Program | Program | Program | Theory or Program | 5 |
| | Total Number of Questions | | | | 4 | 4 | 4 | 4 | 4 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | HTML Text Formatting – Presentational, Phrase Elements – Lists- Character Entities for Special Characters – Creating Links - Links and Navigation - Table Elements and Attributes - Form Controls – Frames – Frameset, Frame, no frames – Creating Links between Frames – Nested Framesets. | | | | | | | | 10 |
| II | CSS Introduction to Cascading Style Sheets – Types of CSS – CSS properties – Text Formatting – Links – Backgrounds - Positioning with CSS – Div – Class - CSS Website Layout using Div and Class - Creating simple navigation menu using CSS. | | | | | | | | 10 |
| III | PHP Introduction to Apache web server and PHP – Downloading and installing of Apache Web Server - Difference between Server-Side Scripting and Client Side Scripting - Creating First Hello World PHP file – Opening of PHP file – Combining PHP and HTML - Declaring Variable - Declaring and Using | | | | | | | | 15 |

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|---------------------------|---|-----------|
| | Constants - Variable Scope - Using Operators - Making Decisions with Conditionals - Repeating Actions through Iteration - Accessing Form Variables. | |
| IV | MYSQL Introduction to MYSQL - The Show Databases and Table Commands - The USE command - Create Database and Tables - Describe Table - Select, Insert, Update, and Delete statement – Creating applications using HTML, CSS, PHP and MYSQL (CRUD Operations). | 10 |
| V | JSON AND REAL TIME WEBSITE DESIGN AND IMPLEMENTATION TECHNIQUE Introduction to JSON - JSON Syntax- Data types- creating JSON objects- Parsing JSON- Development of Application using JSON – Introduction to website – Selecting Domain Name for website from different providers (GoDaddy, HostGator) – Components of real time websites – Hosting a website in to the server – Free hosting providers. | 15 |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. Jon Ducket, “Web Programming with HTML, CSS & JavaScript”, Wiley Publishing, 2005. 2. HTML5 Black Book, 2nd Edition, DT Editorial Services, DreamTech press publishing, 2016. 3. Luke Welling, Laura Thomson “PHP and MySQL Web Development” Pearson Education Inc., Fourth Edition, 2008 4. Json for Beginners by iCode Academy, 2017. 5. Introduction to JavaScript Object Notation by Lindsay basset, O’reilly 2015. 6. James Lee and Brent Ware, "Open-Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", James Lee and Brent Ware, Dorling Kindersley (India) Pvt. Ltd, 2008 <p>ii. References</p> <ol style="list-style-type: none"> 1. Alexis Goldstein, Louis Lazaris, Estelle Weyl. “Html5 & CSS3 for the Real World”. 2. Eric Rosebrock, Eric Filson, "Setting up LAMP: Getting Linux, Apache, MySQL, and PHP and working Together", Published by John Wiley and Sons, 2004 3. Steven D. Nowicki, Alec Cove, HeowEide-goodman, “Professional PHP”, Wrox Press, 2004. 4. Shawn M. Lauriat, “Advanced Ajax Architecture and Best Practices”, Prentic Hall, 2008 | |

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| | <p>iii. Web References</p> <p>(i) Online Tutorial</p> <ol style="list-style-type: none"> 1. www.w3schools.com 2. www.php.net 3. www.phpclasses.org <p>(ii) Online Quiz</p> <ol style="list-style-type: none"> 1. http://www.w3schools.com/html/html_quiz.asp 2. http://www.withoutbook.com/OnlineTestStart.php?quizId=31q |
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| Programme: M.Sc Computer Science | | | | SEM | I | | | | |
|--|---|------------------------|--------------|---------------------------------|----------------|-----------------|----------------|---------------|------------------------|
| Course Code | ELECTIVE – I: A. WEB SERVICES | | | Hours | Credits | | | | |
| MCS174A | | | | 4 | 3 | | | | |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To examine fundamental XML technology • To understand the use of JSON • To gain an understanding about the role of web services in commercial applications • To learn the emerging standard protocols like SOAP, WSDL and UDDI. • To introduce the role of web services in CMS | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 | |

| UNIT | CONTENTS | HOURS |
|------|---|-------|
| I | <p>XML TECHNOLOGY FAMILY</p> <p>XML – benefits – Advantages of XML over HTML, EDI, and Databases – XML based standards – DTD – XML Schemas – X-Files – XML processing – DOM – SAX – presentation technologies – XSL – XHTML – voiceXML – Transformation – XSLT – XLINK – XPATH.</p> | 10 |
| II | <p>JSON AND JSON SCHEMA</p> <p>Introduction to JSON – JSON Comparison with XML – JSON syntax, Datatypes, Objects – Examples – JSON Schema: Hello World! – The type Keyword – Declaring a JSON schema – JSON schema reference: Type specific keywords – Generic Keywords – Combining schemas – The \$schema Keyword – Regular Expression – Structuring a complex schema: Reuse.</p> | 10 |
| III | <p>ARCHITECTING WEB SERVICES</p> <p>Business motivations for web services – B2B – B2C – Technical motivations – limitations of CORBA and DCOM – Service-oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime.</p> | 10 |
| IV | <p>WEB SERVICE BUILDING BLOCKS: SOAP, WSDL AND UDDI</p> <p>Introduction to SOAP – Basic SOAP syntax – Sending SOAP messages – Future of SOAP – Introduction to WSDL – Basic WSDL syntax- SOAP binding – Introduction of UDDI – UDDI API – Future of UDDI</p> | 15 |
| V | <p>XML-E-BUSINESS & XML-CONTENT MANAGEMENT SYSTEM</p> <p>Business to Business – Business to Customer – Different types of</p> | 15 |

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|---------------------------|--|--|
| | B2B Interaction – Components of E-business XML Systems – Enterprise Integration – ebXML – RosettaNet – Introduction of Web Content Management – Components of Content Management System – Role of XML in Web Content Management – Role of metadata (RDF and PRISM) in Web Content Management. | |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. Ron Schmelzer et al. “XML and Web Services”, Pearson Education, 2002. 2. Micheal Droettboom, “Understanding JSON Schema Release 1.0”, 2013. <p>ii. References</p> <ol style="list-style-type: none"> 1. Ethan Cerami, “Web Services Essentials”, O’Reilly, Shroff Publishers & Distributors Pvt.Ltd, Fourth Edition, 2002. 2. Sandeep Chatterjee and James Webber, “Developing Enterprise Web Services: An Architect’s Guide”, Prentice Hall Edition, 2004. <p>iii. Web References</p> <p>(i) Online Tutorial</p> <ol style="list-style-type: none"> 1. www.w3schools.com/xml/ 2. https://www.tutorialspoint.com/xml/ 3. www.xmlmaster.org/en/article/d01/ 4. www.quackit.com/xml/tutorial/ 5. www.tutorialspoint.com/webservices/ 6. www.javatpoint.com/web-services-tutorial 7. tutorials.jenkov.com/web-services/ | |

| Programme: M.Sc Computer Science | | SEM | I |
|----------------------------------|---|--------------|----------------|
| Course Code | ELECTIVE I: B. DATA MINING AND WAREHOUSING | Hours | Credits |
| MCS174B | | 4 | 3 |

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|--|---|------------------------|-----------------|---------------------------------|---------------|---------------|---------------|---------------|------------------------|
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To understand data mining principles and techniques. • To expose the students to the concepts of data warehousing architecture and implementation. • To study the overview of developing areas – web mining, text mining and ethical aspects of data mining. • To identify business applications and trends of data mining. • To understand the concept of web mining. | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | Unit I | Unit II | Unit III | Unit IV | Unit V | | | | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 | |
| UNIT | CONTENTS | | | | | | | HOURS | |
| I | <p>DATA MINING AND PREPROCESSING</p> <p>Data Mining - Kinds of Data – Kinds of patterns –Used technology – Kinds of Applications – Issues in Data mining .Know Your Data: Data objects and Attributes Types –Basic Statistical Description of Data –Data Visualization – Measuring Data Similarity and Dissimilarity. Data Processing –Data Cleaning – Data Integration – Data Reduction –Data Transformation and data Discretization.</p> | | | | | | | 10 | |
| II | <p>DATA WAREHOUSING AND OLAP</p> <p>Data Warehousing–Data Warehouse Architecture- Design and Usage –Data Warehouse Implementation – OLAP operations- ROLAP-</p> | | | | | | | 10 | |

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|---------------------------|---|-----------|
| | MOLAP-Association Rules: Apriori Algorithm- FP- tree Growth Algorithm. | |
| III | <p>CLASSIFICATION TECHNIQUES</p> <p>Classification: Basic Concepts – Decision Tree Induction – Bayes Classification Methods – Rule-Based classification –Model Evaluation and Selection – Techniques to Improve Classification Accuracy.</p> | 15 |
| IV | <p>CLUSTER ANALYSIS</p> <p>Cluster Analysis – Partitioning Methods – Hierarchical Methods – Density-Based Methods – Grid-Based Methods.</p> | 10 |
| V | <p>WEB MINING</p> <p>Web Content Mining- Web Structure Mining- Web Usage Mining- Text Mining- Unstructured Text- Episode rule discovery for texts- hierarchy of categories- Text Clustering- Temporal Data Mining- rules- sequence mining- Time Series Analysis- Spatial Mining- tasks- clustering-trends.</p> | 5 |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. Jiawei Han, Micheline Kamber and Jian Pei, “Data Mining Concepts and Techniques”, Morgan Kaufmann Publishers, Third Edition, 2012. 2. Arun K Pujari, “Data Mining Techniques”, Universities Press (India) private Limited, Fourth Edition, 2017. <p>ii. References</p> <ol style="list-style-type: none"> 1. K.P. Soman, Shyam Diwakar and V. Ajay, “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006. 2. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006 3. Berson, Alex & Smith, Stephen J, “Data Warehousing, Data Mining, and OLAP”, TMH Pub.Co. Ltd, New Delhi, 2012 4. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to | |

Data Mining”, Pearson Education, 2007

iii. Web References

(i) Online Tutorial

1. <http://www.scribd.com/doc/5710731/mining-background-literature-review>
2. <http://www.scribd.com/doc/104389040/Why-Mining>
3. <http://www.scribd.com/doc/6283008/Data-Integration-Data-Mining-Clinical-Research>
4. <http://www.selectbs.com/products-general/what-is-business-intelligence>
5. <http://www.scribd.com/doc/30346964/Business-intelligence>

| Programme: M.Sc Computer Science | | | | SEM | I | | | | |
|----------------------------------|---|-----------------|-------|--------------------------|---------|----------|---------|--------|-----------------|
| Course Code | ELECTIVE I: C. BUSINESS INTELLIGENCE | | | Hours | Credits | | | | |
| MCS174C | | | | 4 | 3 | | | | |
| Learning Objectives | The Course aims to | | | | | | | | |
| | <ul style="list-style-type: none"> • To introduce the idea of decision making in complex industrial and service environments • To understand the science behind better predictions and decisions • To generate an ability to design, analyze and perform experiments on real life problems using various Decision making methodologies. • To Critically evaluate use of BI for supporting decision making in an organization. • To Understand and use the technologies and tools that make up BI | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |

| | | | | | | | | | |
|-------------|---|-----------------------|----|-----------|-----------|-----------|-----------|-----------|--------------|
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| | Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | INTRODUCTION AND CHARACTERISTICS OF COMPLEX BUSINESS PROBLEMS Introduction to decision making methods, AHP, SAW, VIKOR, WPM MCDM, MADM methods and examples Number of Possible Solutions, Time-Changing Environment, Problem Specific Constraints, Multi-objective Problems, Modeling the Problem, A Real-World Example. | | | | | | | | 10 |
| II | ADAPTIVE BUSINESS INTELLIGENCE AND PREDICTION METHODS AND MODELS Data Mining, Prediction, Optimization, Adaptability, the Structure of an Adaptive Business Intelligence System, Data Preparation, Different Prediction Methods, Mathematical Methods, Distance Methods: Logic Methods, Modern Heuristic Methods Additional Considerations, Evaluation of Models. | | | | | | | | 10 |
| III | MODERN OPTIMIZATION TECHNIQUES Local Optimization Techniques, Stochastic Hill Climber, Simulated Annealing, Tabu Search, Evolutionary Algorithms, Constraint Handling. | | | | | | | | 10 |
| IV | COMPUTATIONAL INTELLIGENCE AND EXPERT TECHNIQUES IN DECISION MAKING Design of an expert system for decision making using Neural Network, fuzzy logic and genetic algorithm, Classifiers, Evolutionary Computation: Ant colony optimization, Particle Swarm optimization. | | | | | | | | 10 |
| V | HYBRID SYSTEMS AND ADAPTIVE BUSINESS | | | | | | | | 15 |

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|----------------------------------|---|--|
| | <p>INTELLIGENCE MARKETING</p> <p>Hybrid Systems for Prediction, Hybrid Systems for Optimization, Adaptability, Campaigns, Manufacturing, Investment Strategies, Emergency Response Services, Credit Card Fraud.</p> | |
| <p>Teaching Resources</p> | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. ZbigniewMichalewicz, Martin Schmidt, Matthew Michalewicz, ConstantinChiriac,"Adaptive Business Intelligence", Springer Publications. 2. Venkata Rao, "Decision Making in the Manufacturing Environment:Using Graph Theory and Fuzzy Multiple Attribute Decision Making Methods", Springer publications. 3. Da Ruan, "Computational Intelligence in Complex Decision Systems", Atlantis Press, Amsterdam Press, World Scientific. 4. Hans Jurgen Zimmermann, "Fuzzy sets, decision making and expert system", Kluwer Academic Publishers, Boston. 5. B Carlo Vercellis "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications. <p>ii. References</p> <ol style="list-style-type: none"> 1. Ralph Kimball, Margy Ross, "The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling" Wiley, 2000. 2. Joe Caserta, Ralph Kimball, "The Data Warehouse Etl Toolkit", Wiley, 2004. 3. Christopher Adamson, "Star Schema the Complete Reference", McGraw Hill, 2004. <p>iii. Web References</p> <p>(i) Online Tutorial</p> <ol style="list-style-type: none"> 1. https://www.tableau.com/learn/articles/10-business-intelligence-blogs 2. https://en.wikipedia.org/wiki/Business_intelligence 3. https://looker.com/ | |

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| Programme: M.Sc Computer Science | | SEM | I |
| Course Code | PRACTICAL I: ADVANCED JAVA PROGRAMMING | Hours | Credits |

| | | | | |
|--|--|------------------------|--------------|-----------------------------|
| MCS175P | | 2 | 2 | |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To introduce programming with Applet and AWT. • To give an overview of database access and details for managing information using the JDBC API. • To Examine the use of networking and collections. • To learn how to program Servlet and JSP. • To understand the web programming concepts in the perspective of Client and Server. | | | |
| Blueprint of the Practical Course | Section | Type and Choice | Marks | Questions in Section |
| | A (Exercise 1 – 5) | EITHER OR TYPE | 20 | 1 Pair |
| | B (Exercise 6 – 10) | EITHER OR TYPE | 20 | 1 Pair |
| | TOTAL NUMBER OF QUESTIONS | | | 2 |
| PART | CONTENTS | | | HOURS |
| | <ol style="list-style-type: none"> 1. Develop Applet Programming with various techniques. 2. Develop applications using AWT. 3. Working with Graphics ,Color and Font 4. Develop applications using Swing 5. Working with JDBC Classes(Database Operations- Create, Insert, Delete, Update, Select) 6. Handling ResultSet and Statements. 7. Jasper Report Generation 8. Working with Servlet and JDBC 9. Handling Client/Server Networking 10. Develop Java Server Pages applications using JSP Tags. 11. Multimedia Images and Animation 12. Working with Java Collections. | | | 30 |

| Programme: M.Sc Computer Science | | | SEM | I |
|---|--|------------------------|--------------|-----------------------------|
| Course Code | PRACTICAL - II: WINDOWS APPLICATIONS | | Hours | Credits |
| MCS176P | | | 2 | 2 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To show the behavior of the Reflection To Demonstrate the basic concepts of OOPS To Apply the ADO.NET to establish the connection with database To focus the windows forms controls to create windows applications To create the desktop applications with database | | | |
| Blueprint of the Practical Courses | Section | Type and Choice | Marks | Questions in Section |
| | A (Exercise 1 – 5) | EITHER OR TYPE | 20 | 1 Pair |
| | B (Exercise 6 – 10) | EITHER OR TYPE | 20 | 1 Pair |
| | TOTAL NUMBER OF QUESTIONS | | | 2 |
| UNIT | CONTENTS | | | HOURS |
| I | <ol style="list-style-type: none"> Arrays, Classes and Objects Inheritance Polymorphism Windows Form Controls (Label, Text, Button, Check Box, Radio) Windows Form Controls (List, Combo, Timer, Group Box, Picture Box) Menu Handling Reflection WPF controls (Grid, Button, TextBox, PasswordBox, TextBlock) WPF controls (Borderl, Grid Splitter, Canvas, StackPanel) ADO.NET Connection and Data Command | | | 30 |
| Programme: M.Sc Computer Science | | | SEM | I |
| Course Code | PRACTICAL - III: OPEN-SOURCE TECHNOLOGIES | | Hours | Credits |
| MCS177P | | | 2 | 2 |

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|---|--|------------------------|--------------|-----------------------------|
| Learning Objectives | The Course aims to | | | |
| | <ul style="list-style-type: none"> • learn designing webpage using HTML & CSS • understand the concept of Database • learn Server-side scripting language • introduce applications using PHP with MYSQL | | | |
| Blueprint of the Practical Courses | Section | Type and Choice | Marks | Questions in Section |
| | A (Exercise 1 – 5) | EITHER OR TYPE | 20 | 1 Pair |
| | B (Exercise 6 – 10) | EITHER OR TYPE | 20 | 1 Pair |
| | TOTAL NUMBER OF QUESTIONS | | | 2 |
| UNIT | CONTENTS | | | HOURS |
| I | <ol style="list-style-type: none"> 1. Handling the Text Formatting 2. Displaying all the Lists 3. Table Elements and properties 4. Creating website using Frames 5. HTML Form Controls 6. CSS Menu Creations 7. PHP Control Structures 8. Accessing PHP Variables from HTML form 9. Database Application using PHP & MYSQL 10. Creating JSON Application | | | 30 |

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|---|--|--------------|----------------|
| Programme: M.Sc Computer Science | | SEM | I |
| Course Code | EMPLOYABILITY SKILLS | Hours | Credits |
| MCS178S | | 2 | 0 |
| Learning Objectives | The Course aims to | | |
| | <ul style="list-style-type: none"> • To know the basic requirements of the JOB. • To know the problem in the process of interview. | | |

| | <ul style="list-style-type: none"> • Preparation towards taking part in the interview • To know about the communication process • To improve oneself in facing interview | |
|-------------|---|--------------|
| UNIT | CONTENTS | HOURS |
| I | <p>SELF MOTIVATION TOWARDS JOB</p> <p>To find out interested area for Job – Preparing mindset for Job – Have ready to learn mindset – Learn new things thought by the any persons around you – Keep updating yourself with respect to technology of the particular Job – Search of Job – Attend all the interview.</p> | 6 |
| II | <p>RESUME PREPARATION TECHNIQUES</p> <p>To search for resumes in the internet- Organizing the different areas inside the resumes – Preparing unique resume from your classmates – Difference between fresher’s and experienced resumes – How to get reference and send your resume through mail.</p> | 6 |
| III | <p>COMMUNICATION SKILLS</p> <p>Purpose the self-introduction– Why communication is important for the interview process – What is the importance of the language fluency- Why English is needed for communication– How to develop the basic communication Skills.</p> | 6 |
| IV | <p>SELF GROOMING AND BODY LANGUAGE</p> <p>What are the types of dress code to be followed for interview - How to select the dresses – What is the proper way to get ready one day before the interview - What is the best way to be prepared on the day of interview – What is the importance of Body Language-Google the details of the company: Search for the website of the particular company – Find out the different running business of the company – what is the turnover of the company – Find out the current employees of the company – Find out different location of the company – Find out the history and founder of the company. – Search for the vision and mission of the company – any other details</p> | 6 |
| V | <p>ANSWERING FAQ IN INTERVIEW</p> <p>What is the expected salary- Which location you preferred to work- Why do you choose to come to our company for interview- How do you know about</p> | 6 |

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| | our company- Are you comfortable with any shifts- What is your positive- What is your negative- What is your goal- How long will you work in this company if selected. | |
| Teaching Resources | <p>i. Textbook</p> <ol style="list-style-type: none"> 1. Maria Arokiaraj, Leo Maria Francis, “English for Business Communication”, Oxford Bell Books <p>ii. References</p> <ol style="list-style-type: none"> 1. Bert Decker, 2005, The Art Of Communicating, Crisp Publications, New Delhi. 2. Captain Bob, 2010, Fireup Your Communication Skills, Viva Books Pvt Ltd, New Delhi. 3. Charles J Stewart and William B Cash Jr, 2010, Interviewing Tata Mcgraw Hill Companies, New Delhi. 4. Gangal J.K., 2012, Competitive English, Nirja Publishers, New Delhi. 5. MagasudhaRavinuthala, 2005, TheO.P.Singh, 2012, Art Of Effective Communication In Group Discussion And Interview, S.Chand And Company Ltd, New Delhi. 6. Singh O.P., 2012, Art Of Effective Communication In Group Discussion And Interview, S.Chand And Company Ltd, New Delhi. 7. Sharma R.K., 2007, How To Speak And Write Correctly, Swastik Publishers, New Delhi 8. Sharon GersonAnd Steven Gerson, 2014, Communication Process And Product, M. Dorling Kindersley, New Delhi 9. Viva Career Skill Library, 2008, Communication Skills(Second), Viva Books Pvt. Ltd, New Delhi. <p>iii. Web References</p> <p>(iii) Online Tutorial</p> <ol style="list-style-type: none"> 1. http://en.wikipedia.org/wiki/Communication 2. http://www.mindtools.com/page8.html | |

| Programme: M.Sc Computer Science | | SEM | II |
|----------------------------------|--------------------------------------|--------------|----------------|
| Course Code | DISTRIBUTED OPERATING SYSTEMS | Hours | Credits |
| MCS270T | | 4 | 3 |

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|--|---|------------------------|--------------|---------------------------------|----------------|-----------------|----------------|---------------|------------------------|
| Learning Objectives | The Course aims to | | | | | | | | |
| | <ul style="list-style-type: none"> • To understand the fundamental concepts of operating systems • To understand the need for distributed systems. • To get acquainted with the design principles of distributed operating systems. • To explore the concept of synchronization • To handle the process in distributed environment | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 | |
| UNIT | CONTENTS | | | | | | | HOURS | |
| I | DISTRIBUTED COMPUTING SYSTEM Evolution –Models – Popularity - Distributed Operating System – Issues – Distributed Computed Environment. | | | | | | | 15 | |
| II | MESSAGE PASSING Features of a Good Message Passing – Issues- Synchronization – Buffering – Multidatagram Messages – Encoding and Decoding of Message Data – Process Addressing – Failure Handling. | | | | | | | 10 | |
| III | REMOTE PROCEDURE CALL The RPC Model –Transparency – Implementation – Stub – Messages – Marshaling - Server Management –Parameter Passing Semantics – Call Semantics – Communication protocols – Complicated – Client server Binding – Exception Handling – Security – Special types – Heterogeneous – Light Weight – Optimization. | | | | | | | 15 | |
| IV | SYNCHRONIZATION | | | | | | | 10 | |

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| | Mutual Exclusion - Critical Section –Starvation of process - Three approaches to implement mutual exclusion: Centralized Approach- Distributed Approach – Token Passing Approach – Deadlock - Necessary Conditions for Deadlock - Deadlock Modeling - Handling Deadlocks: Prevention – Avoidance. | |
| V | PROCESS MANAGEMENT Introduction - Process Migration- Desirable Features of a Good Process Migration Mechanism - Process Migration Mechanisms - Process Migration in Heterogeneous Systems - Advantages of Process Migration – Threads - Motivations for Using Threads - Models for Organizing Threads - Issues In Designing a Threads Package. | 10 |
| Teaching Resources | <p>i. Textbook</p> <p>4. Pradeep K. Sinha, ”Distributed Operating System Concepts and Design ”, PHI, New Delhi, 2007</p> <p>ii. Reference</p> <p>1. Andrew S Tanaenbaum, “Modern Operating System”, PHI, New Delhi, 2001</p> <p>iii. Web References</p> <p>(i) Online Tutorial</p> <p>1. http://en.wikipedia.org/wiki/Distributed_operating_system</p> <p>2. http://www.scribd.com/doc/198503016/Distributed-Operating-Systems</p> <p>3. https://www.javatpoint.com/distributed-operating-system</p> <p>(ii) Online Quiz</p> <p>1. https://www.sanfoundry.com/operating-system-questions-answers-distributed-operating-system/</p> <p>2. https://www.javatpoint.com/operating-system-mcq</p> | |

| Programme: M.Sc Computer Science | | SEM | II |
|---|---|--------------|----------------|
| Course Code | ENTERPRISE JAVA PROGRAMMING | Hours | Credits |
| MCS271T | | 5 | 3 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To expose the knowledge of MVC and Java server faces To provide the knowledge and skills required to develop web applications using the | | |

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|--|--|------------------------|--------------|---------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------------------|
| | <p>MVC framework provided by Apache Struts</p> <ul style="list-style-type: none"> To develop Enterprise web application using EJB. To understand and implement the object-relation mapping using Hibernate To explore the knowledge of Aspect Oriented Programming using Spring and Spring MVC. | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | Theory or Theory | Theory or Program | Theory or Program | Program or Program | Program or Program | 5 Pairs |
| | C | Any Three | 15 | Theory | Theory or Program | Program | Program | Theory or Program | 5 |
| Total Number of Questions | | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | HOURS | |
| I | <p>INTEGRATING SERVLETS AND JSP, JAVA SERVER FACES</p> <p>JSP: Basics – Life cycle of JSP- Static and dynamic content- javaBeans components; Understanding the need for MVC: implementing MVC with request dispatcher, summarizing the MVC code, interpreting relative URL, three data sharing approaches; JSF: Basics, Framework roles, Simple JSF application, Life Cycle of JSF page, using core tags, using HTML Component tags, Implementing an Event Listener - localized messages, Standard Converters and Validators – Creating a Custom Convertor and validator.</p> | | | | | | | 15 | |
| II | <p>TRUTS FRAMEWORK</p> <p>Introduction to Struts , Understanding Struts , Struts Flow Control Six Basic steps in using Struts, FormBeans, Forms, Using properties files, Advanced Action, Manual Validation, validation in the Action, validation in the form bean, Struts Tiles, Motivations , Basics, Tiles definitions file.</p> | | | | | | | 15 | |

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| <p style="text-align: center;">III</p> | <p>ENTERPRISE JAVA BEANS</p> <p>EJB: Session Bean, Entity Bean, Message driven Bean, defining clients access with interfaces, life cycle of enterprise Bean, creation of Enterprise Bean, web client, other Enterprise Bean features, handling exceptions, Container- Managed Transactions, Bean Managed Transactions.</p> | <p style="text-align: center;">15</p> |
| <p style="text-align: center;">IV</p> | <p>HIBERNATE</p> <p>Basics- Enterprise Application architectures, Hibernate Motivation, Object Relation Mapping, Collection Mapping, Association Mapping, Collection and Association Relationships, Relationships in Java and Databases, Component Mapping, Inheritance Mapping, Life cycle of Hibernate Entities, Transactions, HQL, Native SQL, Querying Terminology, SQL Query Options, Querying With Hibernate, Hibernate Batch processing and interceptor.</p> | <p style="text-align: center;">15</p> |
| <p style="text-align: center;">V</p> | <p>SPRING</p> <p>Foundation: Motivation- Spring Hello World, Runtime environment, Dependency injection-Inversion of control ,Spring IoC container, Spring framework composition, Spring container instantiation, Spring Bean life cycle, Spring bean definitions and inheritance, Bean naming, Bean scoping, Referencing other beans, Properties integration-Resource integration - Collection mapping, AOP with spring framework, Spring Web MVC.</p> | <p style="text-align: center;">15</p> |
| <p style="text-align: center;">Teaching Resources</p> | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. Marty Hall, Larry Brown., “Core Servlets and Java Server Pages”, 2nd Edition, Pearson Education, 2004 2. Stephanie Bodoffetl., “The J2EETM Tutorial”, Pearson Education, Second Edition, 2005 3. Hibernate Reference Documentation 3.3.1, Copyright © 2004 Red Hat Middleware, LLC available at http://www.hibernate.org/hib_docs/v3/reference/en/html_single/ 4. Gary Mak, Josh Long and Daniel Rubio, “Spring Recipes: A Problem-Solution Approach”, Apress Publications, Second Edition, 2010 5. Craig Walls, ”Spring in action”, Manning Publisher, Third Edition, 2011 <p>ii. References</p> <ol style="list-style-type: none"> 1. Cay S.Horstmann, Gary Cornell, “Core Java Volume I – Fundamentals Core Concepts”, Prentice Hall of India, Ninth Edition, 2012 2. Cay S.Horstmann, Gary Cornell, “Core Java Volume II – Advanced Features”, | |

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| | <p>Prentice Hall of India, Ninth Edition, 2013</p> <p>3. Minter Dave, Linwood Jeff, “Beginning Hibernate, From Novice to Professional”, Apress, Second Edition, 2006</p> <p>4. Doray, Arnold, “Beginning Apache, From Novice to Professional”, Apress, Second Edition, 2006</p> <p>iii. Web References</p> <p>(i) Online Tutorial</p> <ol style="list-style-type: none"> 1. http://courses.coreservlets.com/Course-Materials/struts.html 2. http://www.roseindia.net/jsp/index.shtml 3. http://www.oracle.com/technetwork/java/javaee/javaserverfaces-139869.html 4. http://docs.oracle.com/javaee/1.4/tutorial/doc/JSFIntro.html 5. http://docs.oracle.com/javaee/6/tutorial/doc/bnaph.html 6. http://en.wikipedia.org/wiki/JavaServer_Faces 7. http://docs.oracle.com/cd/E19879-01/819-3669/bnaph/index.html 8. http://www.roseindia.net/servlets/index.shtml 9. http://www.tutorialspoint.com/jsf/ 10. http://www.tutorialspoint.com/ejb/ <p>(ii) Online Quiz</p> <ol style="list-style-type: none"> 1. http://www.withoutbook.com/ 2. http://www.javatpoint.com/ |
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| Programme: M.Sc Computer Science | | | | SEM | II |
|----------------------------------|---|-------------|--------------|---------------------------------|--------------|
| Course Code | WEB APPLICATIONS | | | Hours | Credits |
| MCS272T | | | | 5 | 3 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To understand the difference between desktop and dynamic web applications. • To understand the ASP.NET web application execution model. • To create and modify multi-page Web Form applications and Web Services • To demonstrate features like flow control, data access and data binding • To validate forms with in an application. | | | | |
| Blueprint | Section | Type | Marks | Number of Questions from | Total |

| of the Question Paper | | and Choice | | Unit I | Unit II | Unit III | Unit IV | Unit V | Questions |
|-----------------------------|---|-------------------|----|------------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------|
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | Theory or Theory | Theory or Program | Theory or Program | Program or Program | Program or Program | 5 Pairs |
| | C | Any Three | 15 | Theory | Theory or Program | Program | Program | Theory or Program | 5 |
| | Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | HOURS | |
| I | INTRODUCTION TO ASP.NET AND WEB FORMS Developing ASP.NET Applications - ASP.NET File Types - The bin Directory - Application Updates - A Simple Application from Start to Finish- web.config file Web Form Fundamentals - A Simple Page Applet - The Problem With Response.Write - Server Controls - HTML Server Controls - ViewState - The HTML Control Classes - Events - Event Handling Changes - The Currency Converter application-Adding Support for Multiple Currencies - Adding Linked Images - Setting Styles – A Deeper Look at HTML control classes-HTML control events-The HTML control Base class-The HtmContainerControl Class-The HtmlInputControl Class-The Page class-The Controls collection-The HttpRequest Class-The HttpResponse Class-The ServerUtility Class-Assessing HTML Server controls. | | | | | | | 15 | |
| II | WEB CONTROLS Web Controls - Stepping Up to web Controls - Basic Web Control Classes - The web Control Tags - The WebControl Base Class - Units Enumerated Values - Colors - Fonts - List Controls - Table Controls - AutoPostBack and Web Control Events - How Postback Events Work - The Page Lifecycle - The Greeting Card Applet - Validation and rich Controls- The Calendar Control-Formatting the Calendar-restricting Dates- The AdRotator control-The Wizard control-Validation-The Validation Controls -The Validation Process-The Validator Class-A Simple Validation Example –Sever side | | | | | | | 15 | |

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| | example-Manual Validation-Understanding Regular Expressions-Literals and MetaCharacters-Finding a Regular expression- A Validated Customer Form - Web Services – Creating and Consuming Web Services. | |
| III | COMPONENT BASED PROGRAMMING Introduction – Creating a Simple Component – Properties and State – Database Components – Consuming the Database Component – Enhancing the Component with Error Handling – Aggregate Information – Data Objects. | 10 |
| IV | CUSTOM CONTROLS AND IMPLEMENTING SECURITY User Controls – Creating a Simple User Control – Visual Studio.NET Custom Control Support – Independent User Controls – Integrated User Controls – User Control Events – Limitations – Deriving Custom Controls.Determining Security Requirements – Restricted File Types – Security Concepts – ASP.NET Security Model – Security Strategies – Certificates – SSL – Forms Authentication – Web.Config Settings – Login Page – User Lists – Protecting User Passwords with Encryption | 15 |
| V | DATABASE ACCESS WITH COMMAND, ADAPTER AND XML ADO.NET Data Access - About the ADO.NET Example - Obtaining the Sample Database - Simple Data Access - Simple Data Update - Importing the Namespaces - Creating a Connection - The Connection String SQL - Making the Connection - Defining the Select Command - Using a Command with a DataReader - Updating Data - Using Update - Insert - and Delete Commands - Accessing Disconnected Data - Selecting Disconnected Data - Selecting Multiple Tables - Modifying Disconnected Data - Modifying and Deleting Rows - Adding Information - to a DataSet - Updating Disconnected Data - The Command Builder - Updating a DataTable - Controlling Updates - An Update Example – Using XML - XML’s Hidden Role in .NET - XML Basics - Attributes - Comments - The XML Classes - the XML TextWriter - The XML Text Reader - Working with XML Documents - Reading an XML Document - Searching an XML Document - XML Validation – CreatingXML Schema -XSD Documents - Validating an XML File | 20 |
| Teaching Resources | i. Textbooks <ol style="list-style-type: none"> 1. Mathew MacDonald, “ASP.NET: The Complete Reference”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006 2. Dino Eesposito, “Introducing Microsoft ASP.NET 2.0”, AsokeK.Ghosh, Prentice | |

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| | <p style="text-align: center;">Hall of India, Eastern Economy Edition, New Delhi, 2006</p> <p>ii. Reference</p> <p>1. Stephen Walther, "ASP.NET 3.5 Unleashed", Pearson Education, Dorling Kindersley Pvt. Ltd, Second Edition, 2008</p> <p>iii. Web References</p> <p>(i) Online Tutorial</p> <p>1. http://www.tutorialspoint.com/asp.net/ 2. http://asp.net-tutorials.com/ 3. http://csharp.net-informations.com/</p> <p>(ii) Online Quiz</p> <p>1. http://www.withoutbook.com/OnlineTestStart.php?quizId=70 2. http://www.quiz-magic.com/quiz/96/441/ASPNET</p> |
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| Programme: M.Sc Computer Science | | | | SEM | II | | | | |
|--|---|------------------------|--------------|---------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------------------|
| Course Code | PROGRAMMING IN PYTHON | | | | Hours | Credits | | | |
| MCS273T | | | | | 4 | 3 | | | |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To know the basics of algorithmic problem solving • To read and write simple Python programs. • To develop Python programs with conditionals and loops. • To define Python functions and call them. • To use Python data structures – lists, tuples, dictionaries. • To do input/output with files in Python. | | | | | | | | |
| Blueprint of the Programming Course | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | ANSWER ALL | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | EITHER OR TYPE | 7 | Theory or Theory | Theory or Program | Theory or Program | Program or Program | Program or Program | 5 Pairs |
| C | ANY | 15 | Theory | Theory or | Program | Program | Theory or | 5 | |

| | | THREE | | | Program | | | Program | |
|-------------|--|--------------|----------|----------|----------|----------|----------|----------|--------------|
| | TOTAL NUMBER OF QUESTIONS | | 4 | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | INTRODUCTION TO PYTHON Features of Python - How to Run Python – Identifiers - Reserved Keywords - Variables - Comments in Python - Indentation in Python - Multi-Line Statements - Multiple Statement Group (Suite) – Quotes in Python - Input, Output and Import Functions - Operators. Data Types and Operations: Numbers-Strings-List-Tuple-Set-Dictionary-Data type conversion | | | | | | | | 12 |
| II | FLOW CONTROL & FUNCTIONS Flow Control: Decision Making-Loops-Nested Loops-Types of Loops. Functions: Function Definition-Function Calling - Function Arguments - Recursive Functions - Function with more than one return value. | | | | | | | | 10 |
| III | MODULES, PACKAGES AND FILE HANDLING Modules and Packages: Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules. File Handling: Opening a File - Closing a File - Writing to a File – Reading from a File - File Methods - Renaming a File - Deleting a File - Directories in Python. | | | | | | | | 14 |
| IV | EXCEPTION HANDLING AND DATABASE PROGRAMMING Exception Handling: Built-in Exceptions - Handling Exceptions - Exception with Arguments- Raising Exception - User-defined Exception - Assertions in Python-DB- connection- creating tables- insert-update-delete-read-transaction control-disconnection. | | | | | | | | 10 |
| V | GUI PROGRAMMING .Introduction- Tkinter Widgets-Label- Message- Entry-Text- tk message Box- Button- Radio- Check button- List box- Frames- Top level widgets- Menu-Menu button-Scrollbar-scale widget(Slider Widget)- Canvas- | | | | | | | | 14 |

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| | Layout Managers- Pack-Place-Grid. | |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. Jeeva Jose and P. SojanLal, “Introduction to Computing and Problem Solving with Python”, Khanna Book Publishing Co. (P) Ltd., 2016. 2. Jeeva Jose, “Taming Python by Programming”, Revised Edition, Khanna Book Publishing Co. (P) Ltd., 2019. 3. ArshdeepBahga, Vijay Madiseti, “Cloud Computing: A Hands – On Approach” Universities press (India) Pvt. limited 2016. <p>ii. References</p> <ol style="list-style-type: none"> 1. Wesley J. Chun, “Core Python Programming”, Second Edition, Prentice Hall Publication, 2006. 2. Timothy A Budd, “Exploring Python”, Tata McGraw Hill, New Delhi, ISBN: 780071321228 <p>iii. Web References</p> <ol style="list-style-type: none"> 1. www.learnpython.org/ 2. https://www.codecademy.com/learn/python 3. https://www.Codementor.io 4. https://www.Python.org | |

| Programme: M.Sc Computer Science | | SEM | II |
|---|---|--------------|----------------|
| Course Code | ELECTIVE – II: A. OBJECT ORIENTED ANALYSIS AND DESIGN | Hours | Credits |
| MCS274A | | 4 | 3 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To understand the fundamental concepts of UML diagrams. • To draw diagrams with project documentation. • To analyze the requirements given by stake holder • To design the project with examples. • To understand the Software Development Process | | |

| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
|---------------------------------|--|-----------------|-------|--------------------------|---------|----------|---------|--------|-----------------|
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| | Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | INTRODUCTION Object oriented development – Evidence for Usefulness of Object Oriented development - Modeling Concepts: Modeling – Abstraction - The Three Models. | | | | | | | | 12 |
| II | CLASS MODELING Class Modeling: Object and Class Concepts – Link and Association Concepts -Inheritance - Sample Class Model - Navigation of Class Models – Advanced Class Modeling: Advanced Object & Class Concepts - Association Ends -N-ary Associations – Aggregation - Abstract Classes. | | | | | | | | 12 |
| III | DYNAMIC MODELING State Modeling: Events – States – Transitions & Conditions - State diagrams - State Diagram Behavior - Interaction Modeling: Use Case Models - Sequence Models - Activity Models – Case Study: Online Shopping using the models of use case, sequence and activity | | | | | | | | 12 |
| IV | SYSTEM ANALYSIS Process Overview: Development Stages - Development Life Cycle - Domain Analysis: Overview of Analysis - Domain Class Model - Domain State Model - Domain Interaction Model. | | | | | | | | 12 |
| V | SYSTEM DESIGN System Design: Overview of System Design - Estimating performance - | | | | | | | | 12 |

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| | Making a Reuse plan - Breaking a System into Subsystems - Identifying Concurrency-Allocation of Subsystems - Management of Data Storage - Handling Global Resources - Choosing a Software Control Strategy. |
| Teaching Resources | <p>i. Textbook</p> <ol style="list-style-type: none"> 1. Michael Blaha and James Rumbaugh, “Object-Oriented Modeling and Design with UML”, Prentice Hall of India Private Limited, New Delhi, 2005 <p>ii. References</p> <ol style="list-style-type: none"> 1. Ali Bahrami “Object-oriented Systems Development using UML”, McGraw Hill, Boston, 1999 2. John W.Satzinger, Robert B.Jackson, Stephen D.Burd, “Object – Oriented Analysis and Design with Unified Process”, Course Technology, New Delhi, 2005 3. L.Whitten, Lonned.Bentley, “System Analysis and Design Methods”, Tata McGraw Hill Publishing Company Ltd, Fourth Edition, New Delhi, 1999 <p>iii. Web References</p> <p>(i) Online Tutorial</p> <ol style="list-style-type: none"> 1. www.visual-paradigm.com/product/trainingcenter/demo.jsp 2. en.wikipedia.org/wiki/Unified_Modeling_Language 3. http://www.cs.bilkent.edu.tr/~ugur/teaching/cs319/ |

| Programme: M.Sc Computer Science | | | | SEM | II | | | | |
|----------------------------------|--|-----------------|-------|--------------------------|---------|----------|---------|--------|-----------------|
| Course Code | ELECTIVE – II: B. SOFTWARE TESTING AND QUALITY ASSURANCE | | | Hours | Credits | | | | |
| MCS274B | | | | 4 | 3 | | | | |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To introduce various approaches, techniques, technologies, and methodologies used in software testing and quality assurance. • To understand the role of testing in applications • To learn to design the test cases • To know the different levels of testing • To study the state-of-the-art of software testing and quality assurance. | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |

| | | | | | | | | | |
|-------------|---|-----------------------|-----------|--------|--------|--------|--------|--------|--------------|
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| | Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | TESTING BASICS Testing as an engineering activity – Role of Process in software quality – Testing as a process – Basic definitions – Software testing principles – The tester's role in a software development organization – Origins of defects – Defect classes – The defect repository and test design – Defect examples – Developer / tester support for developing a defect repository. | | | | | | | | 12 |
| II | TEST CASE DESIGN Introduction to testing design strategies – The smarter tester – Test case design strategies – Using black box approach to test case design – Random testing – Equivalence class partitioning – Boundary value analysis – Other black box test design approaches – Black box Testing and COTS – Using white box approach to test design – Test adequacy criteria – Coverage and control flow graphs – Covering code logic – Paths – Their role in white box based test design – Additional white box test design approaches – Evaluating test adequacy criteria. | | | | | | | | 12 |
| III | LEVELS OF TESTING The need for levels of testing – Unit test – Unit test planning – Designing the unit tests – The class as a testable unit – The test harness – Running the unit tests and recording results – Integration tests – Designing integration tests – Integration test planning – System test – The different types – Regression testing – Alpha, beta and acceptance tests. | | | | | | | | 12 |
| IV | FUNDAMENTALS OF SOFTWARE QUALITY & QUALITY ASSURANCE Software quality - Hierarchical models of Boehm and McCall - Quality measurement - Metrics measurement and analysis - Gilb's approach - GQM Model-Quality tasks - SQA plan - Characteristics - | | | | | | | | 12 |

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|---------------------------|---|-----------|
| | Implementation - Documentation - Reviews and audits. | |
| V | QUALITY CONTROL AND RELIABILITY Defect prevention and removal - Reliability models - Rayleigh model - Reliability growth models for quality assessment. Case Study: Tools for quality - Ishikawa's basic tools - CASE tools. | 12 |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003. (Unit (I, II and III) Allan C. Gillies, "Software Quality: Theory and Management", Thomson Learning, 2003. (Unit IV) Stephen H. Kan, "Metrics and Models in Software Quality Engineering", Pearson Education (Singapore) Pvt. Ltd., 2002. (Unit 5) <p>ii. References</p> <ol style="list-style-type: none"> Elfriede Dustin, "Effective Software Testing", Pearson Education, 2003. RenuRajani and Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2003. Mordechai Ben, Menachem and Garry S.Marliss, "Software Quality", Thomson Asia Pvt. Ltd., 2003. Kamna Malik and Praveen Choudry, "Software Quality: A Practitioner Approach", PHI, 2000. <p>iii. Web References</p> <p>(ii) Online Tutorial</p> <ol style="list-style-type: none"> http://en.wikibooks.org/wiki/Software_Quality_Assurance | |

| Programme: M.Sc Computer Science | | SEM | II |
|---|--|--------------|----------------|
| Course Code | ELECTIVE – II: C. WIRELESS SENSOR NETWORKS | Hours | Credits |
| MCS274C | | 4 | 3 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To understand the concepts of wireless sensor networks To understand the protocols for WSN To get exposure on WSN environment with TinyOS and like To understand the layered approach in sensor networks | | |

| | | | | | | | | | |
|--|---|------------------------|--------------|---------------------------------|----------------|-----------------|----------------|---------------|------------------------|
| | <ul style="list-style-type: none"> To design WSN and analyze performance. | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | WIRELESS SENSOR NETWORK ARCHITECTURE Introduction to wireless sensor networks- Challenges, Comparison with ad hoc network, Node architecture and Network architecture, design principles, Service interfaces, Gateway, Short range radio communication standards- IEEE 802.15.4, Zigbee and Bluetooth. Physical layer and transceiver design considerations. | | | | | | | | 12 |
| II | DATA LINK LAYER MAC protocols – fundamentals, low duty cycle protocols and wakeup concepts, contentionbased protocols, Schedule-based protocols - SMAC, BMAC, TRAMA, Link Layer protocols – fundamentals task and requirements, error control, framing, link management, Naming and addressing – address assignment, unique, Content-based and geographical addressing. | | | | | | | | 12 |
| III | NETWORK LAYER Routing protocols – Requirements, Taxonomy - Data-centric routing – SPIN, Directed Diffusion, Energy aware routing, Gradient-based routing – COUGAR, ACQUIRE, Hierarchical Routing – LEACH, PEGASIS, | | | | | | | | 12 |

| | | |
|---------------------------|--|-----------|
| | Location Based Routing – GAF, GEAR, Data aggregation – Various aggregation techniques, Localization and positioning – Properties, Approaches, Mathematical basics for single hop and multi-hop environment. | |
| IV | <p>TRANSPORT LAYER</p> <p>Transport Protocol, Coverage and deployments - Sensing models, Coverage measures, Random deployments: Poisson model, Boolean sensing model, general sensing model, Coverage determination, grid deployment, Reliable data transport, Single packet delivery, Block delivery, Congestion control and rate control, Time synchronization – Issues and protocol – Sender/Receiver, Security – protocols and Key Distribution Techniques.</p> | 12 |
| V | <p>TOOLS FOR WSN</p> <p>TinyOS – Introduction, NesC, Interfaces, modules, configuration, Programming in TinyOS using NesC, TOSSIM, Contiki – Structure, Communication Stack, Simulation environment – Cooja simulator, Programming.</p> | 12 |
| Teaching Resources | <p>i. References</p> <ol style="list-style-type: none"> 1. Anna Hac, –Wireless Sensor Network Design , John Wiley & Sons, 2003. 2. C.S.Raghavendra Krishna, M.Sivalingam and Taribznati, “Wireless Sensor Networks”, Springer Publication, 2004 3. Holger Karl , Andreas willig, “Protocol and Architecture for Wireless Sensor Networks”, John Wiley Publication, 2006. 4. KazemSohraby, Daniel Minoli and TaiebZnati, “Wireless Sensor Networks Technology Protocols and Applications”, John Wiley & Sons, 2007. 5. Paolo Santi, “Topology Control in Wireless Adhoc and Sensor Networks”, John Wiley & Sons, 2005. 6. Philip Levis, David Gay,"TinyOS Programming", Cambridge University Press, 2009 Contiki Open Source Operating System for IOT - http://www.contiki-os.org/ <p>ii. Web References</p> <p>(iii) Online Tutorial</p> <ol style="list-style-type: none"> 1. https://www.geektonight.com/wireless-networks-notes-pdf/ 2. https://en.wikipedia.org/wiki/Wireless_network | |

| Programme: M.Sc Computer Science | | | SEM | II |
|---|---|------------------------|--------------|-----------------------------|
| Course Code | PRACTICAL - IV: ENTERPRISE JAVA PROGRAMMING | | Hours | Credits |
| MCS275P | | | 2 | 2 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To expose the knowledge of MVC and Java server faces To provide the knowledge and skills required to develop web applications using the MVC framework provided by Apache Struts To Develop Enterprise web application using EJB. To understand and implement the object-relation mapping using Hibernate To explore the knowledge of Aspect Oriented Programming using Spring and Spring MVC. | | | |
| Blueprint of the Practical Courses | Section | Type and Choice | Marks | Questions in Section |
| | A (Exercise 1 – 5) | EITHER OR TYPE | 20 | 1 Pair |
| | B (Exercise 6 – 10) | EITHER OR TYPE | 20 | 1 Pair |
| | TOTAL NUMBER OF QUESTIONS | | | 2 |
| UNIT | CONTENTS | | | HOURS |
| I | <ol style="list-style-type: none"> JSP and MVC with Request Dispatcher JSF in JSP Pages,Using all HTML and core render kit Actions and Forms Properties and Messages Creating Web Client and Session Bean Bean Managed Transactions and Container Managed Transaction Object Relation Mapping and Collection Mapping Association Mapping andComponent Mapping and Inheritance Mapping Spring Actions with Bean Spring Web MVC | | | 30 |

| Programme: M.Sc Computer Science | | | SEM | II |
|---|---|------------------------|--------------|-----------------------------|
| Course Code | PRACTICAL - IV: WEB APPLICATIONS | | Hours | Credits |
| MCS276P | | | 2 | 2 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To demonstration of Web Configuration file To apply the web control classes To develop the component programming To create a secured web application with validation To apply the component programming | | | |
| Blueprint of the Practical Courses | Section | Type and Choice | Marks | Questions in Section |
| | A (Exercise 1 – 5) | EITHER OR TYPE | 20 | 1 Pair |
| | B (Exercise 6 – 10) | EITHER OR TYPE | 20 | 1 Pair |
| | TOTAL NUMBER OF QUESTIONS | | | 2 |
| UNIT | CONTENTS | | | HOURS |
| I | <ol style="list-style-type: none"> Web Configuration File HTML Control Classes, Control Events, Container and Input Control Classes, Web Control Classes & Control Tags Validation Controls and Rich Controls Web Services Components Custom Controls User Controls Implementing Security Data Access | | | 30 |

| Programme: M.Sc Computer Science | | | SEM | II |
|----------------------------------|-------------------------------------|--|-------|---------|
| Course | PRACTICAL VI: PROGRAMMING IN PYTHON | | Hours | Credits |

| | | | | | |
|--|---|------------------------|--------------|-----------------------------|--------------|
| Code | | | | | |
| MCS277P | | | | 2 | 2 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To know the basics of algorithmic problem solving To read and write simple Python programs. To develop Python programs with conditionals and loops. To define Python functions and call them. To use Python data structures – lists, tuples, dictionaries. To do input/output with files in Python. | | | | |
| Blueprint of the Practical Course | Section | Type and Choice | Marks | Questions in Section | |
| | A (Exercise 1 – 5) | EITHER OR TYPE | 25 | 1 Pair | |
| | B (Exercise 6 – 10) | EITHER OR TYPE | 25 | 1 Pair | |
| | TOTAL NUMBER OF QUESTIONS | | | | 2 |
| PART | CONTENTS | | | | HOURS |
| | <ol style="list-style-type: none"> Numbers, Strings, List, Tuple, Set and Dictionary Operators Strings, List, Tuple, Set and Dictionary Flow Control Functions Modules and Packages File handling Exception Handling Database Programming Tkinter Widgets Layout Managers | | | | 30 |

| Course Code | TECHNICAL APTITUDE | Hours | Credits |
|----------------------------|---|-----------|---------|
| MCS278S | | 2 | 0 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To impart knowledge on various basic principles involved in Computer science. To prepare the students for facing the technical interview questions To prepare the students for the placement | | |
| PART | CONTENTS | HOURS | |
| | <ol style="list-style-type: none"> Basic concepts of C Programming Controls and Loops in C Functions, Arrays and Pointers in C Other C Programming Concepts OOPS Concepts Classes and Objects Arrays, Pointers and Strings in C++ Inheritance in C++ Polymorphism, Exception Handling and Templates in C++. Database Concepts Software Engineering Concepts Operating System Concepts Networking Concepts C Sharp DOT NET Concepts Java Programming Concepts General Computer Science Aptitude | 30 | |
| Teaching Resources | <p>i. Textbook</p> <ol style="list-style-type: none"> ElaKashyap Sharma, “Technical Aptitude for Interviews Computer Science and IT”, 2nd Revised Edition, Prentice Hall of India Learning Pvt. Ltd. New Delhi, 2016. | | |

| Programme: M.Sc Computer Science | | SEM | III & IV |
|---|---|-------|--------------|
| Course Code | SOFTWARE PROJECT I & II | Hours | Credits |
| MCS377J MCS476J | | | 4 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To examine fundamental XML technology • To understand the use of JSON • To gain an understanding about the role of web services in commercial applications • To learn the emerging standard protocols like SOAP, WSDL and UDDI. • To introduce the role of web services in CMS | | |
| <p>Regulations for third semester</p> <ul style="list-style-type: none"> • The Project work is carried out in a team; each team consists of maximum two members. • Each team has to select an exclusive problem and the team has to develop an application to provide the solution to the problem. • Each student in a team has to deal with a specific area in the problem and submit the report separately. • Faculty members assigned to each group shall supervise the progress of the software project. • After finalizing software project title with the guide, change of title is not allowed. • The phases of the software project are project management, requirement analysis, design, implementation and testing. • The report shall be in A4- size paper and in original. However, photocopies are accepted for reports and forms only. • Plagiarism, when detected will result in zero marks, without the possibility for submission. • In the course of the project development, each student must have regular consultations with the Guide. The consultation is meant to review the candidate's progress, besides advising on any project issues. A minimum of five consultations throughout the whole software project is essential to accept a software project for evaluation. • During each consultation, the candidate must submit the intermediate deliverables to the guide for review. The deliverables will be assessed and marks will be allocated during the software project presentation. Each Consultation Report must reflect the detailed tasks completed for the week, problems encountered in the course of the software project and how he/she resolved them and the plan for the next phase. • A copy of the software project report is to be submitted by the prescribed time | | | HOURS |

announced by the department.

- A student shall be declared to be successful in the project if he/she secures 50% or above in the semester examinations and 50% or above in the aggregate of CIA & Semester examinations. If a candidate fails, he/she has to improve his/her software project and re-submit in the following year.
- Viva Voce is compulsory for all the candidates who have submitted the software project. If a candidate is absent for viva-voce then his/her absence is treated as absent for the semester examination.

Evaluation

The software project will be evaluated on the following components.

CA - 50 Marks

| | | |
|-----------|---|-----------------|
| 1. | First Review | 25 Marks |
| | First Review should cover the following artifacts 1. Requirement analysis 2. Design | |
| 2. | Second Review | 25 Marks |
| | Second Review should cover the following artifacts 1. Implementation 2. Testing | |

Semester Examination

- 50 Marks

1. Evaluation of Project Work

40 Marks

- a. Software - 20 Marks
- b. Testing - 10 Marks
- c. Documentation - 10 Marks

2. Viva – Voce

10 Marks.

- The semester evaluation is carried out by the external and internal examiner individually. The average of both evaluations is awarded as the final mark for software project.

15.2 Regulations for the Final Semester

- A Coordinator will be appointed by the Head of the Department to coordinate the

software project.

- Internal guides from the department will be assigned to the students.
- The software project shall be an independent one. Combined projects are not allowed.
- After finalizing software project title with the guide, change of title is not allowed.
- The phases of the software project are project management, requirement analysis, design, implementation and testing.
- Plagiarism, when detected will result in zero marks, without the possibility for submission.
- In the course of the project development, each student must have regular consultations with the Guide. The consultation is meant to review the candidate's progress, besides advising on any project issues. A minimum of five consultations throughout the whole software project is essential to accept a software project for evaluation.
- During each consultation, the candidate must submit the intermediate deliverables to the guide for review. The deliverables will be assessed and marks will be allocated during the software project presentation. Each Consultation Report must reflect the detailed tasks completed for the week, problems encountered in the course of the software project and how he/she resolved them and the plan for the next phase.
- A copy of the software project report is to be submitted by the prescribed time announced by the department.
- Two Reviews will be conducted before the Final Viva-Voce.
- The report shall be in A4- size paper and in original. However, photocopies are accepted for reports and forms only.
- Two copies of the project report to be submitted at prescribed time announced by the department.
- A student shall be declared to be successful in the project if the candidate secures 50% or above in the Examination and 50% or above in the aggregate of CA and Semester Examination. If a candidate fails he/she has to improve their project work and re-submit in the following even semester.
- Viva-Voce is compulsory for all the candidates who have submitted the project work. If a candidate is absent for viva voce, and then his absence will be treated as absence for the semester examinations.

Evaluation

The Software Project work will be evaluated on the following components.

CA - 50 Marks

| | | |
|-----------|---|-----------------|
| 1. | First Review | 25 Marks |
| | First Review should cover the following artifacts 1. Requirement analysis 2. Design | |
| 2. | Second Review | 25 Marks |
| | Second Review should cover the following artifacts 1. Implementation 2. Testing | |

Semester Examination - 50 Marks

1. Evaluation of Project Work

40 Marks.

- a. Software - 20 Marks
- b. Testing - 10 Marks
- c. Documentation - 10 Marks

2. Viva – Voce

10 Marks

- Two examiners will evaluate the project work report separately and the average is calculated as a final mark for the Semester examination

Template for Software Project

| Project Area | Work products |
|---|--|
| Project Management | • Project Proposal |
| | • Project Plan |
| | Project Review Record-1 |
| Requirements | • System Study (SSD) |
| | • Vision Document (VSD) |
| | • Use-Case Diagram |
| | • Use-Case Specification (UCS) |
| | Project Review Record-2 |
| First Review | Draft Report (Combination of all work products) |
| Analysis and Design | • Sequence Diagram |
| | • Architecture Diagram |
| | • Database Design (Table Design, Data integrity & Constraints) |
| | • Class Diagram |
| | • Component Diagram |
| | • Test Case Design |
| | • User Interface Design |
| | Project Review Record-3 |
| Mid -Term evaluation (second review) | • Draft Report (Combination of all work products) |
| | Project Evaluation Report-1 |
| | • Program code |
| Test | Project Review Record-4 |
| | • Unit, Integration, System test plan |
| | • Test Case Results |
| Evaluation (Third Review) | Project Review Record-5 |
| | Project Report |
| | • Project Presentation |

| | | |
|--|--|--|
| | <ul style="list-style-type: none"> • Application Demo | |
|--|--|--|

| Programme: M.Sc Computer Science | | SEM | IV |
|----------------------------------|---|-------|---------|
| Course Code | HUMAN RIGHTS | Hours | Credits |
| VE1004 | | 2 | 2 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To strengthen respect for human rights and fundamental freedoms, • To value human dignity and develop individual self-respect and respect for others • To develop attitudes and behaviors that will lead to respect for the rights of others. • To promote respect, understanding and appreciation of diversity. • To empower people towards more active citizenship. • To ensure genuine mime gender equality and equal opportunities for women and men. | | |
| UNIT | CONTENTS | HOURS | |
| I | United Nations and Human Rights. | 6 | |
| II | Protection of Human Rights Act, 1993. | 6 | |
| III | Rights to Information Act | 6 | |
| IV | The Right to Education | 6 | |
| V | The Rights of Women | 6 | |

SKILL DEVELOPMENT COURSE: BLOCKCHAIN TECHNOLOGY

LEARNING OBJECTIVES

- To Know next generation of internet and technology.
- To know the basic concepts of compilers.
- To create smart contract (dAPP).
- To deploy the smart contracts in blockchain.

Unit - I: BlockChain - Prerequisites (5 Hrs)

Basics of Cryptography – Basics of Hashing and SHA256 – Encryption and Decryption – Public Key and Private key – Symmetric Cryptography – Asymmetric Cryptography – Digital Signature – Zero knowledge proof – Decentralized vs Centralized system – Transparency – P2P Concepts – Overview of LibP2P.

Unit - II: Introduction to BlockChain (5 Hrs)

Problems with current system – Importance of BlockChain – History of BlockChain – Node – Real Time BlockChain Usecases – Transactions – Merkle Tree – Consensus Algorithm – POW – POS – POA & POH – Miners - Genesis of Block – Block Creation – Workflow of BlockChain – Public BlockChain – Introduction to BitCoin – Introduction to Bitcoin – Cryptocurrency use cases – Overview of other public networks (Ethereum, Solana, Wallet) – MetaMask Wallet Demo.

Unit - III: Ethereum (6 Hrs)

Alt Coins – Trading – Crypto Government Regulations – Ethereum differentiation – Ethereum Architecture – Ethereum Forks – Ethereum Gas – Ethereum transactions – Ethereum Wallets & Types – Multi Signature – Ethereum EVM – Ethereum Clients – Introduction to Smart Contract – Smart Contract Challenges – DApps – Ethereum Accounts & Creation – Ethereum Merge – Ethereum POS

Unit – IV: Smart Contracts (8 Hrs)

Introduction to Solidity – Smart Contract IDE – Test Networks – Solidity Syntax – Solidity data types & access specifier – Interface – Constructor – Event – Enum – Inheritance – Functions – Storage & Memory

Unit – V: Tokens and Private BlockChain (6 Hrs)

Token – Token usecases – ERC-20 Token Creation – ERC-721 Token Creation – NFT Types – NFT Marketplace – NFT Usecases – OpenZapplin – Polygon – IPFS – Private BlockChain Usecases – BlockChain Opportunities.

Textbook

Chris Dannen, “Introducing Ethereum And Solidity: Foundations Of Cryptocurrency And Blockchain Programming For Beginners”, Apress , 2018

References

3. Lorne Lantz, Daniel Cawrey, “Mastering Blockchain: Unlocking the Power of Cryptocurrencies, Smart Contracts, and Decentralized Applications”, O’Reilly Publications, Edition 1, 2020
4. Chandramouli Subramanian, Asha A George, Abhilash K A and Meena Karthikeyan, “BlockChain Technology”, Universities Press (India) Pvt. Ltd., , Edition 1, 2020.

Web References

3. <https://www.coindesk.com/learn/what-is-blockchain-technology/>
4. <https://www.simplilearn.com/tutorials/blockchain-tutorial/blockchain-technology>

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Know next generation of internet and technology.
- Understand the basic concepts of blockchain.
- Create smart contract (dAPP).
- Deploy the smart contracts in blockchain

Evaluation Pattern: Total - 100 Marks

Online Quiz (5 X 10 = 50 Marks)

Assignment (4 X 5 = 20 Marks)

BlockChain Development (30 Marks)

Industrial Exposure:

LeSoftTech, Salem

Ratio of Hours in Offline and Online Mode

70% Offline

30% Online

Course offered for

M.Sc., CS and MCA

SKILL DEVELOPMENT COURSE: DATA SCIENCE WITH PYTHON

LEARNING OBJECTIVES

- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.

- To define Python functions and call them.
- To use Python data structures – lists, tuples, dictionaries.
- To document and transfer the results and effectively communicate the findings using visualization techniques.

UNIT - I: INTRODUCTION TO PYTHON (5 Hrs)

Features of Python - How to Run Python – Identifiers - Reserved Keywords - Variables - Comments in Python - Indentation in Python - Multi-Line Statements - Multiple Statement Group (Suite) – Quotes in Python - Input, Output and Import Functions - Operators. Data Types and Operations: Numbers-Strings-List-Tuple-Set-Dictionary-Data type conversion

UNIT - II: FLOW CONTROL & FUNCTIONS (5 Hrs)

Flow Control: Decision Making-Loops-Nested Loops-Types of Loops. Functions: Function Definition-Function Calling - Function Arguments - Recursive Functions - Function with more than one return value.

UNIT - III: MODULES, PACKAGES AND INTRODUCTION TO DATASCIENCE (5 Hrs)

Modules and Packages: Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules. Python for Data Analysis.

UNIT - IV: NUMPY AND UNIVERSAL FUNCTIONS (7 Hrs)

NumPy Basics: Arrays and Vectorized Computation -The NumPyndarray: A Multidimensional Array Object - Universal Functions: Fast Element-wise Array Functions - File Input and Output with Arrays - Linear Algebra - Random Number Generation.

UNIT - V: PANDAS AND VISUALIZATION (8 Hrs)

Getting started with pandas: Introduction to pandas Data Structures - Essential Functionality - Summarizing and Computing Descriptive Statistics - Handling Missing Data -Hierarchical Indexing - Other pandas Topics- Plotting and Visualization: A Brief matplotlib API Primer.

Textbooks

4. Jeeva Jose and P. SojanLal, “Introduction to Computing and Problem Solving with Python”, Khanna Book Publishing Co. (P) Ltd., 2016.
5. Wes McKinney, “Python for Data Analysis”, Published by O’Reilly Media, 2012.
6. Jake Vander Plas, “Python Data Science Handbook”, O’Reilly Media Publishers, 2016.

References

1. Wesley J. Chun, “Core Python Programming”, Second Edition, Prentice Hall Publication, 2006.
4. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, “Practical Data Science Cookbook”, Packt Publishing Ltd., 2014.
5. Nathan Yau, “Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics”, Wiley, 2011.

Web References

www.learnpython.org/
<https://www.codecademy.com/learn/python>
<https://www.Codementor.io>
<https://www.Python.org>
<http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction>
<https://www.datacamp.com/>
<https://www.dataquest.io/>

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Preparing and pre-processing data
- Visualizing the results of analytics effectively
- Basic understanding of NumPy and Pandas
- Ability to use conditional loops and list by python
- Learn the Visualization through Matplotlib

Evaluation Pattern: Total - 100 Marks

Online Quiz (5 X 10 = 50 Marks)

Assignment (4 X 5 = 20 Marks)

Application Development (2X15=30 Marks)

Industrial Exposure:

Diggibyte Technologies, Bangalore

Ratio of Hours in Offline and Online Mode

50% Offline

50% Online

Course offered for

All UG & PG –Science Departments (Non Computing)

| Programme: M.Sc Computer Science | | SEM | III |
|----------------------------------|--|-------|---------|
| Course Code | INTERNET OF THINGS | Hours | Credits |
| MCS370T | | 4 | 3 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To introduce the IoT and its baseline technologies. • To explore the IOT and M2M and its Connectivity technologies. • To understand the contribution of WSN and other networks towards IOT. | | |

| | | | | | | | | | |
|--|---|------------------------|--------------|---------------------------------|----------------|-----------------|----------------|---------------|------------------------|
| | <ul style="list-style-type: none"> To implement the IOT applications using Arduino and Raspberry Pi. To know the importance of SDN, Sensor cloud and Fog computing. | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | INTRODUCTION TO INTERNET OF THINGS Definition & Characteristics of IoT, Applications of IOT, IOT categories, enablers and connectivity layers, Baseline technologies, Sensors, Actuators, IOT components and implementation, Challenges for IOT; Physical Design of IoT - Things in IoT, IoT Protocols; Logical Design of IoT -IoT Functional Blocks, IoT Communication Models, IoT Communication APIs;IoT Enabling Technologies. | | | | | | | | 10 |
| II | IOT NETWORKING & CONNECTIVITY TECHNOLOGIES IOT Networking: Connectivity terminologies – Gateway allotment- IOT identification and data protocols; Connectivity Technologies. | | | | | | | | 10 |
| III | WIRELESS SENSOR NETWORKS Wireless Sensor Network (WSN): Components of Sensor Node, Modes of Detection and Challenges, Sensor web, Behavior of nodes in WSN, Applications of WSN. | | | | | | | | 15 |
| IV | IOT PLATFORMS DESIGN METHODOLOGY AND IOT PHYSICAL DEVICES & IMPLEMENTATION IoT Design Methodology-steps - Case Study on needs and | | | | | | | | 10 |

| | | |
|--------------------|---|----|
| | implementation of IoT Smart Applications - Introduction to Arduino Board and Types of Arduino Boards. Introduction to Arduino IDE, Architecture of Arduino Board, Programming Arduino Board and Running the coding in Arduino Board – Implementing the IoT Projects. | |
| V | <p>SOFTWARE DEFINED NETWORK AND SENSOR CLOUD</p> <p>SDN: Introduction – Architecture of SDN, Rule placement, Openflow protocol, Controller, SDN in IOT- Software defined WSN – SDN for mobile networking and Access Devices; Sensor Cloud: Architecture, Life cycle, layered structure and Applications- Issues and challenges in Sensor Cloud.</p> | 15 |
| Teaching Resources | <p>i.Text books</p> <ol style="list-style-type: none"> 1. Jeeva Jose, “Internet of Things”, Kanna publishing, 2018. 2. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on Approach)”, 1stEdition, VPT, 2014. <p>ii.References</p> <ol style="list-style-type: none"> 1. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013 16. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014. <p>iii.Web References</p> <p>(i) Online Tutorial</p> <ol style="list-style-type: none"> 1. www.ibm.com › Learn › Internet of Things 2. https://thingspeak.com/ 3. https://yourstory.com/2015/03/internet-of-things-application/ 4. https://create.arduino.cc/iot/ 5. https://www.carriots.com/tutorials | |

| | | | |
|---|--------------------------------|--------------|----------------|
| Programme: M.Sc Computer Science | | SEM | III |
| Course Code | ARTIFICIAL INTELLIGENCE | Hours | Credits |

| | | | | | | | | | |
|--|--|------------------------|--------------|---------------------------------|----------------|-----------------|----------------|---------------|------------------------|
| MCS371T | | | | | | | | 4 | 3 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To provide a strong foundation of fundamental concepts in Artificial Intelligence To provide a basic exposition to the goals and methods of Artificial Intelligence To enable the student to apply these techniques in applications which involve perception, reasoning and learning To introduce the concept of expert systems To impart knowledge about neural networks | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 | |
| UNIT | CONTENTS | | | | | | | HOURS | |
| I | <p>OVERVIEW OF ARTIFICIAL INTELLIGENCE</p> <p>Introduction- Definition- Why AI- Difference between symbolic and non-symbolic representation- History of AI- Turing Test- Chinese Room Test- Applications- Objectives of AI- Artificial Intelligence Programming- Criticism of AI- Future of AI.</p> | | | | | | | 10 | |
| II | <p>KNOWLEDGE REPRESENTATION AND REASONING SYSTEMS</p> <p>Knowledge Engineering- Procedure for Knowledge Acquisition- Knowledge Representation-Logical- Procedural- Network- Structured- Reasoning- KRR Systems- KR languages- Domain Modelling- Semantic Nets- Frame Based Systems- Hybrid Representation Systems.</p> | | | | | | | 15 | |

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| III | <p>UNCERTAINTY</p> <p>Uncertainty: Non-monotonic and monotonic reasoning- confidence factor- Bayes theorem- Bayesian Networks-Fuzzy Logic- Computer vision- NLP- Speech Recognition.</p> | 15 |
| IV | <p>EXPERT SYSTEMS</p> <p>Introduction- Skill vs Knowledge- Characteristics of expert system- history- knowledge engineering- inferencing- Expert system-tools- Applications.</p> | 10 |
| V | <p>NEURAL NETWORKS</p> <p>Difference between human and machine intelligence- features of biological neural networks- human brain learns- human neurons to artificial neurons- neural networks learn- learning algorithms- network architectures and their applications- comparisons of neural networks- rule-based methods-expert systems- benefits of neural network- limitations.</p> | 10 |
| Teaching Resources | <p>i. Textbook</p> <p>1. Rajendra Akerkar, “Introduction to Artificial Intelligence”, Prentice Hall of India, 2008.</p> <p>ii. References</p> <p>1. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.</p> <p>2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw-Hill, 2003.</p> <p>3. George F. Luger, “Artificial Intelligence-Structures and Strategies for Complex Problem Solving”, Pearson Education / PHI, 2002.</p> <p>iii. Web References</p> <p>1. https://www.tutorialspoint.com/artificial_intelligence/</p> <p>2. https://learn.saylor.org/course/view.php?id=96</p> <p>3. https://in.udacity.com/course/intro-to-artificial-intelligence--cs271</p> | |

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| Programme: M.Sc Computer Science | | SEM | III |
| Course Code | DESIGN AND ANALYSIS OF ALGORITHMS | Hours | Credits |
| MCS372T | | 5 | 3 |

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|--|---|------------------------|--------------|---------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------------|
| Learning Objectives | The Course aims to <ul style="list-style-type: none"> • To prove the correctness and analyze the running time of the basic algorithms for those classic problems. • To understand the basic knowledge of algorithm design and its implementation. • To learn the key techniques of Divide-and-Conquer and Greedy Method. • To recognize the concept of Dynamic Programming and its algorithms • To familiarize with Backtracking algorithms. • To understand Branch and Bound techniques for designing and analyzing algorithms. | | | | | | | | |
| Blueprint of the Programming Course | Section | Type and Choice | Marks | Number of Questions from | | | | | Total |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | Questions |
| | A | ANSWER ALL | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | EITHER OR TYPE | 7 | Theory or Theory | Theory or Program | Theory or Program | Program or Program | Program or Program | 5 Pairs |
| | C | ANY THREE | 15 | Theory | Theory or Program | Program | Program | Theory or Program | 5 |
| TOTAL NUMBER OF QUESTIONS | | | 4 | 4 | 4 | 4 | 4 | 20 | |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | INTRODUCTION Algorithm Specification-Performance Analysis: Space complexity- Time Complexity-Asymptotic notations-practical complexities-performance measurement- Randomized algorithms: An informal Description- Identifying the repeated element- Primality testing- Advantages and Disadvantages. | | | | | | | | 13 |
| II | DIVIDE-AND-CONQUER AND GREEDY METHOD Divide-and-conquer: General method-Binary Search-Finding the maximum and minimum-Merge sort- quick sort- Strassen's Matrix multiplication- The greedy Method: The general method-Knapsack problem-Minimum cost | | | | | | | | 17 |

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| | spanning tree. | |
| III | DYNAMIC PROGRAMMING Dynamic Programming: Dynamic programming- All pairs shortest paths- Single source shortest paths- String editing- 0/1 knapsack- The traveling salesperson problem-Flow shop scheduling. | 14 |
| IV | BACKTRACKING Backtracking: General Method-8 queen’s problem- Sum of subsets- Graph coloring-Hamiltonian cycles-Knapsack Problem | 16 |
| V | BRANCH AND BOUND Branch-and-Bound: General method of algebraic problem-Modular arithmetic- Comparison trees-Lower bound through reduction-Planar graph coloring problem-Bin packing. | 15 |
| Teaching Resources | i. Textbook 1. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, “Fundamentals of Computer Algorithms”, Galgotia Publications Pvt.Ltd, 2005 ii. References 1. S.K.Basu, “Design Methods and Analysis of Algorithms”, Fourth edition, 2010 2. A.V.Aho, J.E. Hopcroft and J.D.Ullman, “The Design and Analysis of Computer Algorithms”, Pearson Education Asia, Addison-Wesley Publishing Company, 2003 3. AnanyLevitin, “Introduction to the Design and Analysis of Algorithm”, Pearson Education Asia, Dorling Kindersley India Pvt.Ltd, 2003 iii. Web References 1. http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html 2. http://cs.uef.fi/pages/franti/asa/notes.html 3. http://computerstuff7090.blogspot.in/2012/11/design-analysis-and-algorithm-video.html | |

| Programme: M.Sc Computer Science | | | | SEM | III | | | | | |
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| Course Code | MOBILE APPLICATIONS | | | | Hours | Credits | | | | |
| MCS373T | | | | | 5 | 3 | | | | |
| Learning Objectives | The Course aims to | | | | | | | | | |
| | <ul style="list-style-type: none"> To know the basis of Android application and development environment To able to develop simple and professional application To know the different controls in Android To impart knowledge about handling pictures and menus To get ready for the job opportunity in mobile application development. | | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions | |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 | |
| | B | Either or Type | 7 | Theory or Theory | Theory or Program | Theory or Program | Program or Program | Program or Program | 5 Pairs | |
| | C | Any Three | 15 | Theory | Theory or Program | Program | Program | Theory or Program | 5 | |
| Total Number of Questions | | | | 4 | 4 | 4 | 4 | 4 | 20 | |
| UNIT | CONTENTS | | | | | | | HOURS | | |
| I | INTRODUCTION TO ANDROID History of Android Platform- Android APIs- Android Architecture Application Framework- Features of Android- Android Applications- Application Components - Manifest File- Downloading and Installing Android and Android SDK - Setting up Android Virtual and physical Device - Exploring the Development Environment - The Java Perspective Using Eclipse - DDMS Perspective - Command-Line Tools- Developing and Executing the First Android Application - Using Eclipse IDE to Create an | | | | | | | 15 | | |

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| | Application - Running Your Application - Exploring the Application - Using Command - Line Tools. | |
| II | <p>ACTIVITIES, INTENTS AND FRAGMENTS</p> <p>Working with Activities- Creating an Activity- Starting an Activity – Managing the Life cycle of an Activity - Applying Themes and Styles to an Activity- Displaying a Dialog in the Activity - Hiding the title of the activity- Using Intents-Exploring Intent Objects- Exploring Intent Resolution- Exploring Intent Filters - Resolving Intent Filter Collision - Linking the Activities Using Intent - Obtaining Results from Intent – Passing Data Using an Intent Object- Fragments - Hiding Title Bar and Screen Orientation - Fragment Implementation - Finding Fragments - Adding, Removing and Replacing Fragments - Finding Activity Using Fragment - Using the Intent Object to Invoke Built-in Application.</p> | 15 |
| III | <p>UI USING VIEWS AND VIEW - GROUPS</p> <p>Working with View Groups – Linear Layout – Relative Layout – Scroll Layout – Table Layout – Frame Layout – Tab Layout using the Action Bar – Working with Views – Text – Edit Text – Button – Radio Button – Check Box – Image Button – Toggle Button – Rating Bar – Binding Data with Adapter View Class – List View – Spinner – Gallery – Designing the Auto Text Complete View – Screen Orientation – Anchoring the Views of Current Activity – Handling UI Events – Handling User Interaction with Activities and Views – Specialized Fragments – List Fragment – Dialog Fragment – Preference Fragment – Creating Menus, Option Menus, Context Menu and Sub Menu.</p> | 15 |
| IV | <p>HANDLING PICTURES AND MENUS WITH VIEWS AND STROING THE DATA</p> <p>Working with Image Views – Displaying Images in the Gallery View – Displaying Images in the Grid View – Using the Image Switcher View- Designing Context Menu for Image View- Using the Analog-Clock and Digital Clock Views – Embedding Web Browser in an Activity - Notifying the User Creating the Toast Notification - Creating the Status Bar Notification- Creating the Dialog Notification - Introducing the Data Storage Options - Using Preferences - Using the SQLite Database</p> | 15 |

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| | Creating the Database - Executing the Database Operations. | |
| V | <p>EMAILING, TELEPHONY AND SMS IN ANDROID</p> <p>Building an Application to Send Email - Handling Telephony - Displaying Phone Information Application Receiving Phone Calls – Making Outgoing Phone Calls Application - Handling SMS Sending SMS Using SMS Manager - Sending SMS Using Intent - Receiving SMS Using the Broadcast Receiver Object- Role of Default SMS Providers - . Publishing Android Application: Export android application – Google play store registration.</p> <p>Supplementary Learning: Building Mobile Applications using Xamarin</p> | 15 |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> Pradeep Kothari, “Android Application Development (with kitkat support) Black Book”, Kogent Learning Solution Inc., Dreamtech Press India Pvt. Ltd, Wiley Publications. Sayed Y. Hashimi, SatyaKomatineni, Dave MacLean, “Pro Android 2”, 2010 Edition, Wiley publications. <p>ii. References</p> <ol style="list-style-type: none"> Reto Meier ,”Professional Android Application Development”,2009 Edition, Willy Publication. ZigurdMednieks, Laird Dornin, G. Blake Meike,and Masumi Nakamura, “Programming Android”, OReilly publications. <p>iii. Web References</p> <p>(i) Online Tutorial</p> <ol style="list-style-type: none"> www.tutorialspoint.com www.javatpoint.net | |

| Programme: M.Sc Computer Science | | SEM | III |
|----------------------------------|---|--------------|----------------|
| Course Code | ELECTIVE - III: A. SEMANTIC WEB AND APPLICATIONS | Hours | Credits |
| MCS374A | | 4 | 3 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To learn the fundamentals of semantic web and to conceptualize and depict ontology for semantic web. To make a study of languages for semantic web. | | |

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|---------------------------------------|--|------------------------|--------------|---------------------------------|----------------|-----------------|----------------|---------------|--|
| | <ul style="list-style-type: none"> To learn about the ontology learning algorithms and to utilize in the development of an application. To know the fundamental concepts of ontology management. To learn the applications related to semantic web. | | | | | | | | |
| Blueprint of the Theory Course | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions in each Section |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | ANSWER ALL | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | EITHER OR TYPE | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | ANY THREE | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| TOTAL NUMBER OF QUESTIONS | | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | THE QUEST FOR SEMANTICS Building Models – Calculating with Knowledge – Exchanging Information – Semantic Web Technologies – Layers – Architecture – Components – Types – Ontological Commitments – Ontological Categories – Philosophical Background – Sample Knowledge Representation Ontologies – Top Level Ontologies – Linguistic Ontologies – Domain Ontologies – Semantic Web – Need – Foundation. | | | | | | | | 13 |
| II | LANGUAGES FOR SEMANTIC WEB AND ONTOLOGIES 9 Web Documents in XML – RDF – Schema – Web Resource Description using RDF – RDF Properties – Topic Maps and RDF – Overview – Syntax Structure – Semantics – Pragmatics –Traditional Ontology Languages – LOOM – OKBC – OCML – FLogic Ontology Markup Languages – SHOE – OIL – DAML + OIL – OWL | | | | | | | | 17 |
| III | ONTOLOGY LEARNING FOR SEMANTIC WEB Taxonomy for Ontology Learning – Layered Approach – Phases of Ontology Learning –Importing and Processing Ontologies and Documents – Ontology Learning Algorithms –Methods for Evaluating Ontologies. | | | | | | | | 10 |
| IV | ONTOLOGY MANAGEMENT AND TOOLS Overview – Need for Management – Development Process – Target Ontology – | | | | | | | | 10 |

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| | Ontology Mapping – Skills Management System – Ontological Class – Constraints – Issues, Evolution – Development Of Tools And Tool Suites – Ontology Merge Tools – Ontology Based Annotation Tools. | |
| V | APPLICATIONS Web Services – Semantic Web Services – Case Study for Specific Domain – Security Issues – Web Data Exchange and Syndication - Semantic Wikis – Semantic Portals – Semantic Metadata in Data Formats – Semantic Web in Life Sciences – Ontologies for Standardizations – Rule Interchange Format. | 10 |
| Teaching Resources | i. References <ol style="list-style-type: none"> 1. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, “Foundations of Semantic Web Technologies”, Chapman & Hall/CRC, 2009. 2. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernandez-Lopez “Ontological Engineering: with Examples from the Areas of Knowledge Management, E-Commerce and the Semantic Web”, Springer, 2004. 3. Grigoris Antoniou, Frank van Harmelen, “A Semantic Web Primer (Cooperative Information Systems)”, The MIT Press, 2004. 4. Alexander Maedche, “Ontology Learning for the Semantic Web”, Springer, 2002. 5. John Davies, Dieter Fensel, Frank Van Harmelen, “Towards the Semantic Web: Ontology –Driven Knowledge Management”, John Wiley, 2003. 6. John Davies, Rudi Studer, Paul Warren, “Semantic Web Technologies: Trends and Research in Ontology-based Systems”, Wiley, 2006. | |

| Programme: M.Sc Computer Science | | SEM | III |
|---|---|--------------|----------------|
| Course Code | ELECTIVE – III: B. ETHICAL HACKING & CYBER FORENSICS | Hours | Credits |
| MCS374B | | 4 | 3 |
| Learning Objectives | The Course aims to <ul style="list-style-type: none"> • To understand the hacking techniques of computer forensics. • To learn about data recovery methods. • To know about threats and vulnerabilities • To identify the threats in computer forensics. | | |

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| | <ul style="list-style-type: none"> To get knowledge on data recovery | | | | | | | | |
| Blueprint of the Theory Course | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions in each Section |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | ANSWER ALL | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | EITHER OR TYPE | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | ANY THREE | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| TOTAL NUMBER OF QUESTIONS | | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | ETHICAL HACKING Foundation for Ethical Hacking-Ethical Hacking in Motion-Hacking Network Hosts-Hacking Operating Systems-Hacking Applications. | | | | | | | | 13 |
| II | TYPES OF COMPUTER FORENSICS Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services. | | | | | | | | 17 |
| III | DATA RECOVERY Data Recovery – Evidence Collection and Data Seizure – Duplication and Preservation of Digital Evidence – Computer Image Verification and Authentication | | | | | | | | 10 |
| IV | ELECTRONIC EVIDENCE Discover of Electronic Evidence – Identification of Data – Reconstructing Past Events – Networks. | | | | | | | | 10 |

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| V | <p>THREATS</p> <p>Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies.</p> | 10 |
| Teaching Resources | <p>i. References</p> <ol style="list-style-type: none"> 1. John R. Vacca, “Computer Forensics”, Firewall Media, 2004. 2. Kevin Beaver, “Hacking For Dummies”, John Wiley & Sons, 2012. 3. Chad Steel, “Windows Forensics”, Wiley India, 2006. 4. Majid Yar, “Cybercrime and Society”, Sage Publications, 2006. 5. Robert M Slade, “Software Forensics”, Tata McGrawHill, 2004. <p>ii. Web References</p> <ol style="list-style-type: none"> 1. https://tell.colvee.org/course/view.php?id=14 | |

| Programme: M.Sc Computer Science | | | SEM | III | | | | | |
|---|---|------------------------|--------------|---------------------------------|----------------|-----------------|----------------|---------------|--|
| Course Code | ELECTIVE – III: C. CLOUD COMPUTING | | Hours | Credits | | | | | |
| MCS374C | | | 4 | 3 | | | | | |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To introduce the broad perspective of cloud architecture and model. • To understand the concept of Virtualization and design of cloud Services • To be familiar with the lead players in cloud. • To understand the features of cloud simulator • To apply different cloud programming model as per need. • To learn to design the trusted cloud Computing system | | | | | | | | |
| Blueprint of the Theory Course | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions in each Section |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |

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| | A | ANSWER ALL | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | EITHER OR TYPE | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | ANY THREE | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| | TOTAL NUMBER OF QUESTIONS | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | INTRODUCTION TO CLOUD COMPUTING Introduction - Characteristics - Cloud Models - Cloud Services Examples- Cloud Based Services & Applications - Cloud concepts and Technologies – Virtualization – types - Pros and Cons. | | | | | | | | 13 |
| II | CLOUD SERVICES AND PLATFORMS Compute Service - Storage Services - Cloud Database Services - Application Services - Content Delivery Services - Analytics Services - Deployment And Management Service - Identity And Access Management Services - Open Source Private Cloud Software-Virtualization- Characteristics- taxonomy- types- Pros and Cons. | | | | | | | | 17 |
| III | CLOUD APPLICATION DESIGN AND DEVELOPMENT Design considerations for cloud applications- Reference Architecture for Cloud Applications- Cloud Application Design Methodologies - Data Storage Approaches- Development in Python: Design Approaches. | | | | | | | | 10 |
| IV | MULTIMEDIA CLOUD, APPLICATION BENCHMARKING & TUNING Introduction- streaming protocols- Cloud Application Benchmarking and Tuning: Introduction- workload characteristics- application performance metrics- Benchmarking methodology and tools- deployment prototyping. | | | | | | | | 10 |
| V | CLOUD SECURITY AND APPLICATIONS Cloud Security: CSA Cloud Security Architecture - Authentication - Authorization - Identity and Access management - Data Security - Key | | | | | | | | 10 |

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| | Management- Auditing- Cloud for Healthcare- Energy Systems- Transportation Systems- Manufacturing Industry- Education. | |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. ArshdeepBahga, Vijay Madiseti, “Cloud Computing: A Hands – On Approach” Universities press (India) Pvt. limited 2016. 2. Buyya, Vecciola and Selvi, Mastering Cloud Computing: Foundations and Applications Programming, Tata McGraw Hill, 2013. <p>ii. References</p> <ol style="list-style-type: none"> 1. Rittinghouse and Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2016. 2. Michael Miller “Cloud Computing Web based application that change the way you work and collaborate online”. Pearson edition, 2008. 3. Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More, Jones & Bartlett Learning, 2012. <p>iii. Web References</p> <ol style="list-style-type: none"> 1. www.thecloudtutorial.com/ 2. https://www.tutorialspoint.com/cloud_computing/ 3. www.javatpoint.com/cloud-computing-tutorial 4. https://www.lynda.com/Cloud-Computing-training-tutorials/1385-0.html 5. https://www.siteground.com/tutorials/cloud/cloud_computing.htm | |

| Programme: M.Sc Computer Science | | SEM | III |
|----------------------------------|---|--------------|----------------|
| Course Code | PRACTICAL - VII: DESIGN AND ANALYSIS OF ALGORITHMS | Hours | Credits |
| MCS375P | | 2 | 2 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To prove the correctness and analyze the running time of the basic algorithms for those classic problems. • To understand the basic knowledge of algorithm design and its implementation. | | |

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|--|--|------------------------|--------------|-----------------------------|
| | <ul style="list-style-type: none"> To learn the key techniques of Divide-and-Conquer and Greedy Method. To recognize the concept of Dynamic Programming and its algorithms To familiarize with Backtracking algorithms. To understand Branch and Bound techniques for designing and analyzing algorithms. | | | |
| Blueprint of the Practical Course | Section | Type and Choice | Marks | Questions in Section |
| | A (Exercise 1 – 5) | EITHER OR TYPE | 20 | 1 Pair |
| | B (Exercise 6 – 10) | EITHER OR TYPE | 20 | 1 Pair |
| | TOTAL NUMBER OF QUESTIONS | | | 2 |
| PART | CONTENTS | | | HOURS |
| | <ol style="list-style-type: none"> Divide and Conquer with Recursive Function Divide and Conquer with Non-Recursive Function Strassen’s Matrix Multiplication Greedy Method Dynamic programming Shortest path problems Travelling sales person problem Back tracking- N-Queen problem, Graph Coloring Sum of subsets, Hamiltonian problem Modular Arithmetic&Bin Packing | | | 30 |

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| Programme: M.Sc Computer Science | | SEM | III |
| Course Code | PRACTICAL - VI: MOBILE APPLICATIONS | Hours | Credits |
| MCS376P | | 2 | 2 |
| Learning Objectives | The Course aims to <ul style="list-style-type: none"> To understand the mobile application development To interpret the working process of Activities and Fragments To Develop mobile application using Telephony | | |

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|---|---|------------------------------------|--------------|-----------------------------|
| | <ul style="list-style-type: none"> To create a mobile application using SMS manager To develop the mobile application | | | |
| Blueprint of the Practical Courses | Section | Description Type and Choice | Marks | Questions in Section |
| | A (Exercise 1 – 5) | EITHER OR TYPE | 20 | 1 Pair |
| | B (Exercise 6 – 10) | EITHER OR TYPE | 20 | 1 Pair |
| | TOTAL NUMBER OF QUESTIONS | | | 2 |
| UNIT | CONTENTS | | | HOURS |
| I | <ol style="list-style-type: none"> Simple Android Application. Working with Activity, Working with Fragments UI Controls (Text, Edit Text, Button, Radio Button, Check Box, and Layout) UI Controls (Image Button, Toggle Button, Rating Bar, List View, Gallery) Working with Image Views (Gallery View, Grid View) Working with Image Views (Image Switcher View, Context Menu for Image View) CRUD Operations Using SQLite DB Emailing Telephony SMS | | | 30 |

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| Programme: M.Sc Computer Science | | SEM | III |
| Course Code | CAREER BUILDING SKILLS | Hours | Credits |
| MCS378S | | 2 | 0 |

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| Learning Objectives | The Course aims to <ul style="list-style-type: none"> • Today’s world is all about relationship, communication and presenting oneself, one’s ideas and the company in the most positive and impactful way. • This course intends to enable students to achieve excellence in both personal and professional life. | |
| UNIT | CONTENTS | HOURS |
| | <p>Unit - I: Attitude and Altitude, Lateral Thinking, Time is Money</p> <p>Unit - II: Leaders are Born or Made - Team Building.</p> <p>Unit - III: Inter-Personal Skills, Business Communication in English</p> <p>Unit - IV: Presentation Skills, Business Correspondence, Self yourself</p> <p>Unit - V: Interviews, Group Dynamics, Internet for Job Seekers</p> | 30 |
| Teaching Resources | <p>i. Textbook</p> <ol style="list-style-type: none"> 1. Prof.G.Ravindran, Prof.S.Papu Benjamin Elango, Dr.L.Arockiam “SUCCESS THROUGH SOFT SKILLS”, Institute For Communication and Technology, Tiruchirappalli-620 003. <p>ii. References</p> <ol style="list-style-type: none"> 1. Shiv Khera, “You Can Win” – Macmillan Books – 2003 Revised Edition, 2. Stephen Covey, “7 Habits of highly effective people “ 3. Dr R L Bhatia, “Managing Time for a competitive edge”. 4. Robert Heller, “Effective leadership”, Essential Managers DK publishers. 5. Newstrom, Keith Davis, “Organizational Behavior”, Tata McGraw Hill. <p>iii. Web References</p> <ol style="list-style-type: none"> 1. http://jobsearch.about.com/b/2014/01/27/top-7-most-important-soft-skills.htm 2. http://www.slideshare.net/Rahulkunwar/soft-skill-training 3. http://www.wikihow.com/Develop-Interpersonal-Skills | |

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| Programme: M.Sc Computer Science | | SEM | III |
| Course Code | INDUSTRIAL PLANT TRAINING | Hours | Credits |
| MCS379S | | | 2 |

REGULATIONS

1. Students need to undergo an industrial training during the summer vacation after the completion of the first year.
2. The duration of the training programme can be four weeks.
3. Requisition for a bonafide certificate can be arranged through a coordinator designated by the department for the IPT course.
4. On applying for industrial training the student has to submit review form along with industrial training acceptance letter from the respective company to the department industrial training Coordinator.
5. On completion of the training the student has to submit a report at the time fixed by the department.
6. The report will be evaluated by a committee of one internal faculty and a supervisor of the department.
7. The student has to make an oral presentation for about 15 minutes including question and answer sessions.
8. There is no external examination.
9. Viva-Voce will be conducted at the end of the III semester by two internal faculty members.

Evaluation

Evaluation of the IPT Report -80 Marks

- i. First Week Report- 15 Marks
- ii. Second Week Report- 15 Marks
- iii. Third Week Report- 15 Marks
- iv. Presentation - 15 Marks
- v. Documentation - 20 Marks

Viva-Voce -20 Marks

Total - 100 Marks

| Programme: M.Sc Computer Science | | | | SEM | IV | | | | |
|--|--|------------------------|--------------|---------------------------------|----------------|-----------------|----------------|---------------|------------------------|
| Course Code | BIG DATA ANALYTICS | | | Hours | Credits | | | | |
| MCS470T | | | | 4 | 3 | | | | |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To understand the needs for Big Data and its environments. To learn the basic requirements of Big Data Technologies. To expose the knowledge of MapReduce programming framework (Hadoop). To be familiar with NoSQL DB's Cassandra and MongoDB To understand Hive and Pig technologies for analyzing the Big Data. | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | HOURS | | | | |
| I | <p>TYPES OF DIGITAL DATA AND BIG DATA</p> <p>Classification of Digital Data - Characteristics of Data - Evolution of Big Data - Definition of Big Data - Challenges with Big Data - Big Data Definition - Other Characteristics of Data Definitional Traits of Big Data – Need of Big Data - Information Consumer vs Produce Information -Traditional Business Intelligence (BI) versus Big Data - A Typical Data Warehouse Environment - A Typical Hadoop Environment.</p> | | | | 10 | | | | |

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| <p align="center">II</p> | <p>BIG DATA ANALYTICS AND TECHNOLOGY LANDSCAPE</p> <p>Classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Top Challenges Facing Big Data - Data Science - Data Scientist - Terminologies Used in Big Data Environments- Basically Available Soft State Eventual Consistency (BASE) - Few Top Analytics Tools; NoSQL (Not OnlySQL).</p> | <p align="center">10</p> |
| <p align="center">III</p> | <p>HADOOP AND MAPREDUCE PROGRAMMING</p> <p>Introducing Hadoop - RDBMS versus Hadoop - Distributed Computing Challenges - History of Hadoop - Hadoop Overview - Use Case of Hadoop - Hadoop Distributors - HDFS (Hadoop Distributed File System) - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator) - Interacting with Hadoop Ecosystem - Mapper - Reducer - Combiner - Partitioner.</p> | <p align="center">15</p> |
| <p align="center">IV</p> | <p>MONGODB AND CASSANDRA</p> <p>Terms Used in RDBMS and MongoDB - Data Types in MongoDB - MongoDB Query Language; Introduction to Cassandra - Apache Cassandra - An Introduction - Features of Cassandra - CQL Data Types - CQLSH - Keyspaces - CRUD (Create, Read, Update and Delete) Operations - Collections - Using a Counter - Time to Live (TTL) - Alter Commands Import and Export – Querying System Tables.</p> | <p align="center">10</p> |
| <p align="center">V</p> | <p>HIVE AND PIG</p> <p>Hive Architecture - Hive Data Types - Hive File Format - Hive Query Language (HQL) - RCFile Implementation - SerDe - User-Defined Function (UDF) ; The Anatomy of Pig - Pig on Hadoop - Data Types in Pig - Running Pig - Execution Modes of Pig - Relational Operators - Pig versus Hive.</p> | <p align="center">15</p> |
| <p>Teaching Resources</p> | <p>i. Textbook</p> <p>1. Seema Acharya and SubhashiniChellappan, “Big Data and Analytics”, Wiley Publication.</p> <p>ii. References</p> | |

1. SoumendraMohanty, MadhuJagadeesh, and HarshaSrivatsa, “Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics”, Apress Publication. ‘Bid Data Now 2012 Edition’, O’Reilly, First Edition, 2012

2. Paul Zikopoulos, Thomas Deutsch, Dirk Deroos, David Corrigan, Krishnan Parasuraman and James Giles, “Harness the power of Big Data”, McGrawHill, 2013

iii. Web References

(i) Online Tutorial

- https://www.tutorialspoint.com/big_data_analytics/index.htm
- <https://www.javatpoint.com/what-is-big-data>
- <https://www.codersarts.com/post/apache-hive>
- <https://www.tutorialspoint.com/hive/index.htm>

(ii) Online Compiler

- <https://onecompiler.com/cassandra>
- <https://www.sololearn.com/compiler-playground/cyxZGXwMQS9E/>

(iii) Online Quiz

- <https://www.freshersnow.com/big-data-analytics-quiz/>
- <https://quizizz.com/admin/quiz/5e9eb74058b230001b788f98/big-data-analytics-quiz-based-on-unit-1-and-2>
- <https://www.interviewbit.com/big-data-mcq/>

| Programme: M.Sc Computer Science | | | | SEM | IV | | | | |
|-------------------------------------|---|------------------------|--------------|---------------------------------|----------------|-----------------|------------------------|----------------|---------------|
| Course Code | DATA SCIENCE WITH PYTHON | | | Hours | Credits | | | | |
| MCS471T | | | | 5 | 3 | | | | |
| Learning Objectives | The Course aims to | | | | | | | | |
| | <ul style="list-style-type: none"> To know the fundamental algorithmic ideas to process data. To learn to apply hypotheses and data into actionable predictions. To document and transfer the results and effectively communicate the findings using visualization techniques. To employ the Map reduce technique | | | | | | | | |
| Blueprint of the Programming | Section | Type and Choice | Marks | Number of Questions from | | | Total Questions | | |
| | | | | Unit I | Unit II | Unit III | | Unit IV | Unit V |
| | A | ANSWER | 2 | 2 | 2 | 2 | 2 | 2 | 10 |

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|---------------|--|-------------------------------|----|------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------|
| Course | ALL | | | | | | | | |
| | B | EITHER OR TYPE | 7 | Theory or Theory | Theory or Program | Theory or Program | Program or Program | Program or Program | 5 Pairs |
| | C | ANY THREE | 15 | Theory | Theory or Program | Program | Program | Theory or Program | 5 |
| | TOTAL NUMBER OF QUESTIONS | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | | | | | HOURS |
| I | INTRODUCTION TO DATA SCIENCE Python for Data Analysis - Essential Python Libraries – Installation and setup python basics: The python Interpreter- Ipython Basics- Data Structure and Sequences: Tuple – list. | | | | | | | | 13 |
| II | NUMPY AND UNIVERSAL FUNCTIONS NumPy Basics: Arrays and Vectorized Computation -The NumPyndarray: A Multidimensional Array Object - Universal Functions: Fast Element-wise Array Functions - File Input and Output with Arrays - Linear Algebra - Random Number Generation. | | | | | | | | 17 |
| III | PANDAS Getting started with pandas: Introduction to pandas Data Structures - Essential Functionality - Summarizing and Computing Descriptive Statistics - Handling Missing Data -Hierarchical Indexing - Other pandas Topics. | | | | | | | | 14 |
| IV | DATA LOADING, STORAGE, AND FILE FORMATS Reading and Writing Data in Text Format - Binary Data Formats - Interacting with HTML and Web APIs - Interacting with Databases - Data Wrangling: Clean, Transform, Merge, Reshape. | | | | | | | | 16 |
| V | PLOTTING AND VISUALIZATION | | | | | | | | 15 |

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|---------------------------|--|--------------|----------------|
| | Plotting and Visualization: A Brief matplotlib API Primer - Plotting Functions in pandas -Python Visualization Tool Ecosystem - Time Series. | | |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. Wes McKinney, “Python for Data Analysis”, Published by O’Reilly Media, 2012. 2. Jake Vander Plas, “Python Data Science Handbook”, O’Reilly Media Publishers, 2016. 3. Curtis Miller, “Hands-On Data Analysis with NumPy and Pandas”, Packt Publications, June 2018. <p>ii. References</p> <ol style="list-style-type: none"> 1. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”, 2013. 2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, “Practical Data Science Cookbook”, Packt Publishing Ltd., 2014. 3. Nathan Yau, “Visualize This: The Flowing Data Guide to Design, Visualization, and 4. Statistics”, Wiley, 2011. 5. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015. 6. 1. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/) 2. Guido van Rossum and Fred L. Drake Jr, “An Introduction to Python - Revised and Updated for Python 3.2”, Network Theory Ltd., 2011.http://www.network-theory.co.uk/docs/pytut/) <p>iii. Web References</p> <ol style="list-style-type: none"> 1. http://www.johndcook.com/R_language_for_programmers.html 2. http://bigdatauniversity.com/ 3. http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction 4. https://www.datacamp.com/ 5. https://www.dataquest.io/ | | |
| | Programme: M.Sc Computer Science | | SEM |
| Course Code | MACHINE LEARNING | Hours | Credits |

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|--|--|------------------------|--------------|---------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------------------|
| MCS472T | | | | | | | | 5 | 3 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To recognize and implement various ways of selecting suitable model parameters for different machine learning techniques To select and implement machine learning techniques and computing environment that are suitable for the applications under consideration. To solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues. To analyze and design a real world problem for implementation and understand the dynamic behavior of a system. | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | | Unit I | Unit II | Unit III | Unit IV | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | Theory or Theory | Theory or Program | Theory or Program | Program or Program | Program or Program | 5 Pairs |
| | C | Any Three | 15 | Theory | Theory or Program | Program | Program | Theory or Program | 5 |
| Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 | |
| UNIT | CONTENTS | | | | | | | HOURS | |
| I | <p>INTRODUCTION TO MACHINE LEARNING</p> <p>Learning Systems- Goals and Applications- Aspects of developing a learning system- Training data- Linear Perceptrons as Neurons- Neural Nets- Working- Layers- Activation Functions- Feed Forward Neural Networks- Limitations- DBNs- Deep learning for Bigdata- Local minima- rearranging neurons- Spurious local minima- Comparison of AI- Machine learning & Deep learning.</p> | | | | | | | 15 | |

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| <p style="text-align: center;">II</p> | <p>TYPES OF LEARNING</p> <p>Supervised Learning- Unsupervised Learning- Case Study- Classification- MLP in Practice- Overfitting-Linear and non-linear discriminative- decision trees- Probabilistic- K-nearest neighbor learning algorithm- curse of dimensionality.</p> | <p style="text-align: center;">15</p> |
| <p style="text-align: center;">III</p> | <p>LEARNING ALGORITHMS</p> <p>Logistic Regression- Perceptron- Exponential Family- Generative Learning algorithms- Gaussian Discriminant Analysis- Naïve Bayes- SVM-Kernels- Model Selection- Bagging- Boosting- Evaluating and debugging- Classification errors.</p> | <p style="text-align: center;">15</p> |
| <p style="text-align: center;">IV</p> | <p>UNSUPERVISED AND LEARNING ALGORITHMS</p> <p>Clustering- K-means Clustering- EM algorithm- Mixture of Gaussians- Factor Analysis- Principal and Independent Component Analysis- latent Semantic Indexing- Spectral or sub-space clustering.</p> | <p style="text-align: center;">15</p> |
| <p style="text-align: center;">V</p> | <p>REINFORCEMENT LEARNING, IOT AND MACHINE LEARNING</p> <p>Markov Decision Processes- Bellman Equations- Value Iteration and Policy Iteration- Linear quadratic regulation- LQG Q-Learning- Policy versus value learning- POMDPs- IoT- Recent trends- various models. Case Study: Object Detection and smudging using gradient Descent, Spam Filtering based on Text Classification.</p> | <p style="text-align: center;">15</p> |
| <p style="text-align: center;">Teaching Resources</p> | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. Rajiv Chopra, "Machine Learning", Khanna Publications, New Delhi, 2018. 2. V.K. Jain, "Machine Learning", Khanna Publications, New Delhi, 2018 <p>ii. References</p> <ol style="list-style-type: none"> 1. Gareth James, Daniela Witten, Trevor Hastie, "Introduction to Statistical Learning", Robert Tibshirani, Springer, 2013. 2. Richard Duda, Peter Hart, David Stork, "Pattern Classification", 2nd Ed., John Wiley & Sons, 2001. 3. Christopher Bishop, "Pattern Recognition and Machine Learning", Springer 2006. <p>iii. Web References</p> <p style="padding-left: 40px;">(i) Online Tutorial</p> <ol style="list-style-type: none"> 1. https://www.datacamp.com/courses/introduction-to-machine-learning-with- r | |

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| | <p>2. https://elitedatasience.com/learn-machine-learning</p> <p>3. https://www.analyticsvidhya.com/learning-path-learn-machine-learning/</p> |
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| Programme: M.Sc Computer Science | | | | SEM | IV | | | | |
|--|---|------------------------|--------------|---------------------------------|----------------|-----------------|----------------|---------------|------------------------|
| Course Code | ELECTIVE – IV: A. CRYPTOGRAPHY AND NETWORK SECURITY | | | Hours | Credits | | | | |
| MCS473A | | | | 4 | 3 | | | | |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To introduce Classical Encryption techniques To understand the principles of encryption algorithms To have a detailed knowledge about authentication, hash functions and application-level security mechanisms. To introduce Network Security Concepts To understand the System level Security | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | | 4 | 4 | 4 | 4 | 4 | 20 |
| UNIT | CONTENTS | | | | HOURS | | | | |
| I | <p>INTRODUCTION</p> <p>Need for Security – Approaches- Principles- Types of Attacks- Cryptography Techniques: Plain text and Cipher Text – Substitution- Transposition- Encryption and Decryption- Symmetric and Asymmetric Key Cryptography- Steganography- possible attacks.</p> | | | | 15 | | | | |
| II | SYMMETRIC KEY CRYPTOGRAPHIC ALGORITHMS | | | | 10 | | | | |

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| | Algorithm Types and Modes - Overview of Symmetric – Key Cryptography – Data Encryption Standard – International Data Encryption Algorithm (IDEA) – RC4 –RC5- Blowfish – Advanced Encryption Standard (AES). Case Study: Diffie Hellman Key Exchange | |
| III | ASYMMETRIC KEY CRYPTOGRAPHIC ALGORITHMS Introduction and Overview of Asymmetric-Key Cryptography – RSA Algorithm – ElGamal Cryptography – Symmetric – and Asymmetric- Key Cryptography – Digital Signatures – Knapsack Algorithm – Attack on Digital Signatures – Problems with the Public-Key Exchange. | 15 |
| IV | INTERNET-SECURITY PROTOCOLS Basic concepts of IS Protocols – Secure Socket Layer – Transport Layer Security – Secure Hyper Text Transfer Protocol – Secure Electronic Transaction -Email Security – Wireless Application Protocol Security. | 10 |
| V | NETWORK SECURITY, FIREWALLS AND VPN Introduction – Brief introduction to TCP/IP- Firewalls- types of firewalls- Firewall Configurations- Limitations of Firewall- IP Security- Virtual Private Networks- Intrusion: Intruders- Audit Records- Intrusion Detection- Distributed Intrusion Detection- Honeypots. | 10 |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. AtulKahate, "Cryptography and Network Security", Tata McGraw-Hill, Third Edition 2017. 2. William Stallings, "Cryptography and Network Security - Principles and Practices", Prentice Hall of India, Sixth Edition, 2014. 3. Behrouz A Forouzan, "Cryptography and Network Security", Tata McGraw-Hill, Third Edition 2018. <p>ii. References</p> <ol style="list-style-type: none"> 1. AtulKahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003. 2. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001. 3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003. <p>iii. Web References</p> | |

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| | 1. www.tutorialspoint.com/cryptography/ 2. https://www.geeksforgeeks.org/cryptography-introduction/ |
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| Programme: M.Sc Computer Science | | | | SEM | | IV | | | |
|--|--|-----------------|-------|--------------------------|---------|----------|-----------|--------|-----------------|
| Course Code | ELECTIVE – IV: B. SOCIAL NETWORK ANALYSIS | | | Hours | | Credits | | | |
| MCS473B | | | | 4 | | 3 | | | |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To gain knowledge about the current web development and emergence of social web. To study about the modeling, aggregating and knowledge representation of semantic web. To appreciate the use of machine learning approaches for web content mining. To learn about the extraction and mining tools for social networks. To gain knowledge on web personalization and web visualization of social networks. | | | | | | | | |
| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 | |
| UNIT | CONTENTS | | | | | | HOURS | | |
| I | CLUSTERING AND CLASSIFICATION Supervised Learning – Decision tree - Naïve Bayesian Text Classification - Support Vector Machines - Ensemble of Classifiers – Unsupervised Learning – K-means Clustering – Hierarchical Clustering – Partially Supervised Learning – Markov | | | | | | 10 | | |

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| | Models – Probability-Based Clustering – Vector Space Model | |
| II | <p>SOCIAL MEDIA MINING</p> <p>Data Mining Essentials – Data Mining Algorithms - Web Content Mining – Latent semantic Indexing – Automatic Topic Extraction – Opinion Mining and Sentiment Analysis – Document Sentiment Classification</p> | 10 |
| III | <p>EXTRACTION & MINING COMMUNITIES IN WEB SOCIAL NETWORKS</p> <p>Extracting evolution of Web Community from a Series of Web Archive – Detecting Communities in Social Networks – Definition of Community – Evaluating Communities – Methods for Community Detection & Mining – Applications of Community Mining Algorithms – Tools for Detecting Communities – Social Network Infrastructure and Communities – Decentralized Online Social Networks – Multi-Relational Characterization of Dynamic Social Network Communities</p> | 15 |
| IV | <p>HUMAN BEHAVIOR ANALYSIS AND PRIVACY ISSUES</p> <p>Understanding and Predicting Human Behavior for Social Communities – User Data Management, Inference and Distribution – Enabling New Human Experiences – Reality Mining – Context-Awareness – Privacy in Online Social Networks – Trust in Online Environment – Trust Models Based on Subjective Logic – Trust Network Analysis – Trust Transitivity Analysis – Combining Trust and Reputation – Trust Derivation Based on Trust Comparisons – Attack Spectrum and Countermeasures</p> | 10 |
| V | <p>VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS</p> <p>Graph Theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing Online Social Networks – Visualizing Social Networks with Matrix-Based Representations – Node-Link Diagrams – Hybrid Representations – Applications – Covert Networks – Community Welfare – Collaboration Networks</p> | 15 |

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| | – Co-Citation Networks – Recommendation in Social Media: Challenges – Classical Recommendation Algorithms – Recommendation Using Social Context – Evaluating Recommendations | | |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. Peter Mika, “Social networks and the Semantic Web”, Springer, 2007. 2. Borko Furht, “Handbook of Social Network Technologies and Applications”, Springer, 2010. 3. Bing Liu, “Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data (Data- Centric Systems and Applications)”, Springer; Second Edition, 2011. 4. Reza Zafarani, Mohammad Ali Abbasi, Huan Liu, ”Social Media Mining”, Cambridge University Press, 2014. 5. Guandong Xu, Yanchun Zhang and Lin Li, “Web Mining and Social Networking Techniques and applications”, Springer, 2011. 6. Dion Goh and Schubert Foo, “Social information retrieval systems: emerging technologies and Applications for searching the Web effectively”, Idea Group, 2007. <p>ii. Web References</p> <ol style="list-style-type: none"> 1. https://en.wikipedia.org/wiki/Social_network_analysis 2. http://mjdenny.com/workshops/SN_Theory_I.pdf | | |
| Programme: M.Sc Computer Science | | SEM | IV |
| Course Code | ELECTIVE – IV: C. SOFT COMPUTING | Hours | Credits |
| MCS473C | | 4 | 3 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> • To learn the basic concepts of Soft Computing • To become familiar with various techniques like neural networks, genetic algorithms and fuzzy systems. • To apply soft computing techniques to solve problems. • To introduce fuzzy systems and its applications • To impart knowledge on developing hybrid systems | | |

| Blueprint of the Question Paper | Section | Type and Choice | Marks | Number of Questions from | | | | | Total Questions | |
|--|---|-----------------------|-------|--------------------------|------------|-------------|------------|-----------|--------------------|---------|
| | | | | Unit I | Unit II | Unit III | Unit IV | Unit V | | |
| | A | Answer All | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| | B | Either or Type | 7 | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| | C | Any Three | 15 | 1 | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 4 | 20 | |
| UNIT | CONTENTS | | | | | | | | HOURS | |
| I | INTRODUCTION TO SOFT COMPUTING Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network. | | | | | | | | 15 | |
| II | ARTIFICIAL NEURAL NETWORKS Back propagation Neural Networks – Kohonen Neural Network - Learning Vector Quantization -Hamming Neural Network – Hopfield Neural Network- Bi-directional Associative Memory -Adaptive Resonance Theory Neural Networks- Support Vector Machines – Spike Neuron Models. | | | | | | | | 10 | |
| III | FUZZY SYSTEMS Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets – Classical Relations and Fuzzy Relations -Membership Functions - Defuzzification – Fuzzy Arithmetic and Fuzzy Measures -Fuzzy Rule Base and Approximate Reasoning – Introduction to Fuzzy Decision Making. | | | | | | | | 15 | |
| IV | GENETIC ALGORITHMS | | | | | | | | 10 | |

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| | Basic Concepts- Working Principles -Encoding- Fitness Function – Reproduction -Inheritance Operators – Cross Over – Inversion and Deletion -Mutation Operator – Bit-wise Operators -Convergence of Genetic Algorithm. | |
| V | HYBRID SYSTEMS Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination – LR-Type Fuzzy Numbers – Fuzzy Neuron – Fuzzy BP Architecture – Learning in Fuzzy BP- Inference by Fuzzy BP – Fuzzy ArtMap: A Brief Introduction – Soft Computing Tools – GA in Fuzzy Logic Controller Design – Fuzzy Logic Controller | 10 |
| Teaching Resources | <p>i. Textbooks</p> <ol style="list-style-type: none"> 1. N.P.Padhy, S.P.Simon, “Soft Computing with MATLAB Programming”, Oxford University Press, 2015. 2. S.N.Sivanandam ,S.N.Deepa, “Principles of Soft Computing”, Wiley India Pvt. Ltd., 2nd Edition, 2011. 3. S.Rajasekaran, G.A.VijayalakshmiPai, “Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications “, PHI Learning Pvt. Ltd., 2017. <p>ii. References</p> <ol style="list-style-type: none"> 1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, —Neuro-Fuzzy and Soft Computing, Prentice-Hall of India, 2002. 2. KwangH.Lee, —First course on Fuzzy Theory and Applications, Springer, 2005. 3. George J. Klir and Bo Yuan, —Fuzzy Sets and Fuzzy Logic-Theory and Applications, Prentice Hall, 1996. 4. James A. Freeman and David M. Skapura, —Neural Networks Algorithms, Applications, and Programming Techniques, Addison Wesley, 2003. <p>iii. Web References</p> <ol style="list-style-type: none"> 1. https://www.javatpoint.com/what-is-soft-computing 2. https://www.tutorialspoint.com/difference-between-ai-and-soft-computing | |

| Programme: M.Sc Computer Science | | SEM | IV |
|---|--|--------------|----------------|
| Course Code | PRACTICAL – IX: DATASCIENCE WITH PYTHON | Hours | Credits |
| MCS474P | | 2 | 2 |

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|--|--|------------------------|--------------|-----------------------------|
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To know the fundamental algorithmic ideas to process data. To learn to apply hypotheses and data into actionable predictions. To document and transfer the results and effectively communicate the findings using visualization techniques. To employ the Map reduce technique | | | |
| Blueprint of the Practical Course | Section | Type and Choice | Marks | Questions in Section |
| | A (Exercise 1 – 5) | EITHER OR TYPE | 20 | 1 Pair |
| | B (Exercise 6 – 10) | EITHER OR TYPE | 20 | 1 Pair |
| | TOTAL NUMBER OF QUESTIONS | | | 2 |
| PART | CONTENTS | | | HOURS |
| | <p>1. NumPy</p> <ul style="list-style-type: none"> i. Computation on NumPy Arrays: Universal Functions ii. Aggregations: Min, Max, and Everything in Between iii. Computation on Arrays: Broadcasting iv. Comparisons, Masks, and Boolean Logic v. Fancy Indexing vi. Sorting Arrays vii. Structured Data: NumPy's Structured Arrays <p>2. Data Manipulation with Pandas</p> <ul style="list-style-type: none"> i. Data Indexing and Selection ii. Operating on Data in Pandas iii. Handling Missing Data iv. Hierarchical Indexing v. Combining Datasets: Concat and Append vi. Combining Datasets: Merge and Join vii. Aggregation and Grouping viii. Pivot Tables ix. Vectorized String Operations x. Working with Time Series | | | 30 |

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| | xi.High-Performance Pandas: eval() and query() 3. Visualization with Matplotlib i.Simple Line Plots ii.Simple Scatter Plots iii.Visualizing Errors iv.Density and Contour Plots v.Histograms, Binnings, and Density vi.Customizing Plot Legends vii.Customizing Colorbars viii.Multiple Subplots ix.Text and Annotation x.Customizing Ticks xi.Customizing Matplotlib: Configurations and Stylesheets xii.Three-Dimensional Plotting in Matplotlib xiii.Geographic Data with Basemap xiv.Visualization with Seaborn 4. Data Analysis using Numpy, pandas, matplotlib and seaborn(.csv, .txt etc.) | |
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| Programme: M.Sc Computer Science | | SEM | IV |
|---|--|--------------|----------------|
| Course Code | PRACTICAL - X: MACHINE LEARNING | Hours | Credits |
| MCS475P | | 2 | 2 |
| Learning Objectives | The Course aims to <ul style="list-style-type: none"> • To recognize and implement various ways of selecting suitable model parameters for different machine learning techniques • To select and implement machine learning techniques • To analyze and design a real world problems for implementation and understand the dynamic behavior of a system • To evaluate and interpret the results of the algorithms | | |

| Blueprint of the Practical Courses | Section | Type and Choice | Marks | Questions in Section |
|------------------------------------|--|-----------------------|----------|----------------------|
| | A (Exercise 1 – 4) | EITHER OR TYPE | 20 Marks | 1 Pair |
| | B (Exercise 5 – 8) | EITHER OR TYPE | 20 Marks | 1 Pair |
| | TOTAL NUMBER OF QUESTIONS | | | 2 |
| UNIT | CONTENTS | | | HOURS |
| I | 1. Decision Tree Algorithm 2. K-nearest neighbor learning algorithm 3. K-means clustering 4. Expectation Maximization algorithm 5. Principal Component Analysis 6. Independent Component Analysis 7. Latent Semantic Indexing 8. Spectral or Sub Space Clustering | | | 30 |

| Programme: M.Sc Computer Science | | SEM | III & IV |
|----------------------------------|--|----------|----------|
| Course Code | SOFTWARE PROJECT I & II | Hours | Credits |
| MCS377J MCS476J | | 4 | 3 |
| Learning Objectives | The Course aims to <ul style="list-style-type: none"> To examine fundamental XML technology To understand the use of JSON To gain an understanding about the role of web services in commercial applications To learn the emerging standard protocols like SOAP, WSDL and UDDI. To introduce the role of web services in CMS | | |

Regulations for third semester

- The Project work is carried out in a team; each team consists of maximum two members.
- Each team has to select an exclusive problem and the team has to develop an application to provide the solution to the problem.
- Each student in a team has to deal with a specific area in the problem and submit the report separately.
- Faculty members assigned to each group shall supervise the progress of the software project.
- After finalizing software project title with the guide, change of title is not allowed.
- The phases of the software project are project management, requirement analysis, design, implementation and testing.
- The report shall be in A4- size paper and in original. However, photocopies are accepted for reports and forms only.
- Plagiarism, when detected will result in zero marks, without the possibility for submission.
- In the course of the project development, each student must have regular consultations with the Guide. The consultation is meant to review the candidate's progress, besides advising on any project issues. A minimum of five consultations throughout the whole software project is essential to accept a software project for evaluation.
- During each consultation, the candidate must submit the intermediate deliverables to the guide for review. The deliverables will be assessed and marks will be allocated during the software project presentation. Each Consultation Report must reflect the detailed tasks completed for the week, problems encountered in the course of the software project and how he/she resolved them and the plan for the next phase.
- A copy of the software project report is to be submitted by the prescribed time announced by the department.
- A student shall be declared to be successful in the project if he/she secures 50% or above in the semester examinations and 50% or above in the aggregate of CIA & Semester examinations. If a candidate fails, he/she has to improve his/her software project and re-submit in the following year.
- Viva Voce is compulsory for all the candidates who have submitted the software project. If a candidate is absent for viva-voce then his/her absence is treated as absent for the semester examination.

Evaluation

The software project will be evaluated on the following components.

CA - 50 Marks

| 1. | First Review | 25 Marks |
|----|---|----------|
| | First Review should cover the following artifacts | |
| | 3. Requirement analysis | |
| | 4. Design | |

HOURS

| | | |
|-----------|--|-----------------|
| 2. | Second Review | 25 Marks |
| | Second Review should cover the following artifacts | |
| | 3. Implementation | |
| | 4. Testing | |

Semester Examination - 50 Marks

3. Evaluation of Project Work 40 Marks

- a. Software - 20 Marks
- b. Testing - 10 Marks
- c. Documentation - 10 Marks

4. Viva – Voce 10 Marks.

- The semester evaluation is carried out by the external and internal examiner individually. The average of both evaluations is awarded as the final mark for software project.

15.2 Regulations for the Final Semester

- A Coordinator will be appointed by the Head of the Department to coordinate the software project.
- Internal guides from the department will be assigned to the students.
- The software project shall be an independent one. Combined projects are not allowed.
- After finalizing software project title with the guide, change of title is not allowed.
- The phases of the software project are project management, requirement analysis, design, implementation and testing.
- Plagiarism, when detected will result in zero marks, without the possibility for submission.
- In the course of the project development, each student must have regular consultations with the Guide. The consultation is meant to review the candidate's progress, besides advising on any project issues. A minimum of five consultations throughout the whole software project is essential to accept a software project for evaluation.
- During each consultation, the candidate must submit the intermediate deliverables to the guide for review. The deliverables will be assessed and marks will be allocated during the software project presentation. Each Consultation Report must reflect the detailed tasks completed for the week, problems encountered in the course of the software project and how he/she resolved them and the plan for the next phase.
- A copy of the software project report is to be submitted by the prescribed time announced by the department.

- Two Reviews will be conducted before the Final Viva-Voce.
- The report shall be in A4- size paper and in original. However, photocopies are accepted for reports and forms only.
- Two copies of the project report to be submitted at prescribed time announced by the department.
- A student shall be declared to be successful in the project if the candidate secures 50% or above in the Examination and 50% or above in the aggregate of CA and Semester Examination. If a candidate fails he/she has to improve their project work and re-submit in the following even semester.
- Viva-Voce is compulsory for all the candidates who have submitted the project work. If a candidate is absent for viva voce, and then his absence will be treated as absence for the semester examinations.

Evaluation

The Software Project work will be evaluated on the following components.

CA - 50 Marks

| | | |
|-----------|---|-----------------|
| 1. | First Review | 25 Marks |
| | First Review should cover the following artifacts 3. Requirement analysis 4. Design | |
| 2. | Second Review | 25 Marks |
| | Second Review should cover the following artifacts 3. Implementation 4. Testing | |

Semester Examination - 50 Marks

3. Evaluation of Project Work 40 Marks.

- Software - 20 Marks
- Testing - 10 Marks
- Documentation - 10 Marks

4. Viva – Voce 10 Marks

- Two examiners will evaluate the project work report separately and the average is calculated as a final mark for the Semester examination

Template for Software Project

| Project Area | Work products |
|---|--|
| Project Management | <ul style="list-style-type: none"> • Project Proposal |
| | <ul style="list-style-type: none"> • Project Plan |
| | Project Review Record-1 |
| Requirements | <ul style="list-style-type: none"> • System Study (SSD) |
| | <ul style="list-style-type: none"> • Vision Document (VSD) |
| | <ul style="list-style-type: none"> • Use-Case Diagram |
| | <ul style="list-style-type: none"> • Use-Case Specification (UCS) |
| | Project Review Record-2 |
| First Review | Draft Report (Combination of all work products) |
| Analysis and Design | <ul style="list-style-type: none"> • Sequence Diagram |
| | <ul style="list-style-type: none"> • Architecture Diagram |
| | <ul style="list-style-type: none"> • Database Design (Table Design, Data integrity & Constraints) |
| | <ul style="list-style-type: none"> • Class Diagram |
| | <ul style="list-style-type: none"> • Component Diagram |
| | <ul style="list-style-type: none"> • Test Case Design |
| | <ul style="list-style-type: none"> • User Interface Design |
| | Project Review Record-3 |
| Mid -Term evaluation (second review) | <ul style="list-style-type: none"> • Draft Report (Combination of all work products) |
| | Project Evaluation Report-1 |
| | <ul style="list-style-type: none"> • Program code |
| | Project Review Record-4 |
| Test | <ul style="list-style-type: none"> • Unit, Integration, System test plan |
| | <ul style="list-style-type: none"> • Test Case Results |
| | Project Review Record-5 |
| Evaluation (Third Review) | Project Report |
| | <ul style="list-style-type: none"> • Project Presentation |
| | <ul style="list-style-type: none"> • Application Demo |

| Programme: M.Sc Computer Science | | SEM | IV |
|---|---|--------------|----------------|
| Course Code | HUMAN RIGHTS | Hours | Credits |
| VE1004 | | | 2 |
| Learning Objectives | The Course aims to <ul style="list-style-type: none"> • To strengthen respect for human rights and fundamental freedoms, • To value human dignity and develop individual self-respect and respect for others | | |

| | <ul style="list-style-type: none"> To develop attitudes and behaviors that will lead to respect for the rights of others. To promote respect, understanding and appreciation of diversity. To empower people towards more active citizenship. To ensure genuine mime gender equality and equal opportunities for women and men. | |
|------|---|-------|
| UNIT | CONTENTS | HOURS |
| I | United Nations and Human Rights. | 6 |
| II | Protection of Human Rights Act, 1993. | 6 |
| III | Rights to Information Act | 6 |
| IV | The Right to Education | 6 |
| V | The Rights of Women | 6 |

| Programme: M.Sc Computer Science | | SEM | IV |
|---|---|-------|--------------|
| Course Code | RESEARCH INVESTIGATION | Hours | Credits |
| MCS477S | | | 2 |
| Learning Objectives | <p>The Course aims to</p> <ul style="list-style-type: none"> To enable the students to choose an area of specialization. To help the students to focus on current research in computer science. To understand the research areas by collecting and reading research papers, analysing qualitative and quantitative aspects by a survey or implementation. | | |
| REGULATIONS | | | HOURS |
| <p>1. The department offers different research domains such as Big Data, Web Services, and Cloud Computing, e-Learning, Open Source Software Technology, Data Mining, Semantic Web, Ontology and Language Technology.</p> <p>2. Students have to join these research groups during their fourth semester.</p> <p>3. Students have to search for the topic in reputed Journals to find problem and</p> | | | |

asked to

30

develop a solution or survey from the collected papers.

4. Students are expected to present the outcome of their experiments and analysis.

5. Students are expected to prepare an individual technical report on the field of their study.

6. Topics for study are given below. The students can choose any one of these topics or

Suggest a relevant topic in consultation with the Research Supervisor. The research areas

are not limited to the below:

a. eLearning

b. Web Services

c. Data Mining

d. Big Data Analytics

e. Software Metrics

f. Cloud Computing

g. Ontology and Semantics

h. Internet of Things

7. The student has to present the research paper as a report and that will be evaluated by a committee of two internal faculty members.

8. The student has to make an oral presentation for about 15 minutes including question and

answer sessions before this committee.

9. There is no external Examination.

Evaluation

Report - 80 Marks

- i. First Phase – Report- 15 Marks
- ii. Presentation - I- 15 Marks
- iii. Second Phase – Report- 15 Marks
- iv. Presentation - II- 15 Marks
- v. Documentation - 20 Marks

| | | |
|------------------|--------------------|--|
| Viva-Voce | - 20 Marks | |
| Total | - 100 Marks | |

MSW

I MSW

SEMESTER – I

CODE: MSW130T

INTRODUCTION TO SOCIAL WORK PROFESSION – Main Core-1

Learning Outcome: *The students will...*

- Gain knowledge about the profession of Social Work
- Understand the different fields of Social Work
- Get exposed to the historical growth and development of Social Work

UNIT - 1: Social Work: Definition, Objectives and Functions. History of Social Work in India, Evolution of social work in the west. Concept of International Social Work. Concepts related to Social Work: Social Service, Social Welfare, Social Policy, Social Security, Social Defence, Social Transformation, Social Justice, Social Reforms, Social Movements, Social Action, Social Development and Social Empowerment.

UNIT - 2: Theories and Models of Social Work: Systems Theory, Psychodynamic Theory, Social Learning Theory and Conflict Theory. Models of Social Work - Problem Solving Model, Cognitive Behaviour Model, Crisis Intervention Model, Integrated social work model, developmental model, empowerment and justice model and radical model. Indigenous models of Social work

UNIT - 3: Social Work as Profession: Nature, Philosophy, Values and Principles. Code of ethics for Indian Social Workers towards clients, colleagues, agency and as professionals. Introduction to Social Work methods. Competencies of Professional Social Workers- International & National Associations of social work – Problems of professionalization in India - Networks in Social Work.

UNIT – 4: Fields of Social Work: Social Work with Community, Medical and Psychiatric Social Work, Industrial Social Work, Social Work with Family and Children, School Social Work, Correctional Social Work, Social Work with Youth, Working with Marginalized Groups, Geriatric Social Work and Social Work in Peace and Non-violence. Ecology & Environment, Disaster & Crisis management, International Social work

UNIT – 5: Indian Social Reformers and their Contribution: Raja Ram Mohan Roy, Sarojini Naidu, EVR Periyar, Gandhiji, Vinobave, Narayana Guru Vallalar and Jyotirao Govindrao Phule. Vallalar, Mehta Padkar- Contemporary Social Reforms in India, Social welfare & Development programs of government of India in relation to SDG

Reference:

1. Bhattacharya, Sanjay. 2008. Social Work Psycho- Social and Health Aspects. Deep and Deep publications. New Delhi.
2. Chowdhry, Paul. 1992. Introduction to Social Work. Atma Ram and Sons. New Delhi.
3. Dean. H. Hepworth, Ronald, H. Rooney, Glenda Dewberry Ronney, Kimberly Strom-Gottfried, Jo Ann Larsen, 2010, Theory and Skills in Social Work, Cengage Learning India Pvt Ltd, New Delhi
4. Elizabeth A. Seyal, 2010 Professional Social Work, Cengage Learning India Pvt Ltd, Delhi
5. Ghanshyam Shah (2004), Social Movements in India a Review of Literature, Sage Publications, New Delhi
6. Godwin Prem Singh J, 2009, Millennium Development Goals, Allied Publishers Pvt. Ltd, Mumbai
7. Higham, Patricia. 2006. Social Work- Introducing Professional Practice. Sage Publications. New Delhi
8. Jane Williams, 2008, Child Law of Social Work British Library Cataloguing in Publication, New Delhi.
9. Shaikh Azhar Iqbal, 2008, Modern Trends in Social Work, Sublime Publication, Jaipur
10. K. Varmi Kanthan, Jyothi Vazhiyil Vallalar, Vanathi Pathipagam, Chennai
11. M.P Gurusamy, 1977, Vallar oru Arimugam, Madurai Kamarajar University, Madurai

SOCIAL WORK PRACTICE WITH INDIVIDUALS (Main Core-2)

I MSW

SEMESTER – I

CODE: MSW131T

Learning Outcome: *The students will...*

- **Gain knowledge about the primary method of social work practice with individuals**
- **Understand the techniques and approaches of social work practice with individuals**
- **Acquire the skill of working with individuals**

UNIT 1: Social Casework- Concept & Definition. Historical development of Social Casework. Objectives of working with individuals. Principles of social casework practice- Individualization, Purposeful expression of feelings, controlled emotional involvement, Acceptance, Non-judgmental attitude, Client self-determination and Confidentiality. Components of Casework (Perlman's model)-Person, Problem, Place and Process.

UNIT 2: Casework Process: Intake: Study: 1. Interviewing (types, purpose, skills, techniques and principles of interviewing), Home visits, Collateral contacts, Referrals 2. Assessment/Social Diagnosis: Use of genograms and ecomaps 3. Treatment/ Intervention, Evaluation, Termination

UNIT 3: Case Worker - Client Relationship: Characteristics of professional relationship: empathy, non-possessive warmth, genuineness and self-disclosure; Obstacles in client worker relationship: Transference, Counter transference and Resistance.

UNIT 4: Techniques in Practice- Ventilation, emotional support, action oriented support, advocacy, environment modification, modeling, role-playing and confrontation. Tools - Observation, listening, communication, rapport building, questioning, giving feedback. Record keeping – Face sheet, Narrative, Process and Summary recording, Principles of Recording. Case presentation as tool of professional development.

UNIT 5: Casework Practice: Approaches and Models - Psycho Social approach, Person Centered Approach, Problem Solving Approach, Crisis Intervention Model and Relevance of an Eclectic model for practice. Working with Individuals in different settings: Educational, Family and Child Welfare, Medical and psychiatric, Correctional and Industrial setting.

Reference

1. Bhattacharya, Sanjay. 2009. Social Case Work Administration and Development. Rawat Publications. New Delhi.
2. Elizabeth A Segal, et.al. 2010. Professional Social Work. Cengage Learning India Pvt. Ltd. India.
3. Helen Harris Pearlman, (1968), Social Casework A Problem Solving Process, The University Of Chicago.
4. Jainendra Kumar Jha (2002), Social Welfare and Social Work, J.L. Kumar for Anmol Publications Pvt. Ltd. New Delhi.
5. Kottles A. Jeffrey, David S., Shepard. 2009. Counseling Theories and Practice. Cengage Learning India Pvt. Ltd. New Delhi.
6. Mamta Sehgal, Nirmala Sherjung (1997), Marital Disputes & Counselling Remedial Measures-Vol 3, APH Publishing Corporation-New Delhi.
7. Mathew, Grace. 1992. An introduction to Social Case Work. Tata Institute of Social Sciences.
8. Mujawar W.R., N.K. Sadar. 2010. Field Work Training in Social Work. Mangalam Publications. New Delhi.
9. Perlman Helan Haris. 2011. Social Case Work – Problem Solving Process. Rawat Publications. India.
10. Philip Burnard (2009) Counselling Skills Training Book Of Activities, Viva Books- New Delhi.
11. Upadhya, R. K. 2010. Social Case Work A Therapeutic Approach. Rawat Publications. New Delhi

SOCIAL WORK PRACTICE WITH GROUPS – Main Core- 3

I MSW

SEMESTER – I

CODE:MSW132T

Learning Outcome: *The students will...*

- **Gain knowledge about the primary method of social work practice with groups**
- **Understand the techniques and approaches of social work practice with groups**
- **Acquire the skill of working with groups**

UNIT 1: Concepts of Social Group Work: Concept of group and its importance of groups in human life cycle; Group is an Instrument of Change; Definition of social group work; Characteristics of social group work; History and development of social group work.

UNIT 2: Group Process and Dynamics group process, group interaction, Leadership and its development in group process, Communication in group- Verbal and non-verbal communication; Group dynamics: - group bond, sub-groups, group conflict, confrontation, apathy and group control; Importance of relationship; Conflict resolution;

UNIT 3: Social Group Work Method & Group Work Process: Values and distinctive principles of Group Work; Types of groups in social group work practice- Group Work Process: Tuckman (1965), and Rogers (1967) model: Forming, Storming, Norming, Performing and Mourning (adjourni). Role of social worker in different stages of group development.

UNIT 4: Use of Programme and recording in Social Group Work: Concept of programme, Principles of programme planning, Importance of programme in group work practice, Programme planning and implementation for group development- Skills for Social Group work - Social group work practice in different settings.

UNIT 5: Evaluation of Group Work & Group Work Lab (Practical) :Importance of recording in group work, Principles of recording, Types of recording- , Techniques of recording –observation, sociogram, interaction diagrams- Bale’s categories of interaction process analysis- Importance of continuous evaluation in group work, Types of evaluation- Methods of evaluation

References:

1. Charles Zastrow H, Msw , Ph.D, 2009, Social Work With Groups, Cengage Learning Publication, Australia
2. Gerald Corey, Marianne Schneider Corey, Patrick Callanan, Michael J. Michael Russell, 1992, Group Techniques, Brooks, And Cole Publication Company Pacific Hrave, California
3. Harlkich Trecker B, 1955, Social Group Work Methods And Principles
4. Ken Heap, 1985, The Practice Of Social Work With Group George Allen And Union Publication Ltd, London
5. Marianne Schneider Corey And Gerald Corey, 1992, Groups Process And Practice, Brooks And Cole Publication Company, California
6. Ronald W, Tosland, 2005, An Introduction To Group Work Practice, Pearson Publication, London, New York
7. Sahu R. K , 2010, Group Dynamics And Team Building, Excel Books, New Delhi
8. Siddiqui , 2008, Group Work Theoretical Practices, Rawat Publication, Jaipur
9. Steven Rose .R , 1998, Group Work With Children And Adolescents, Sage Publications, New Delhi
10. Tom Douglas, 1993, A Theory Of Group Work Practice, Palgrave Macmillan Printing, London.

Tom Douglas, 1976, Group work Practice, Tavistock Publication Ltd, London

SOCIOLOGY FOR SOCIAL WORK PRACTICE (IDC-1) (30 Hours Only)

I MSW

SEMESTER – I

CODE: MSW133T

Learning Outcome: *The students will...*

- **Gain knowledge about the society and its dynamism**
- **Understand the problems of the society**
- **Acquire the skills of working with the society**

Unit 1: Sociology: Meaning and Characteristics of Society, Community, Social Group, Social Association and Social Institution. Social Structure: social Institution – Traditional and emergent, Social Groups – Primary & secondary, Social status and Roles – Ascribed and Achieved. Social stratification : definition, Importance, theories and Forms of social stratification. Social Structure and functions of Social Institutions - marriage, family, kinship, caste, religion and education. Linkages between Sociology & Social Work

Unit 2: Socialization: Concept, Goals, Models, Types – Primary Secondary, Re-socialisation & De-Socialisation, Anticipatory and reverse socialization, Process and agents. Social control: Concept, types (public opinion & propaganda) and functions. Major Agents of Social control: Kinship, Religion, Law, Education, Morality, Traditions folkways, Mores and Customs.

Unit 3: Process of Social Change: Concepts and Definition, Theories of Social change – Structural Functionalist Theory, Conflict Theory, Cyclic Theory, Linear (Evolutionary) Theory and modernization Theory. Urbanization, Industrialization, Westernization, Sanskritisation, Secularization. Resistance to social change-cultural lag and Ethnocentrism.

Unit 4: Social Movements in India: Concept, Definitions and Characteristics, Models – Competition, Cooperation, Conflict, Accommodation, and Assimilation, Process of social movements - Peasant, Tribal, Dalits, Backward Class, Women, Minority groups, Working Class and Student.

Unit 5: Social Problems: Corruption, Malnourishment, Child Abuse, violence against women & Sexual minorities (Transgender) - Human Trafficking, Communalism, Terrorism and environment degradation. Caste/ Religion and domination, Technology based social issues and social media

Reference

1. Abhijit Dasgupta, 2012, On The Margins: Tribes, Castes And Other Social Categories(Fourth), Sage Publications, New Delhi
 2. Anthony Giddens, 1998, Sociology(Third), Polity Press, London
 3. Sachdev D.R. And Vidhya Bhushan, 2006, Introduction To Sociology, Kitab Mahal, Allahabad
 4. Frank N Magill, 1995, International Encyclopedia Of Sociology, British Library, England
 5. Indhira R., 2012, Themes In Sociology Of Education, Sage Publications, New Delhi
 6. Jainendra Kumar Jha, 2002, Basic Principles Of Developmental Sociology, Anmol Publications, New Delhi
 7. Khare R.S., 2006, Caste, Hierarchy, Individualism, Oxford University Press, New Delhi
 8. Mohanty B. B., 2012, Agrarian Change And Mobalization, Sage Publications, New Delhi
 9. Sahu D.R., 2012, Sociology Of Social Movement, Sage Publications, New Delhi
 10. Shanger Rao C. N, 2012, Sociology Principles Of Sociology With An Introduction To Social Thought, S Chand And Company, New Delhi
 11. Surinder S Jodhka, 2012, Changing Caste, Ideology, Identity And Mobility, Sage Publications, New Delhi
- Thara Bhai L., 2012, Indian Sociology Issues and Challenges, Sage Publications, New Delhi.

PSYCHOLOGY FOR SOCIAL WORK PRACTICE (IDC-2) (30 Hours Only)

I MSW

SEMESTER – I

CODE: MSW134T

Learning Outcome: *The students will...*

- Gain basic knowledge on psychology
- Understand the behavior of human beings
- Acquire the skill of using psychological testing tools in dealing with individuals

UNIT 1: **Psychology:** Meaning, Definition, history and fields of psychology - Introduction to Schools of thought: Structuralism and Functionalism, Gestalt Psychology, Behaviorism, Psychoanalysis, Humanistic Psychology, Cognitive Psychology - *Behaviour*-Definition, Factors Influencing Human Behavior: Heredity and Environment - Concepts: Science of mind, Science of behavior- Conscious & Subconscious processes.

UNIT 2: **Psychological Processes in Behavior:** *Perception* - Concept of Perception, Characteristics, process and factors influencing perception Hallucination, Delusion, Illusion, Attitudes, Prejudices, Biases and Stereotyping. Processes of Adjustment & Mal-adjustment. Coping Mechanisms vs. Defense Mechanism. *Attitude:* Definition, Concept, formation of attitudes and attitudinal change *Intelligence:* Concept, theories and assessment. *Motivation:* Meaning, definition, types and characteristics of motives, theories of motivation. *Personality:* Meaning, Definition, types and factors influencing Personality, Theories of Personality. - *Leadership:* Definition, theories of leadership

UNIT 3: **Social Bases of Behavior:** Needs and Motives, Emotions, Cognition, Memory Intelligence, and Learning. Development: concept and principles - Developmental periods: infancy, babyhood, childhood, puberty and adolescence, early adulthood, middle age and old age - Developmental stages and Developmental tasks - Areas of Human Development – Physical, Social, Emotional, Moral and Cognitive development. Theories of Human Development: Freud's Psycho-Sexual theory, Erickson's Psycho-social theory and Cognitive Theory of Jean Piaget

UNIT 4: **Abnormal Psychology:** Concepts of normality and abnormality. Mental Health, characteristics of mentally healthy person, factors influencing mental health – Causes of abnormality – basic information on symptoms, causes and treatment of major and minor mental illnesses. International Classification of Diseases (ICD): Neurosis & Psychosis..

UNIT 5: **Intervention methods:** Relevance of Psychology to Social Work practice - Role of social workers in promoting mental health, Psychological counseling and Psychological Testing: IQ / Achievement Test and Attitude Test- Basic concept of Psychometrics and Testing.

References

1. Abril Lal Mukherjee, 2015, A Textbook Of Cognitive Psychology, Rajat Publications, New Delhi
2. Anuratha Ngangom, 2012, Research Methodology In Psychology, Maxford Books, New Delhi
3. Daine E Papalia And Sally Wendkos Olds And Ruth Duskin Feldman, 2004, Human Development (Ninth), Tata Mcgraw-Hill, New Delhi
4. David F Marks, Michael Murray, Brian Evans And Emeé Vida Estacio, 2011, Health Psychology (Third), Sage Publications, New Delhi
5. Delhinaima Khatoon, 2012, General Psychology, Darling Kinderley, South Asia .
6. Elizabeth B Hurlock, 2009, Development Psychology (Fifth), Tata Mcgraw-Hill, New Delhi
7. Elizabeth B. Hurlock, 2005, Child Development, Tata Mc Graw-Hill Publishing Company Ltd, New Delhi
8. John W Santrock, 2011, Life Span Development (Thirteen), Tata Mcgraw-Hill, New Delhi
9. Lewis R Aiken And Gary Groth-Marnat, 2009, Psychological Testing And Assessment, Dorling Kindersley Pvt. Ltd, New Delhi
10. Margarete Parrish, 2012, Social Work Perspectives On Human Behaviour, Rawat Publications, Jaipur
11. Mohan Kumar, 2014, Dictionary Of Psychology, Aitbs Publishers, Delhi
12. Naima Khatoon, 2012, General Psychology, Dorling Kindersley Pvt Ltd, India
13. Philip Banyard, Mark N.O. Davies, Christian Norman And Belinda Winder, 2012, Essential Psychology, Sage Publications, New Delhi
14. Singh H.D., 2007, Handbook Of Basic Human Physiology, S.Chand And Company Ltd, New Delhi

**THEATRE SKILLS - (Skill Paper -SK 1) (30 Hours
Only) MSW –I SEMESTER –I
CODE:MSW135S**

Learning Objectives: The Students will

....

Gain better understanding theatre fundamentals

Have Personality development through theatre

Have the ability to Create Alternative thoughts and Alternative MAesthetics.

Unit 1: Introduction of Acting: Yoga - Performance skills (Basic) - Physical preparation (Body Language, Body Movement, sign, Expression through body). Body Flexibility through theatre games.- Folk dance and folk instruments.

Unit 2: Mind And Body: See, hear, believe, react, observe and concentrate - Study of the self, the self and others, and self and society - Individuality, Self-Identity, Ideology, Political Awareness - aware of the body, how to use the body, imagination - enter space - Memory.

Unit 3: Voice culture and Rhythm: Introduction to voice and speech - Building voice: Projection and Resonance - Building voice - Vibration and Articulation - Building Voice: All aspects - Building Speech: Exercises and using Elements of speech - Building Speech: Using Dramatic Texts, Story Telling - concentrate on rhythm.

Unit 4: Trust & Modulation and Diction: Trust, Co-ordination, Adaptation, Adjustment, Help - Reading script - Pronunciation, Modulation and Diction. Space and Time- Understanding space - Entering Space – Examine - Understanding time.

Unit 5: Imagination and Improvisation- Physical Actions. Given Circumstances. Scoring an Action. Transitions. Breaking down an Action. Creating Reality. Use of Mime. Emotions and Expressions: Emotion and Expression - Emotion Control.

Referencs

1. Badal Sircar, "The Third Theatre"
2. Lizbeth Goodman (Et.) "The Routhledge Reader in Politics and Performance" Routhledge,
London, 2000.
3. Prasanna, "INDIAN METHOD in ACTING" National School of Drama, 1, Bahawan Das Road,
New Delhi. 2014.

CIA Components for Theatre Skills (100 Marks)

1. Learning Interest (Theatre skills Workshop evaluation): 20 Marks
2. Attendance: 5 Marks
3. Theatre Skills Record: 25 Marks
4. End Semester: Skill Demonstration (Individual - 30 and Group - 20): 50 Marks

**CONCURRENT FIELD WORK – I (Main
Core)**

I MSW SEMESTER – I CODE:MSW136F

Learning Outcome:

- Got exposure with regard to the various settings of social work
- Underwent a group living experience and to understand the living conditions of people
- Acquired the skill in street theatre and folk lore

Field Work Components:

1. Observational Visits -The first year students during the first semester go for observational visits to various settings: Medical & Psychiatric, Rural Community Setting, Slum Visits, Industrial Setting, Correctional Setting and Tribal Setting.
2. Social Work Camp for a week
3. Skill Laboratory Experience in Social Work Methods

The students spend two days in a week and expected to spend a minimum of 15 hours per week in the field for practice based learning.

Every week the students write a report of their activities and submit to the concerned field work supervisor on Mondays. The supervisor conducts individual and group conference regularly.

The CA marks are awarded by the supervisor out of 50 marks for the quality, regularity, initiatives, leadership, participation and team worker.

At the end of the semester Viva Voce is conducted by an external examiner and marks are awarded out of 50.

Internal – Field Work (50 Marks)

Regularity in Record submission : 10

Marks Initiative Taken during the Field Work

: 15 Marks Rural Camp – Participation and

Contribution : 10 Marks Record Quality :

15 Marks

Viva Voce (50 Marks)

| | | |
|--------------------|-------|------------------------------|
| Observation Visits | : | 10 |
| Marks | | |
| : 10 | Marks | Rural Camp |
| : 10 | Marks | Lab Sessions |
| : 10 | Marks | Group Seminar Presentation |
| : | | Presentation & Communication |
| | 10 | Marks |

SOCIAL WORK PRACTICE WITH COMMUNITIES (Main Core-4)

I MSW

SEMESTER – II

CODE: MSW230T

Learning

Outcome:

- Gained knowledge about the primary method of social work practice with communities
- Understood the techniques and approaches of social work practice with communities
- Acquired the skill of working with communities

UNIT 1: Community: Community: Concept, Characteristics and Classification. Community organization: Concept, History, Objectives Principles & Process of community organization - Study and survey, analysis, assessment, discussion, organization, action, reflection, modification, continuation. Similarities and differences between community organization and community development

UNIT 2: Models of community organization: locality Development, social planning, social action, Skills in community organization: Communication, training, consultation, public relations, resource mobilization, liaisoning. Community Organisation as a Para – Political Process – Networking, Conscientisation, Planning and Organising, Roles and Strategies of Social movements

UNIT 3: Methods of community organization: Awareness creation, planning and organizing, education, networking, participation, leadership, community action, legislative and non-legislative actions. Application of community organization in rural, urban, tribal settings and online community organization.

UNIT 4: Social Action in Community Organization: Concept, Purpose and Techniques, Social Action as a method of social work. Approaches to social action – Paulo Friere, Saul Alinsky, Martin Luther King, Ambedkar

UNIT 5: Strategies and Tactics in Social Action: individual contact, conscientization, negotiation, collaborative pressure, advocacy, legal suasion, public relations, political organization, conflict resolution and violence. Contextual usage of strategies- Roles and Responsibilities of social activists.

Reference:

1. Christopher, A.J., and Thomas William. 2006. Community Organization and Social Action.
Himalaya Publications. New Delhi.
2. Cox M. Fred et. al. 2005. Strategies of Community Organization. 4th Edition.
Peacock Publishers. New Delhi.
3. Jainendra Kumar Jha, 2002, Social Work And Community Development, Anmol Publications
Pvt Ltd, New Delhi
4. Johri Pradeep Kumar. 2005. Social Work and Community Development. Anmol Publications
Pvt. Ltd. New Delhi.
5. Kumar Jha Jainendra. 2002. Social Work and Community Development. Anmol Publications
Pvt. Ltd. New Delhi.
6. Kumar Somesh. 2008. Methods for Community Participation. Vistar Publications. New Delhi.
7. Ledwith Margaret. 2005. Community Development. A Critical Approach.
Rawat Publications. New Delhi.
8. Margaret Ledwith, 2005, Community Development, Rawat Publications, Jaipur.
9. Mukundan N. And M.Hilaria Soundari, 2008, Emerging Dimensions In Selp Help Groups, Dominant Publishers And Distributors, New Delhi.
10. N.Lalitha, 2008, Shg's And Micro Finance, Dominant Publishers And Distributors, New Delhi.
11. Pradeep Kumar Johri,2005, Socila Work For Community Development, Anmol Publications
Pvt Ltd, New Delhi.
12. Somesh Kumar, 2008, Methods For Community Participation, Vistaar Publications, New

Delhi.

13. Surendra K.Vettivel, 1992, Community Participation Empowering the Poorest Roles of Ngo's, Vetri Publications, New Delhi.

HUMAN RESOURCE MANAGEMENT (Main Core-5)

I MSW

SEMESTER – II

CODE: MSW231T

Learning Outcome: *The students will...*

- **Gain knowledge about the management of human resources**
- **Understand the programmes and activities of management of human resources**
- **Acquire the skills of working with organized and unorganized human resources**

UNIT 1: Human Resource Management: Introduction to Human Resource Management: Evolution of HRM, Definition, Concept of Management. Managerial and operative function. Personnel Management Vs Human Resource Management. Recent challenges and Trends in HRM

UNIT 2: Human Resource Planning, Selection and Placement: Concept and process of Human Resource planning – Recruitment and selection. Sources of manpower supply: On-Campus, Off-Campus, Referrals, Consultancies, internal Mobility, and Types of outsourcing process. Concept and process of Human Resource planning - Recruitment and selection. Sources of manpower supply: On-Campus, off-Campus, Referrals, Consultancies. Types of Outsourcing (KPO,RPO, BPO etc.). Selection process. Interviewing Techniques and skills. Types of Interview . Job Analysis: Job specification and descriptions, Job classification, Job enrichment and Job evaluation Concept of HR Analytics

UNIT 3: Learning and Development: Induction and Placement; HRD- Concept, Importance of training; Training Needs Analysis, Types of Training. Employee engagement

UNIT 4: Compensation Management: Concept of Wage and Salary – Wage Theories – Types of wages – Wage Board - Wage Components - wage differentials – wage regulators – Incentive Schemes - Fringe Benefits -Employee benefit plans, Rewards and Recognitions.

UNIT 5: Employee Retention, Separation and HR Lab: Attrition and Retention - Concept and Problems. Causes of Job Hopping. Leave Management: Types of Leave. Disciplinary procedures: Concept of Charge Sheet, Domestic enquiry. Grievance Redressal Procedures; Performance Management Systems; Transfers and Promotions. Separation: Discharge, Dismissal, Resignation, Retirement, VRS, Exit Interview; Retirement –Pre retirement Counseling and Benefits.

References

1. Arun Monappa, 2011, Managing Human Resources, Rajiv Beri for Macmillan Publishers India. Ltd, Chennai
2. Aswathappa K, 2011, Human Resource Management ,6 Ed, Tata McGraw Hill Education Pvt Ltd
3. Dr.N. Premavathi, 2011, Human Resource Management and Development,1 Ed, Sri.Vishnu Publications, Chennai.
4. Dwivedi R S, 2012, Text Book of Human Resource Management, Vikas Publishing House Pvt Ltd, New Delhi.
5. Gary Dessler, Biju Varkkey, 2012, Human Resource Management (12thEd.), Dorling Kinderley India Private Ltd
6. Jayant Mukherjee, 2012, Designing Human Resources Management Systems a Leaders Guide, Sage Publications, New Delhi.
7. Lowell H. Lamberton, Leslie Minor, 2012, Human Relations Strategies for Success, 4th Ed, Tata McGraw-Hill Education Pvt.Ltd, New Delhi,
8. Michael J Kavanagh, Mohan Thite, Richard D Johnson, 2012, Human Resource Information System, SAGE Publications India Pvt.Ltd, New Delhi
9. Murton, Inmmam & Osullivan, 2011, Human Resource Management, Great Hodder Education, London
10. Nickwilton,2012, An Introduction to Human Resource Management, Sage Publications India Pvt Ltd.
11. Seetharaman S, B. Venkateswara Prasad, 2012, Human Resource Management, Scitech Publications Pvt Ltd- Chennai
12. Sharma V K, 2013, Human Resource Management, Evolution &The Challenges Ahead, Vinod Vasishtha for Viva Books Pvt. Ltd, New Delhi
13. Tanuja Agarwala, 2013, Strategic Human Resource Management, Oxford University Press, New Delhi.
14. V K Sharma, 2013, Human Resource Management, Evolution and challenges Ahead, Viva Books Pvt.Ltd, New Delhi.

References:

1. AbirLal Mukherjee (2015) A Textbook of Abnormal Psychology, Rajat Publications, New Delhi.
2. Allison Werner-Lin and Nancee M.Biank, 2006, "Oncology social work", Handbook of Health Social Work, N.J. Wiley
3. Anubhuti Dubey And Aradhana Shukla, 2015, Mental Health-Psycho Social Perspective, Concept Publishing Company, New Delhi.
4. Aradhana Shukla And Anubhuti Dubey, 2015, Mental Health-Psycho Social Perspective, Concept Publishing Company, New Delhi.
5. Arthur Browne.T (2006) "Social work roles and health-care settings", Handbook of Health Social Work.
6. Bentley, K.J. 2001 Social Work Practice in Mental Health: Contemporary Roles, Tasks, and Techniques. Wadsworth Publishing
7. Gelder, M., Mayou, R., & Cowen, P.2004, Oxford Textbook of Psychiatry 4th Edition.7. Oxford: Oxford University Press
8. Joan Beder, 2006, "Oncology social work with adults", Hospital social work: the interface of medicine and caring, Routledge Publishers, New York.
9. Joan Beder, 2006, "Social work on the psychiatric unit", Hospital social work: the interface of medicine and caring, N.Y. Routledge
10. Malitta Engstrom, 2006, "Physical and mental health: interactions, assessment, and intervention", Handbook of Health Social Work, N.J. Wiley
11. Mangal S.K. (2012) Abnormal Psychology, Sterling Publishers, New Delhi.
12. Pandey, V. C. 2004, Child Counselling& Education. Vol. I, II, Delhi, Isha Books
13. Patel, V., & Thara, R.2002 Meeting the Mental Health Needs of Developing Countries: NGO Innovations in India. New Delhi: Sage Publications
14. Sadock, B. J., & Sadock, V.A. (eds.) 2005 Comprehensive Textbook of Psychiatry 8th Edition. Lippincott Williams & Wilkins, Philadelphia

SOCIAL WELFARE ADMINISTRATION (IDC– 3) (30 Hours Only)

I MSW SEMESTER – II CODE: MSW233T

Learning Outcome: *The students will...*

- Gain knowledge about social welfare administration of service organizations
- **Understand welfare programmes of the government**
- **Acquire the skill of establishing a human service organization**

UNIT 1: Welfare State: Concept and relevance. Indian Constitution: Fundamental rights and Directive principles of State Policy- Social Policy and Planned social change. National Policy on Voluntary sector (2007).

UNIT 2: Social Welfare Administration- Concept, Features - Non-Government, Non-Profit making and self –governing organizations. Human Service Organizations by Orientation, by Levels of operation and by Focus. Major programmes of Central Social Welfare Board and State Social Welfare Board.

UNIT 3: Basic Administration Processes: Planning, Organizing, staffing and directing. Elements of Directing: Supervision, motivation, leadership, communication, monitoring and evaluation. Administrative skills – Writing reports, letters and minutes of meetings

UNIT 4: Finance Administration: Budgeting, accounting and auditing. Maintenance of books and accounts, financial documents and records. Mobilization of financial resources - Grants in Aid. Foreign Contribution and Regulation Act – 1976 and Amendments. Exemptions under Income tax Act: 80G, 35AC & 35 (1) (ia).

UNIT 5: Registering of an Organization: Procedures related to registering under Societies Registration Act 1860, Charitable Trust Act 1912 and Indian Companies Act 1956. Administrative Structure – Memorandum, Bye laws, Constitution, Deed, Functions and responsibilities of governing board, committees and office bearers. Case Study of a NGO with legal compliance and programme reporting.

References

1. Batra, Nitin. 2004. Administration of social Welfare in India. Jaipur. Raj Publishing House.
2. Bhattachary, Sanjay. 2009. Social Work Administration and Development. New Delhi. Rawat Publication.
3. Chowdhry, D.Paul. 1992. Social Welfare Administration. Atmaram and Sons.
4. Encyclopaedia of Social Work. Vol I & III Also for Units IV & V
5. Kohli, A.S & S.R. Sharma. 1998. Encyclopedia of Social Welfare and Administration. New Delhi. Anmol Publication.
6. Patel, N Vinod&Rana, K, Girish.2007. Personnel Management. Jaipur. Oxford Book Company.
7. Sarita Sharma, Basotia G. R. Popalia A.K. 1997. Management, Function, financial Planning and Policy. Kanishka Publishers. New Delhi

LABOUR WELFARE AND LABOUR LEGISLATIONS (IDC-4) (30 Hours Only)
I MSW SEMESTER – II CODE: MSW234T

Learning Outcome: *The students will...*

- **Gain knowledge about labour legislations and labour welfare**
- **Understand the legal provisions of labour welfare**
- **Acquire the skills of working with corporate sector**

UNIT 1: Introduction: Industrialization –Concept and Impact of Industrialization in India. Labour: Concept, Characteristics and Problems of Indian Labour. Organized and unorganized Labour. Labour Welfare: Concept, need, objectives, principles and theories. Administration of labour- Central and State level . Labour welfare officer: Qualification, Need, roles and functions. Objectives and Functions of ILO.

UNIT 2: Labour Legislations: Concept and History of labour Legislations in India. Legislations for labour welfare in different types of industries: The Factories Act of 1948, The Mines Act, 1952 , The Motor Transport Workmen Act, 1961 Plantation Labour Act, 1951, The Dock Workers (Safety Health and Welfare) Act 1986, Tamilnadu Shops and Establishment Act 1947- Sexual Harassment of women at workplace (Prevention Prohibitions & Redressal) Act 2013.

UNIT 3: Industrial Relations Legislation: Indian Trade Union Act 1926, Industrial Disputes Act 1947, Employment Legislations: Industrial Employment (Standing Orders) Act 1946, Contract Labour (Regulations and Abolition) Act 1970. Tamil Nadu Industrial Establishment (National Festival and Holidays Act 1958).

UNIT 4: Wage Legislations: Payment of wages Act, 1936, Minimum wages Act, 1948., Payment of Bonus Act, 1965, Equal Remuneration Act 1976.

UNIT 5: Social Security Legislations : Employees State Insurance Act 1948, Employees Provident Fund Act 1952, Payment of Gratuity Act 1972, Maternity benefit Act 1961, Workmens Compensation Act 1923. TN Labour Welfare Fund Act 1972, (Relevant Case Studies to be discussed in the class). All the Acts will be discussed based on changes made in the Labor Legislation Codes.

Reference

1. Babu Sharath and Rashmi Shetty. 2007, Social Justice and Labour Jurisprudence. SAGE Publication. New Delhi.
2. Bhatia, 2008 Strategic Industrial Relations and Labour Laws, Deep and Deep Publications, New Delhi.
3. Jain J.N. and Ajay Bholra, 2009, Modern Industrial Relations and Labour Laws, Regal Publications, New Delhi.
4. Kapoor, N.D. 1993. Elements of Industrial Law. Sultan Chand & Sons. New Delhi.
5. Kapoor, N.D. 1995. Hand Book of Industrial Law. Sultan chand & Company. New Delhi
6. M.R.Sreenivasan, 2006, Industrial Relations and Labour Legislations, Margham Publications, Chennai
7. Ramaswamy, E.A. & Uma Ramaswamy. 1981. Industry and Labour: An Introduction Oxford University Press. New Delhi.
8. Singh B. D. 2010, Industrial Relations and Labour Laws, Excel Books, New Delhi.
9. Srivastava S. C., 2014, Industrial Relations And Labour Laws, Vikas Publishing House Pvt. Ltd, New Delhi.
10. Tripathi, P.C.1994. Personnel Management and Industrial Relations. Sultan Chand&Co. New Delhi.
11. Vaidyanathan, S. 1986. Factory Laws Applicable in Tamilnadu. Vols: 1,2,3. Madras Bood Agency. Madras.

COMMUNICATION SKILLS (Skill Paper- SK-2) (30 Hours Only)

MSW –I

SEMESTER –II

CODE:MSW235S

Learning Objectives: The Students will

- gain better understanding about the purpose and means of communication
- gain knowledge on the different modes of communication
- acquire the ability to communicate effectively and professionally.

Unit I:

Communication: Meaning, Nature (Body Language), Importance and Purpose of Communication. Communication Network in an Organization.

Practical:

1. (Oral) Participating in a dialogue. Situation will be given on the spot.
2. (Written) On the spot preparation of dialogue. Situation will be given on the spot.

Unit-II:

Presentation Skills, Interviews (Dress code & Etiquette), Preparing and organizing a Speech, Presenting at meeting, presenting reports.

Practical:

1. (oral) Extemporaneous (On the spot speech), Theme will be given on the spot.
2. (oral) Presentation of an object or answering an interview question.
3. (oral) Reviewing a report and presenting

Unit III

Effective Writing Skills: Elements of Effective Writing, Main Forms of Written Communication: Agenda, Minutes, Notices, Writing of CV, Memo, Drafting an E-mail, Press Release. Correspondence: Personal, Official and Business, Report Writing.

Practical:

1. (Written) Writing a reply mail to an organization (Situation will be given on the spot – Use of CC, BCC)
2. (Written) Preparing a news for press release (Situation will be given on the spot)
3. (Written) Preparation of CV. Marks can be allotted based on the quality of the CV.

Unit-IV:

Communication using ICT: MS Office-Word, Excel and PowerPoint, Visuals, Dropbox, Skype, Facebook, Google Meet, Zoom, LinkedIn

Practical:

1. (Written) Creating a word document with proper aligning (source file will be given)
2. (Written) Preparing a chart after a proper calculation in Excel (Source data will be given on the spot)
3. (Written) Preparing a presentation in PowerPoint from the source in Word File (Source will be given on the spot)

Unit V

Etiquettes in Communication: Phone and Email Etiquettes, meetings, group discussions, office, Social Media, client and employer. Attire and appearance.

Practical:

1. (Theoretical/Objective type) Written test on Etiquettes while responding to Phone call and Email, Office, Social Media and Employer
2. Participation in FGD (Theme will be given on the spot)
3. Marks will be allotted for the attire and appearance from the observation made during the semester.

References:

1. Bert Decker, 2005, The Art Of Communicating, Crisp Publications, New Delhi.
2. Captain Bob, 2010, Fireup Your Communication Skills, Viva Books Pvt Ltd, New Delhi.
3. Charles J Stewart and William B Cash Jr, 2010, Interviewing Tata Mcgraw Hill Companies, New Delhi.
4. Gangal J.K., 2012, Competitive English, Nirja Publishers, New Delhi.
5. Magasudha Ravinuthala, 2005, The O.P.Singh, 2012, Art Of Effective Communication In Group Discussion And Interview, S.Chand And Company Ltd, New Delhi.
6. Singh O.P., 2012, Art Of Effective Communication In Group Discussion And Interview, S.Chand And Company Ltd, New Delhi.
7. Sharma R.K., 2007, How To Speak And Write Correctly, Swastik Publishers, New Delhi
8. Sharon Gerson And Steven Gerson, 2014, Communication Process And Product, M. Dorling Kindersley, New Delhi
9. Viva Career Skill Library, 2008, Communication Skills(Second), Viva Books Pvt. Ltd, New Delhi.

CIA Components for Communication Skill Paper (100 Marks)

1. Resume Writing: 10 Marks
2. Extemporary Speech: 10 Marks
3. Group Discussion: 10 Marks
4. Class Participation and Interaction: 10 Marks
5. Record:10 Marks

Semester End VIVA Voce (50)

Concurrent Field work
II

I MSW SEMESTER – II CODE:
MSW236F

Learning Outcome: *The students will...*

- Practice the primary methods of Social Work in different settings
- Understand the applicability of the methods and techniques of Social Work in the fields of social work
- Enhance their skills of Social Work practice

The first year students during the second semester go for Practice Based Social Work for two days in a week and expected to spend a minimum of 15 hours per week in the field where they are placed.

The first year students are placed in villages or hospitals or schools or NGOs or government offices or counseling centers or welfare organizations or service organization for their Practice Based Social Work.

During the placement they have to practice all the primary methods of social work. One has to help minimum of 3 clients using casework method, and form one group and practice group work method following all the stages of group work practice with at least 10 sessions and must take a issue and do it as a Group Project following the principles of community organization and social action.

Every week the students write a report of their activities and submit to the concerned field work supervisor. The supervisor conducts individual and group conference regularly. The CA marks are awarded by the supervisor out of 50 marks for the quality, regularity, initiatives, leadership, participation and team worker. At the end of the semester Viva Voce is conducted by an external examiner and marks are awarded out of 50.

Internal (50
Marks)

| | | | | | |
|--------------------------|------------|-------|------------|---------|------|
| Regularity in Submission | | | | | : 10 |
| Marks | Initiative | Taken | during the | Field | Work |
| : | 15 | Marks | Team | Work | |
| : | 10 | Marks | Record | Quality | |
| : | 15 Marks | | | | |

Viva Voce (50
Marks)

| | | | | | |
|--------------------|--------|-------|--------------|--------------|---------------|
| Case Work Practice | | | | | : 15 |
| Marks | Group | Work | Practice | | |
| : | 15 | Marks | Community | Organization | Practice |
| : | 15 | Marks | Presentation | & | Communication |
| : | 5 Mark | | | | |

BLOCK FIELD WORK (Required)

I MSW

SEMESTER – II

CODE: MSW237F

Learning Outcome: *The students will...*

- **Gain experience in a social work field by being in an open or closed setting**
- **Understand the techniques and approaches adopted by the organization**
- **Apply the knowledge gained, in the field of social work**

During the summer holidays the first year students go for one month (not less than 26 working days) field placement training preferably in their respective field of specialization. The students are placed in villages or hospitals or schools or NGOs or government offices or counseling centers or welfare organizations or service organization or industries during the summer holidays according to their field of specialization.

During the placement the students are expected to learn about the vision, mission, philosophy, administration, strategies, programs, activities, and achievements. Students can involve in the activities of the organization to whatever extent possible and learn the administrative and execute roles of the Social Worker.

Students should get daily activity sheets signed by the concerned persons in the

organizations. They have to write daily records of their learning and submit to the department once they complete their field placement. Successful completion is certified by the department and communicated to the Controller of Examination.

This is **Course Completion Requirement and 4 credits are attached**. Students will be evaluated based on the Agency Supervisor Feed Back and by the Department Staff for the report submitted by the students after completion of Field Work.

Evaluation Criteria: (100 Marks)

1. Presentation of the Field Work: 50 marks
2. Report Quality : 50 Marks

TRANSACTIONAL ANALYSIS (Certificate Course-1) (30 Hours Only) I
MSW SEMESTER – II CODE: MSW238X

Learning Outcome: *The students will...*

- Gain knowledge about the concepts related to transaction analysis
- Understand the self and others
- Acquire the skills of communication and problem solving

UNIT I: An overview of T.A: Introduction to Structural analysis – Development of Ego states. The Parent ego state, Incomplete Parent ego state, Re-parenting. The Child ego state, Shifts between Natural & Adapted Child ego states. Activating Child Ego State. The Adult ego state -- Activating and strengthening the Adult ego state.

UNIT II: Introduction to Analyzing Transactions – Complementary transactions, Crossed transactions and ulterior transactions. The human hunger for Strokes -- Stroking hunger, Positive Stroking, Discounting and Negative Stroking. The hunger for Structured Time - Withdrawal, Rituals, Pastimes, Games, Activities and Intimacy.

UNIT III: Stamp collecting – Psychological Trading of Stamps. Redemption of Stamps. Psychological Game Playing—The Yes-but’ game, The Uproar game, the ‘Lets you and Him Fight’ game, the ‘See what you made me’ game. Giving up games.

UNIT IV: The Drama of Life Scripts-Injunctions and Counter Injunctions- Scripts with Curse- Counter scripts. Rewriting scripts through Awareness, Spontaneity and Intimacy.

UNIT V: Application of TA: Effective transaction for personal, family and profession wellbeing. References:

1. Berne, Eric, 1996, Games People Play- The Basic Book of Transactional Analysis. Ballantine Books, New York.
2. Berne, Eric, 1964, Games People Play. Grove Press, New York.
3. Berne, Eric, 1961, Transactional Analysis In Psychotherapy, Grove Press, New York
4. Harris A. Thomas, 1969, I’ am OK-You are OK.; Harper & Row, New York.
5. James, Muriel & Jongeward, 1976, Born to Win, Addison Wisely Publishing Company, London
6. Steiner M. Claude, 1982, Scripts People Live. Bantam Books, Toronto
7. Steiner M. Claude, 1974, Games Alcoholics Play, Ballantine Books, New York.
8. Widdow son, Mark. 2010, Transactional Analysis -100 Key Points and Techniques, Routledge, New York.

Note: it is an extra credit course (Optional). Course Fee and duration will be fixed by the department in consultation with the resource persons. Students need to pay Rs. 50 to the office of Controller of Examinations. The course will be conducted for minimum of 30 hours outside

the regular time table. No CIA or Semester end exams will be conducted. Certificates will be issued by the Department for those who have completed the cours

SEMESTER III

SOCIAL WORK RESEARCH & STATISTICS (Main Core-7) II MSW SEMESTER – III CODE: MSW330T

Learning Outcome: *The students will...*

- Gain knowledge about research methodology & statistical applications
- Understand the usages of computer packages in research
- Acquire the skill of adopting the methodology and the application of statistics

UNIT 1: Concept and Process: Social Science Research- Scientific attitude, characteristics. Social Work research- Research Types and Process. Importance of theory, conceptualization and operationalization in Research. Variables–Independent and dependent. Preparing Research Project Proposal. Funding Opportunities for Social Work Researches.

UNIT 2: Research Methodology: Research Design: Exploratory, Descriptive, Diagnostic, Explanatory and Experimental & Quasi Experimental Hypothesis: nature and types, assumptions and Testing of hypothesis. Sampling: meaning, types - probability and non-probability. Data Collection Methods: Nature and types questionnaire, interview schedule and standardized tools. Validity and reliability testing of tools. Ethical responsibilities in Research.

UNIT 3: Measurement of Data: Meaning and Types: Primary and Secondary Data. Levels of measurement: Nominal, Ordinal, Interval and Ratio. Scale: Meaning and types: Likert, and Semantic differential.

UNIT 4: Application of Statistical Tests: Type of Statistics: Descriptive and Inferential (Parametric and Non Parametric): Conditions for Parametric and Non Parametric Tests. Descriptive statistics: Central Tendency: Mean, Median, Mode, Range, Standard deviation, Quartile Deviation. Presentation of Descriptive Statistics: One way, two way and summary tables, Diagrams: Pie, Bar, Histogram, Line and Cluster Bar Chart. Parametric Tests: One sample ‘t’ test, Independent Sample ‘t’ test. ANOVA and MANOVA, Paired Sample ‘t’ test and Pearson Correlation.

UNIT 5: Research Report Writing style and structure (Use of APA and MLA Style). Guidelines to Publish Research Papers. Plagiarism Testing. Intellectual Property Rights.

Reference

1. Aditham Bhajanaga Rao. 2006. Research Methodology. Excel books. New Delhi.
2. Allen Rubin and Earl Babbie, 2011, Methodology For Social Work Research, Cengage
Learning India Pvt. Ltd, New Delhi.
3. Cargan, Leonard. 2008. Doing Social Research. Jaipur. Rawat Publications.
4. Chadhary CM. 2009. Research methodology. Ashish Paranmi RBSA publishers. Jaipur.
5. Debashis Chakraborty. 2009. Research Methodology. Saurabh Publishing House. New Delhi.
6. Foster, J.J. 1998. Data Analysis Using SPSS for Windows. Sage Publications Ltd. London.
7. Gaur, Ajai S and Sanjaya S Saur. 2009. Statistical Methods for Practice and Research. A
guide to Data Analysis using SPSS. Sage Publications. New Delhi.
8. Gosh B.N., 2008 Scientific Methods And Social Research, Sterling Publications Pvt. Ltd, New Delhi.
9. Gupta, S. P. 2009. Statistical Methods. New Delhi. Sultan Chand and Sons.
10. Ian Shaw and Nick Gould, 2001, Qualitative Research in Social Work, Sage Publications, London.
11. Kothari, C.R. 2004. Research Methodology – Methods and Techniques. New Delhi. New
Age International Private Limited.
12. Kultar Singh. 2007. Quantitative Social Research Methods. Sage Publications India PVT LTD. New Delhi.
13. Michael Bloor, Jane Frankland, Michelle Thomas, Kate Bobson 2001, Focus Groups in Social
Research, Sage Publications, New Delhi.
14. Padgett, D.L. 1998. Qualitative Methods in Social Work Research. Sage Publications.
California.
Susanne Friese, 2012 Qualitative Data Analysis with Atlas, Sage Publications, New Delhi

RURAL & URBAN COMMUNITY DEVELOPMENT (Main Core-8)
II MSW SEMESTER – III CODE: MSW331A

Learning Outcome: *The students will...*

- Gain knowledge about rural urban community
- Understand the programmes & activities of rural and urban development
- Acquire the skills of working with rural and urban community

UNIT 1: Community: meaning, types, characteristics. Community development: Definition & philosophy. Evolution of Community Development. Human Development Index - Dimensions and importance. Sustainable development: meaning, importance. SDGs (Sustainable Development Goals). National priorities of the Govt. of India.

UNIT 2: Rural Community Development – Principles, approaches. Early experiments of rural development. Assessment of needs and problems in the community. Participation – meaning, relevance, & levels. Dimensions of participation. Participation in rural development. Participatory Rural Appraisal – characteristics, principles, tools, techniques – Social Mapping, Venn Diagram, Monogram, Health Matrix, Resource Mapping, Time line, Steps and limitations. Extension – meaning, principles, approaches.

UNIT 3: Urbanization: Concept- Urban, Urbanism - Characteristics- Types of urban centers - Town - Metropolitan city Satellite towns - Megacity - Parallel city and Smart City. Urban development and Urban community development - meaning - origin of urban community development- Welfare extension policy of central social welfare board as pilot project - Delhi project -Baroda project - Jamshedpur project. Urban governance structure and development schemes

UNIT 4: Urban Social problems: Crime – accidents – Prostitution -Pavement Dwellers – Street Children – Solid Waste Management - Pollution Control. Urban traffic problems- Metro rail and MRTS projects -Road safety systems - Infrastructure development - Urban housing problems – Housing schemes- Urban development Programs and Policies - Town planning - Urban Renewal programs in Indian cities – Smart cities & Development Corridors. Characteristics of Slums in Indian cities- Tamil Nadu Slum clearance board- Functions of slum clearance Board- Programs for slum dwellers.

UNIT 5: Role of Government & NGOs in Development: Government programs & schemes – poverty alleviation, women development, SC/ST development and child development. Voluntary action – NGOs in rural urban development. Community based organization, programs & projects. Involvement of NGOs in urban community development - Need for NGOs in urban community development – N.G.Os working at Urban centers.

References:

1. Amitabh Bhatnagar, 2008, Rural Microfinance and Microenterprise, Concept Publishing Company, New Delhi
2. Anastasia Nikolopoulou And Taisha Abraham And Farid Mirbagheri, 2010, Education For Sustainable Development, Sage Publications, New Delhi
3. Katar Singh, 2010, Rural Development(Third), Sage Publications
4. Kumar, Somesh. 2004, Participatory Method in Community Work. New Delhi: Himalya Publisher.
5. Maheswari, S.R. 1994, Rural Development in India. Delhi. Sage publishers.
6. Narayanasamy N. And M.P.Boraian, 2005, Participatory Rural Appraisal, Concept Publishing Company, New Delhi
7. Noble G. Allan, 1997, India Urbanization New Delhi. Tata McGraw Hill Publishing Company.
8. Rajib Luchanpanigrahy. 2006. NGO for Rural Development. Mohit Publications. New Delhi.
9. Rasure K A. 2010. Rural Credit in the Era of Globalization. Madhav Books Publications. Hariyana.
10. Shankar Chatterjee, 2011, Implentation Of Rural Development Programmes, Serials Publications, New Delhi
11. Singh Kattar. 2009. Rural development. Sage publications. New Delhi.
12. Venkatarama Ayyar C.P., 2004, Town Planning In Early South India, Mittal Publications, New Delhi
13. William, A. Thomas and A. J. Christopher. 2011. Rural Development – concept and recent approaches. Jaipur. Rawat Publications.

INDUSTRIAL RELATIONS (Main Core-8)
II MSW SEMESTER – III CODE: MSW331B

Learning Outcome: *The students will...*

- **Gain knowledge about trade unions**
- **Understand the functions and activities of trade unions**
- **Acquire the skill of working with the workers and unions**

UNIT 1: Industrial Relations: Concept, Characteristics and Approaches -State and Industrial Relations – Code of Conduct and Code of Discipline in Industry

UNIT 2: Collective Bargaining: Concept – Theories – Goals – Principles – Prerequisites – Stages of Collective Bargaining – Bargaining Strategies – The factors influencing Collective bargaining – Skills of an effective bargaining agent. Inter and Intra union rivalry, Concept of Conciliation, Arbitration and Adjudication.

UNIT 3: Workers Participation in Management: Concept – Aims and objectives – Scope – Levels of Participation – Conditions essential for working of the Scheme of workers' participation in Management

UNIT 4: Trade Unions and Employers Organization: Origin and Growth of trade union movement in India – Theories – Functions – Administration of Unions – Leadership – Membership and Finance – Close shop, Open Shop and Check off system – Employers' organization: Objectives and functions of various employers' organization, membership and finance. Issues and Challenges of Trade unions in India. Emerging Trends in Union – management relations: Impact of Globalization and Liberalization. New Paradigms of Industrial Relations in India. Grievance - Meaning and forms, sources of grievance, approaches to grievance machinery, Grievance procedures, model grievance procedure. Disciplinary procedures, approaches to manage discipline in Industry, Principles of Hot stove rule.

UNIT 5: International Labour Organization: History – Mission and Objectives – Structure: International Labour Office , General Body and International Labour Conference – Functions of ILO . Concept of Tripartism in ILO in India: India-Decent Work Country Program (2013-17) ,

Reference

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YOUTH DEVELOPMENT (Main Core -8)

II MSW

SEMESTER – III

CODE: MSW331C

Learning Outcome: *The students will...*

- Gain knowledge about concept of youth and theories on adolescents
- Understand youth work and its various approaches and models
- Gain knowledge of the policies and programmes of youth development

UNIT 1: Youth: Concept - Youth as age Category, as transitional stage, as social Construct. Demographic Profile of Indian Youth. Theories on Adolescence: Hall's storm and stress model, Erickson's Psychosocial Theory of Development, Blo's Theory of Process of Disengagement by adolescents, Richard Jessor's Problem Behaviour Theory.

UNIT 2: Youth Development: Concept- Youth Development Index based on Human Development Index dimensions - Education, Income and Health. Youth Indicators drawn from Sustainable Development Goals of the United Nations Organization. Youth Led Development: Concept- Youth Led Sustainable Development in the focus areas of Health and Population dynamics, Education and Skill development, Gender equality and Women empowerment, Peace and Non-violence and Climate

UNIT 3: Positive Youth Development: Conceptual Understanding of Positive Youth Development (Competence, Character, Confidence, Connection and Caring). Community engagement framework for youth development - Factors promoting and hindering youth engagement in the Community.

UNIT 4: Approaches and Models of Youth Work: Nature & definition of Youth Work. Approaches to Youth Work – Relief based approach, Welfare based approach, Development based approach and Policy Development based approach. Models of Youth work – Treatment model, Reform model, Advocacy model, Conscientization model and Don Bosco's Preventive model. Youth Clubs, Youth Movements and Youth Parliaments. Career Opportunities in Youth Work

UNIT 5: Youth Policy & Programmes: Policy- Policy development framework- Essential features of National Youth Policy of India (2014). Youth Development Programs of Indian Government; NSS, NSS, NCC, Scouting and Guiding, NYC, NYK, Scouting and Guiding, National Youth Corps, NYK and RGNIYD. Youth Organizations involved in Youth Development: United Nations Population Fund (UNFPA), International Youth Foundation (IYF), DBYA South Asia, Restless Development India and MagicBus.

References

1. Chowdhry D.P.1988. Youth Participation and Development. New Delhi. Atma Ram and Sons Publications.
2. Harper and Malcolm. 1996. Empowerment Through Enterprise. London. Intermediate Technology Publications.
3. Kenyon, et.al. 1996. Youth Policy 2000. Formulating and Implementing National Youth policies. London. Commonwealth Secretariat Module -9, CYP. Chandigarh. Asia Regional Centre.
4. Macwangi M – Zambia.1998. Promoting Enterprise and Economic Development. Module 11. CYP. Chandigarh: Asia Regional Centre.
5. Philip and MCMichael 1996. Development and Social Change. London. A global Perspective. Sage publications.
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RURAL AND URBAN GOVERNANCE

II MSW

Semester – III

Code: MSW332A

Learning Outcome: The students will...

- Gain knowledge about rural and urban governance
- Understand the functions and activities of rural and urban governance
- Acquire the skills of working with and through local self-governments

Unit – I: Governance and Good Governance. Democratic Decentralization. E-Governance, Evolution of Rural Self Governments: Ancient period– Ur, MahaSabha, Variyams, kudumbu, alunganam. Mughal period - Patwari, Muqaddam, Jagirdars, and Zamindar. British period – Mahalwari system, Ryotwari system, Indian rebellion 1857 and decentralization. Mayo’s Resolution, Ripon Resolution, Royal Commission, Montague-Chemsford Reforms, and Government of India Act, 1935. After independence - Balwant Raj Mehta Committee, Ashok Mehta Committee, G V K Rao Committee, L M Singhvi Committee, and Constitutionalisation of Rural Governance.

UNIT 2: 73rd Constitutional Amendment Act, 1992 (Pachayat Raj Institutions) – Gram Sabha, Constitution, Composition and duration of panchayat, Reservation of seats, Disqualification of members, Powers, and responsibilities of Panchayats. Powers to impose taxes and Funds of Panchayats. Constitution of Finance Commission to review financial position. Elections to the Panchayats. Application to union territories.

UNIT 3: Evolution of Urban Self Governments: Ancient period – district administration, Nagaram, and Mahanagaram. Mughal period -Kotowal. British period – first municipal corporation, Town committee, Royal Army Sanitary Commission, Mayo’s Resolution, Ripon Resolution, Royal Commission, Morley-Minto Reforms, Government of India Acts 1919, Government of India Act 1935. After independence – Simla conference, Local Finance Enquiry Committee, Rathnasabapathy Mudaliar Committee, Matthai Committee, White Paper on the Reforms of Local Administration, Rural Urban Relationship committee, K. N. Sahay committee, and Constitutionalisation of Urban Governance.

Unit 4: 74th Constitutional amendment act, 1992 (The municipalities) – Metropolitan area, Municipal area, Municipality, Constitution, composition and duration of municipality, Constitution and composition of Wards Committees, Reservation of seats, Powers and responsibilities of Municipalities, Elections to the Municipalities. Committee for district planning. Committee for Metropolitan planning.

UNIT 5: Evolution of Tribal Self Governments. Before independence - Scheduled Districts Act 1874, the government of India act 1919, the government of India act 1935. After Independence – Advisory committee on Fundamental Rights, Minorities and Tribal and Excluded Areas, Sub committees of the advisory committees, Article 244 (Fifth Schedule of the Constitution), Bhuria Committee, The Provisions of the Panchayats (Extension to the Scheduled Areas) Act, 1996 / PESA Act 1996 - Village, Grama Sabha and its power

Reference:

1. Agarwal Babitha. 2009. Urbanization of Rural Areas. Rajdhani. New Delhi.
2. Arora K. Ramesh. 2009. Panchayati Raj Participation and Decentralisation. Rawat publications. Jaipur.
3. Bidyut Mohanty. 1993. Urbanization in Developing Countries, Concept Publishing Company. New Delhi.
4. Bondy Padhyay. D. 2003. Empowering Panchayats Handbook for Master Trainers Using Participatory Approach. Concept Publications. New Delhi.
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6. Khanna. B.S. 1994. Panchayat Raj in India. Deep & Deep publications. New Delhi.
7. Kshisagar, R.K.. 1994. Dalit Movement in India and its Leaders. MD Publications. New Delhi.
8. Mehta G.S. 2008. Participation of Women in the Panchayati Raj System. Kanishka Publishers. New Delhi.
9. Ravinder Singh Sandhu. 2006. Urbanization in India. Sage Publications. New Delhi

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1. Balaji B, 2013, Service Marketing & Management, S.Chand & Company Private Limited, New Delhi.
2. Dasler Gary, 2011, Human Resource Management, Dorling Kindersly (India. Pvt. Ltd.), New Delhi.
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6. Kandula, Srinivas. 2005. Human Resource Development in Competitive Business Environment. ICFAI University press. Hyderabad.
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8. Negi, Jag Mohan. 1997. Professional Hotel Management. S. Chand and Co. Ltd. New Delhi.
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STRATEGIES FOR YOUTH DEVELOPMENT (Main Core-9)

II MSW

SEMESTER-III

CODE: MSW332C

Learning Outcome: The Students will ...

Understand the different strategies by which youth development could be achieved

Gain knowledge of government and private interventions in the development of youth

Acquire skills in designing capacity building programmes.

Unit 1: Promoting Healthy Life Style: Unhealthy life style among youth: Excessive Sedentary activities (Television, video games, social networks) and nutrient deficit fast foods. Problems due to poor physical fitness among adolescents and youth. Healthy Life Style-Concept and Importance. Body Mass Index. Benefits of regular physical activities- Walking, trekking, jogging, cycling, swimming, aerobics activities and Indigenous knowledge and practice in healthy living (yoga, pranayama, meditation). Food Pyramid for healthy life style.

Unit 2:Capacity Building: Concept, Significance of capacity building of youth. Methods – Training, Out-bound training, Folk and theatre training, Exposure visits, youth participation in forums and groups - Training Needs Analysis (TNA), Competency Analysis- Writing training objectives- Designing a training programme. Evaluation of training based on Kirkpatrick's model. Documentation and dissemination of outcomes of capacity building.

Unit 3:Livelihood: Concept -Sustainable Livelihoods approach to poverty -UNDP, CARE and DFID approach to Sustainable Livelihood -Strengths and weaknesses - Sustainable livelihood projects in India. Formation of self-help groups of men/women of economically deprived families - Orientation on the basic characteristics of micro-finance and micro-enterprise and its effective management. New Entrepreneurs & Enterprise Development Scheme (NEEDS). Incentives and subsidies for earmarked for SC, ST and women entrepreneurs.

Unit 4:Entrepreneurship: Concept-Entrepreneurial skills and competencies. Feasibility Study: Product/Service Feasibility, Industry/Market Feasibility, Organizational Feasibility and Financial Feasibility. Steps in setting up a micro enterprise: Product Selection, market survey, viable business plan, choice of technology, man power, production process, quality standards and marketing strategies. Institutional support services by Government and corporate sector.

UNIT 5: Community Health: Concept - Community Health Concerns -Youth-led Community health and Sanitation. Programs: National Rural Health Mission, National AIDS Control Programme. First Aid, Immunization programs. Community Health Education on Water, Sanitation and waste management.

References

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5. Jonathan Roberts, 2009, *Youth Work Ethics*, Learning Matter Ltd,
6. Kate Sapin, 2013, *Essential Skills For Youth Work Practice (2nd Edition)*, Sage Publication, New Delhi
7. Kuriakosenpallikunel, 2005, *Empowering Community: Empowering The Young At Risk*, National Research And Documentation Center, Bangalore
8. Martin Robb, 2007, *Youth In Frameworks, Settings, Encounters*, Sage Publications, London
9. Mary Tyler, Liz Hogarth And Bkylan Merton, 2009, *Managing Modern Youth Work*, Learning Matters Ltd, Padrtow, Co.
10. McNulty, Michael; Nagarajan, Geetha, 2005, *Serving Youth with Microfinance: Perspectives of Microfinance Institution and Youth*. Chemonics International, USAID
11. Melvin Delgado, 2000, *New Arenas For Community Social Work Practice With Urban Youth*
12. Peter Ronald Desouza, Sanjay Kumar, Sandeep Shastri, 2009, *Indian Youth In A Transforming World*, Sage Publications, New Delhi
13. Roger Harrison, Cathy Benjamin, Sheila Curran And Rob Hunter, 2007, *Leading Work With Young People*, Sage Publications, New Delhi
14. Sarumathy M, Hiranniya Kalech, 2007, *Youth Policies And Programmes In South Asia*, Rajiv Gandhi National Institute Of Youth Development (RGNIYD), Sriperambadur, India
Sarumathy, M, Hiranniya Kalesh.P, 2007, *Youth In Decentralized Governance*, Rgniyd, Sriperambudu

QUALITATIVE RESEARCH IN SOCIAL WORK (Main Elective-1) (30 Hours Only)

II MSW

SEMESTER – III

CODE: MSW333A

Learning Objectives: Students will

Understand the concept and scope of qualitative research

Gain knowledge on the process and approaches of qualitative research

Acquire skills for data collection and documentation

Gain skills in data analysis and management

Unit – I: Concept: Qualitative research-Concept, Characteristics, Objectives and scope. Ethical responsibilities in qualitative research- Challenges in qualitative research- Mixed Method in research -Quantitative & Qualitative.

Unit – II: Process of Research: Problem Formulation: Review of literature, site selection and time frame, selection of samples, Collection of data, Data processing and analysis and interpretation and documentation of observations and findings.

Unit – III: Approaches to Qualitative Research: Ethnography, Grounded theory, Interpretative phenomenological analysis, Disclosure analysis, Conversation analysis, Content analysis and Narrative analysis. Qualitative Sampling and Selection: Convenience, Typical Case Sampling, Critical Case Sampling, Maximum Variation Case Sampling, Intensity Sampling and Snowball Sampling.

Unit – IV: Data Collection Methods: Observation, Case studies, In-depth Interview, Focus Group Discussion, Artifacts/field records, Narrative and Open ended questions in questionnaires. Use of audio/video gadgets and photos in data collection.

Unit –V: Data analysis and Management: Convergence and Divergence. Types of analysis: Conversation, discourse and genre. Coding the data using software programmes in qualitative research. Writing the research report.

Reference

1. Allen Rubin and Earl Babbie, (2011), *Methodology For Social Work Research*, Cengage Learning India Pvt. Ltd, New Delhi.
 2. B.N .Gosh, (2008) *Scientific Methods And Social Research*, Sterling Publications Pvt. Ltd, New Delhi.
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HOSPITAL ADMINISTRATION (Main Elective-1) (30 Hours Only)
II MSW SEMESTER – III CODE: MSW333B

Learning Outcome: *The students will...*

- **Gain basic knowledge on Hospital Administration**
- **Understand the functions of Hospital**
- **Acquire the skill for administering Hospitals.**

UNIT-I: Overview of Health Care Sector: Overview of Health Care Sector in India – Primary care – Secondary care – Tertiary care – General & special Hospitals - Understanding the Hospital Management: Routine Admission/Discharge Procedures/Discharge Summary - Hospital Utilisation Statistics: Average Length of Stay (ALS), Bed Occupancy Rate and Turn Over Interval – Role of Medical, Nursing Staff, Paramedical and Supporting Staff. NABH Guidelines and Principles

UNIT-II: Functional Hospital Organization: Hospital code of ethics, medical ethics, standards for hospitals, - Hospital functions - Front Office: Duties & Responsibilities - Health Records: Daily Reports / Returns: Hospital Census, Matron's Report, Medical Officer's Report, Casualty Report, Medico-Legal Cases, Report from ICU / ICCU, Security Report, Maintenance Department Report and OT List. - Patient's Complaints - Medical Certificates.

UNIT –III Hospital Administration: Hospital Committees: Role, Composition, Frequency of Meetings, Minutes of the Meetings, Follow-up Actions. - Duties & Responsibilities of the Hospital Administrator/CEO - Role of Medical Superintendent, Resident Medical Officer, Night duty Executive; Public and guest relation: information regarding patients, medical information, attendants' management.

UNIT-IV: HRM in Hospitals: Nature and Scope of HRM – Meaning and Definition – Functions – Objectives – Organization of HRM Department - Policy Evolution of Personnel - Duty Roster of various categories of Staff - Administration of Patient Related Schemes: Medical Insurance (Cashless Benefit), Central Government Health Scheme (CGHS), Ex-Servicemen Contributory Health Scheme (ECHS), Third Party Administrator (TPA), Employee's State Insurance (ESvarI) - Hospital Waste Management - Methods of Infection Control - Standard Operating Procedures (SOPs) - Availability of Materials: Critical Items, Stock Level, Procurement Methods.

UNIT V: Challenges in Hospital Administration: Emergency Codes: Disaster Management: Fire Fighting. Dealing with Crisis Situation, Mob violence, Bomb threat, Terrorist strike, Mass casualties, Political agitation, Prisoners - Hospital Security: Staff, Patients, New born babies, Female staff/Patients, Stores. - Application of Hospital Information System (HIS) & Management Information System (MIS) - Accreditation – Tele health - Health Tourism - Health Insurance and Managed Care.

References

1. Dave P.K., Shakti Gupta, NK Parmar, Sunil Kant, **Emergency Medical Service and Disaster Management - A Holistic Approach**, Jaypee Brothers Medical Publishers Pvt. Ltd., New Delhi.
2. Goel S.L. & R. Kumar, Hospital Administration and Management, Deep & Deep Publications, New Delhi.
3. Hem Chandra , Hospital Equipment Management, Bharat Book Centre, Lucknow
4. Katakam A., GD Kunders, S Gopinath, Hospitals Planning, Design and Management, Tata McGraw-Hill Publishing Company Limited, New Delhi.
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11. Syed Amin, Tabish, Hospital and Health Services Administration - Principles and Practice, Oxford University Press, New Delhi.
12. Yashpal Sharma , Handbook on Hospital Administration, Durga Printers, Jammu

THERAPEUTIC INTERVENTIONS IN SOCIAL WORK (Main Elective-1) (30 Hours

Only) **II MSW**

SEMESTER – III

CODE: MSW333C

Learning Outcome: *The students will...*

Understand the nature, goals and prerequisites of psychopathology

Acquire knowledge about the different schools and techniques in psychotherapy.

Gain knowledge about the application of therapies as an intervention in Social Work

UNIT I: Psychotherapy: Definition, Types and Goals - Professional and ethical issues- Unique features of psychotherapies- Personal characteristics of therapists

Unit II: Psychotherapies: Client Centered Therapy, Rational Emotive Therapy, Family Therapy, Group Therapy, Cognitive Behaviour Therapy- Application of CBT in Clinical Settings.

Unit III: Expressive therapy: Art therapy, Dance therapy, Writing therapy, Music therapy, Psychodrama and Motivational interviewing. Emerging Trends in Holistic treatment.

Unit IV: Techniques: Therapeutic techniques based on classical, operant and modeling theories. Relaxation training- muscular relaxation; Meditation; Flooding; Systematic Desensitization; Paradoxical Intention; Assertive training.

Unit V: Clinical Social Work: Definition, Goals and Standards of Clinical Social Work Practice. Clinical social work settings - Role in a multi-disciplinary team- Need for license to practice.

Reference

1. Allen, H. Frederick, *Psychotherapy with Children*, 1942, W.W. Norton & Company. INC, New York
2. Egan, Gerard, 2006 *The skilled helper: A problem management and opportunity, Development Approach to helping*, Wadsworth publishers, Boston, USA
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CORPORATE SOCIAL RESPONSIBILITY (Main Elective-2) (30 Hours Only)

II MSW SEMESTER – III CODE: MSW334A

Learning Outcome: *The students will...*

- **Gain knowledge about Corporate Social Responsibility**
- **Understand the functions and activities of Social Audit**
- **Acquire the skills of promoting and working in CSR programmes**

UNIT 1: Corporate Social Responsibility – Concept, and significance – Evolution of CSR – The Triple Bottom Line Approach - CSR Issues: Environmental, Social, Labor related, Ethical and Governance.

UNIT 2: Organizational environment - Meaning - Types - Organizational Life Cycle - Impact of technology - impact of cultural values on managerial effectiveness - Social responsibilities of business.

UNIT 3: Role of ‘Standards and Codes’ in CSR: ISO – 14001(Environmental Management System), Occupational Health and Safety Management Systems (OHSAS) – 18001, Global Compact-UN, Stakeholder Engagement Standard -AA – 1000 (Stakeholder Engagement Standard).

UNIT 4: NGO and CSR – Indian Companies Act2013 from CSR perspective- Program for the neighborhood: Health, Education, Employment, Social Entrepreneurship and Environment. Communication: Annual Reports and Sustainability Reports.

UNIT 5: CSR- Success Stories in Indian Context – Infosys, TISS, TISCO, USHA. ASSOCHAM Reports in CSR. CSR Awards.

Reference

1. Akhileshwar Pathak, 2014, Legal Aspects Of Business (Sixth), Mcgraw Hill Publications, New Delhi.
2. Garg K.C. And V.K. Sareen and Mukesh Sharma and R.C.Chawla, 2008, Legal Environment of Business, Kalyani Publications, Chennai.
3. Jeffrey A Mello, 2011, Strategic Management of Human Resource (Third), Cingage Learning Ind Pvt Ltd, New Delhi.
4. John D Daniels and Lee H Radebaugh and Daniel P Sullivan, 2005, International Business (Tenth), Pearson Education Pvt Ltd, New Delhi.
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Sharma R.K. And PuneetGoel and Pooja Bhagwan,2009, Business Ethics And Corporate Governance,KalyaniPublications,Chennai

HOTEL FRONT OFFICE MANAGEMENT (Main Elective-2)

II MSW

SEMESTER III

CODE: MSW334B

Learning Objectives

- To enhance the employability skill and knowledge of students on hotel management.
- To facilitate students to understand the functions of front office
- To enable student with right skill for front office management. .

Unit – I: Introduction to Hotel Industry – Concept of Hotel – Types of Hotels – Types of Rooms and Tariff – Restaurant: Food and Beverage Management -Tourism – Importance of Hospitality in Tourism – Tourism in India- Role of Travel Agents in Tourism Industry.

Unit – II: Front office Operations – Concept – Functions – Importance of Front office Department in Guest satisfaction – Qualities and Attributes of Front office Personnel – FOM Organizational Structure – Guest Cycle (Pre-arrival, arrival, Occupancy and Departure) – Job Description (Front office Manager, Reservation Supervisor, Front Office Cashier, Front Office Assistants, Reservation Assistants and Bell Boys). Lobby – Reservation Management (Online, Telephonic and Agent bookings) – visit to a Hotel / Resort

Unit III: Information (Information Desk, Information Rack, Key Management) – Reception

- Front office procedures for Emergencies (Fire Fighting, Prevention of employee and guest theft and First Aid)- Night Auditing – Equipments in Front Office (PBX, PABX, EPABX)

Unit – IV: Front office Cashier – Functions – Records and Ledgers - Hotel Credit – Foreign Currency Encashment– Safety Locker Management – Establishing Room Rates (Rule of Thumb, Hubbart’s Formula) – Room Revenue Analysis.

Unit –V : Skills for Front Office Management – Personal Hygiene and Grooming – Computing Skills – Telephone Etiquette – Email Etiquette – Problem Solving Skills - Trends in Front Office Management. Case Study on Hotel Front office Administration

Reference:

Alan Fyall & Brian Garrod, 2010, Aspects Of Tourism Marketing, Viva Books Pvt.Limited, New Delhi

Chistopher Lovelock & Jochen Writz & Jayanta Chatterjee, 2011, Services Marketing, Dorling Kindersley Pvt.Limited, South Asia

Ernst Schneider, 2008, Healthy By Nature, Editorial Safeliz, Spain

George D. Pamplone- Roger, 2010, Encyclopaedia Of Foods Healthy Recipes, Editorial Safeliz, Spain

George D. Pamplone- Roger, 2010, Healthy Body, Editorial Safeliz, Spain

Jack D. Niemeyer & Joe Perdue, 2009, Discovering Hospitality And Tourism, Dorling Kindersley Pvt. Limited, South Asia

Jagmohan Negi, 1997, Professional Hotel Management, Chand & Company Limited, New Delhi

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Metti M.C., 2008, Customer Service And Hotel Management, Anmol Publications Pvt.Limited , New Delhi

Pragati Mohanty, 1992, Customer Service and Hotel Management, Ashish Publishing House, New Delhi

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Sudhir Andrews, 1998, Hotel Front Office Training Management, Tata Mcgraw-Hill Publising Company Limited, New Delhi

DISASTER MANAGEMENT (Main Elective-2) (30 Hours Only)

II MSW SEMESTER – III CODE:MSW334C

Learning Outcome: *The students will...*

Understand the dynamic factors of disasters and their impact at an individual and societal level.

Deal with disaster preparedness, crisis management, risk reduction and rehabilitation and understand how they are connected.

Identify the role of different agencies in Disaster Management.

Unit-I: Understanding Disasters: Meaning, Concept. Type of Disasters – Man Made & Nature Made. Effects of Disasters – Physical, Economic, Social, and Psychological Effects. Disaster Vulnerability of India: Lessons from Bhopal Gas Tragedy, Gujarat Earth Quake, Orissa Super Cyclone, Floods, Epidemic & Pandemic

Unit-II: Disaster Management Cycle: Preventions. Mitigation, Preparedness, Response, and Recovery. Relief, Rehabilitation and Reconstruction. Factors influencing disaster preparedness and response. National Policy on Disaster Management (2009).

Unit III: Disaster Management Act(2005): – Community Based Disaster Management (CBDM)– Panchayat level Disaster Response Team – Disaster Relief and Risk Transfer through Insurance - Income Generation Activities and Housing - Task Force.

Unit – IV: Methods & Techniques - Vulnerability Analysis - Survival skills - Creating Awareness through IEC and Media – Training for Youth (CPR, Fire Fighting and Mock Drill) - Relief Camp Organisation - Recovery after disasters.

Unit – V: Role of Social Workers in Psycho-social Support. Role of Agencies in Disaster Management: Role of Government in Disaster Management – National Disaster Management Authority (NDMA) – Role of International Organisations and Civil Society Organisations

Reference

1. Disaster Prevention and Mitigation (1982), United Nations Disaster Relief Coordination, New York.
2. Form William H and Sigmund Nosow (1958), Community in Disaster, Harper and brothers Publishers, New York
3. Julie Freestone And Rudi Raab, 2004, Disaster Preparedness, Viva Books Pvt Ltd, New Delhi
4. Klinenberg Eric (2002), Heat Wave: A Social Autopsy of Disaster in Chicago, University of Chicago Press, Chicago.
5. Mamata Swain, JaganathLenka, MinatiMallick, 2007, Gender Perspective in Disaster Management, Serials Publications, New Delhi
6. Mamata Swain, JaganathLenka, MinatiMallick, 2007, Gender Perspective in Disaster Management, Serials Publications, New Delhi
7. Parida P.K. (2002), Towards Rebuilding a Post Disaster Society: A Case Study of Super Cyclone Affected Coastal Orissa , The Indian Journal of Social Work, Vol 63, Issue 2.
8. Quarantelli, (1998), What is a Disaster, Routledge, London and New York.
9. SenAmartya (1981), Poverty and Famines, Oxford University Press, New Delhi.
10. Sharma Dharendra (1983), India s Nuclear Estate, Lancers, New Delhi.
Sinha P C, 1998, Encyclopaedia of Disaster Management (Vol 01 to 10), Anmol Publications Pvt.Ltd, New Delhi.

**DATA PROCESSING & ANALYSIS SKILL (SPSS & NVivo)
Skill Paper–SK 3 (30 Hours Only)**

II MSW

III SEMESTER

CODE: MSW335S

Learning Outcome: *The students will...*

- **Gain knowledge on SPSS and NVivo**
- **Gain Skills and Methods to use the statistical software.**
- **Gain experience in using SPSS & NVivo in data processing and analysis.**

Unit I: Basic steps of Data Analysis: editing, coding, code book preparation. Creating data file, syntax file and output file. Defining data: Variable name, Variable label, Values, value labels.

Unit II: Management of data file - adding cases, adding variables, saving files, retrieving data files, rectifying missing values and system error. Recoding of data, computing of data.

UNIT III: Data Analysis: Single frequency, bivariate analysis, Median vs QD, use of charts and diagrams. Editing of table and charts, exporting tables and charts in word document. Testing of hypothesis: Chi-square test, T-test, ANOVA, Correlation matrix, Generating reports and Interpretation of Data

UNIT IV: NVivo in Qualitative Research: Methodologies supported by NVivo - NVivo key terms – Creating a new project- Bringing material into NVivo: Interviews, articles and other documents, Creating nodes and Internides, Importing data files, audio and video transcripts, photos and images, web pages, social media content and research article

UNIT V: Coding and making nodes: Memos, annotations and links- Exploring people, places and other cases- Summarizing data in framework matrices- Displaying data in charts, models and graphs, tree maps and cluster analysis diagrams - Creating reports and extracts in qualitative research with Qualitative Lab- Practical .

Reference:

1. Foster, J.J. 1998. Data Analysis Using SPSS for Windows. Sage Publications Ltd. London.
2. Gaur, Ajai S and Sanjaya S Saur. 2009. Statistical Methods for Practice and Research. A guide to Data Analysis using SPSS. Sage Publications. New Delhi.
3. Gupta, S. P. 2009. Statistical Methods. New Delhi. Sultan Chand and Sons.
4. Padgett, D.L. 1998. Qualitative Methods in Social Work Research. Sage Publications. California.
5. Manual- N Vivo 10 for Windows- www.explore.qsrinternational.com/new-york-university

Data Processing & Analysis Skill - (SPSS & NVivo) (100 Marks)

1. Assignment: 10 Marks
 2. Class Participation: 10 Marks
 3. Record note: 20 Marks
 4. Practical (Skill Demonstration): 20 Marks
- End Semester – Viva Voce: 40 Mark

CONCURRENT FIELD WORK – III (Core)

II MSW

SEMESTER – III CODE: MSW337F

Learning Outcome: *The students will...*

- **Gain experience by applying the theoretical knowledge in the field**
- **Understand the functions and activities of field placement organization**
- **Acquire of the skills of applying the class learning into practice**

During the third semester field work, the students are placed in agencies according to their specialization and they undergo the field training under the close supervision of the agency personnel.

The students get a hand on experience of the day –to- day functioning of the agency. They assist the agency in their routine functions of the organization and participate in all the professional activities. It provides them an opportunity to link theory with practice.

The students are encouraged to undertake mini research studies, analyze data and present their findings. The students also undertake any assignments given to them by the agency; they may also undertake any research for the organization.

The Concurrent Field Work is for a period of a month (Total of 24 to 26 days). At the completion of the field work the students are required to submit the record for valuation and guidance. The CA marks are awarded by the supervisor out of 50 marks for the quality, regularity, initiatives, leadership, participation and team work.

At the end of the semester Viva Voce is conducted by an external examiner and marks are awarded out of 50.

Internal Components (50 Marks):

| | |
|---------------------------------------|------------|
| Presentation of Field Work Experience | : 10 Marks |
| Record Quality | : 15 Marks |
| Initiatives Taken and Progress Shown | : 15 Marks |
| Subject Areas Covered | : 10 Marks |

Viva Voce Components (50 Marks)

| | |
|---------------------------------------|------------|
| Knowledge Gained | : 10 Marks |
| Skills Acquired | : 15 Marks |
| Responsibilities and Initiative Taken | : 15 Marks |
| Presentation and Communication | : 10 Marks |

RESEARCH PROJECT –I (Core)

II MSW

SEMESTER – III

CODE: MSW336J

Learning Outcome: *The students will...*

- Gains knowledge and skills in developing a research proposal for undertaking a research

(quantitative and qualitative).

- Acquire knowledge on problem formulation and review of literature.

- Gain knowledge on designing the methodology and prepare tools for data collection.

Each student is assigned with a research supervisor. The students have to get the guidance and carryout the following steps and complete the research project.

1. Selection of Topic, Defining terms, Finalization of Objectives of Study.
2. Feasibility Study, Pilot Visit to the study field.
3. Detailed Research Proposal
4. Introductory Chapter
5. Review of Literature and Bibliography
6. Finalization of Research tool

The supervisor internally evaluates the work of the student out of 50 marks for the above components, considering the quality, punctuality and regularity of consultation and learning interest.

Internal (50 Marks)

| | |
|---|------------|
| Regularity in Submitting Reports | : 10 |
| Marks Consultation Received from the Supervisor | |
| : 15 Marks Progress Shown | |
| : 15 Marks Quality of Reports (Library and other resources used and Language Clarity) | : 10 Marks |

The student submits the approved chapters as a spiral volume. Viva Voce is conducted by an external examiner along with the concerned Supervisor. Marks are awarded out of 50.

The VIVA components/marks:

| | |
|---|------|
| Research Project Proposal | : 10 |
| Marks Chapter I | |
| : 10 Marks Chapter II - Literature Review | |

| | | | | | | |
|---|----|-------|--------------|-------|---------------|-------|
| : | | 10 | | Marks | | Tools |
| : | 10 | Marks | Presentation | and | Communication | |
| : | | | 10 | | Marks | |

Research Process

| | |
|----|---|
| | |
| 1 | Identification of List of Research Topics |
| 2 | Write up of three interested Research topics |
| 3 | General Introduction of selected research topic (Tentative) |
| 4 | Field Feasibility Report |
| | Review of Literature |
| 5 | Introduction which covers the objectives of RoL |
| 6 | Concepts |
| 7 | Definitions |
| 8 | Theories |
| 9 | Models |
| 10 | National and international policy, programmes, schemes, etc., |
| 11 | National and International situations |
| 12 | Summary of already explored areas |
| 13 | Research Gaps |
| 14 | Research Questions |
| 15 | Research Problems |
| 16 | Conclusion |
| 17 | Objectives (General and Specific) |
| 18 | Hypothesis (Optional) |
| 19 | Conceptual Framework |
| | Methodology |
| 20 | Field of Study |
| 21 | Working definitions |
| 22 | Source of data |
| 23 | Research Design |
| 24 | Sampling Design |
| 25 | Data analysis plan |
| | Preparations of Tool |
| 26 | <i>Demographic variables</i> |
| 27 | <i>Items to assess the objectives</i> |
| 28 | <i>Scale of measurement</i> |
| 29 | <i>Suggestions/Recommendations</i> |
| | Tool Standardization |
| 30 | Concurrent validity/construct validity/content validity/Face validity/Reliability |
| 31 | Pre-test |
| 32 | Final tool for data collection |
| 33 | Time schedule |
| 34 | Budget |
| 35 | Proposal |
| | Title of the Study |
| | General Introduction |

| | |
|--|--|
| | Statement of the Problem |
| | Significance of the Study/Need of the study |
| | Scope of the Study |
| | Field of Study |
| | General and Specific Objectives |
| | Hypothesis (Optional) |
| | Tool of data collection |
| | Pre testing of tool |
| | Source of data |
| | Research design |
| | Sampling design |
| | Data analysis plan |
| | Time schedule |
| | Budget |
| | Expected outcome |
| | Name and address of the researcher with station and date |
| | Name and signature of the guide |

PSYCHOMETRIC & TESTING TOOLS (Certificate Course-2) (30 Hours Only)

II MSW

SEMESTER – III

CODE:MSW338X

Learning Outcome: *The students will...*

Gain knowledge about psychological assessment and purposes

Acquire skills about intelligence, aptitude and interest assessments

Explore various types of assessment in personality, emotions, health and will learn the administration of such tests

Gain assessment skills in the areas of family and career

UNIT-I: Psychometric testing - Concept and meaning- Practice of using psychological theories in the construction of psychometric measures- Need and significance of psychometric testing for personal growth and career development- Reliability and validity in psychometric tool.

UNIT-II: Assessment of Intelligence, Aptitude and Attitude: Assessment of intelligence: Bhatia's Battery of Performance Test, Wechsler adult intelligence scale (WAIS). Emotional Intelligence Inventory by S K Mangal, Attitude Scale by Chauhan and Saroj Aurora.

Unit III: Assessment of Aptitude: General Aptitude Test Battery (GATB). Assessment of Interests: Strong Interest Inventory

UNIT-IV Assessment of Personality: Measures of personality: Myers-Briggs Type Indicator (MBTI. Adjective Check list – Personality assessment in work setting, Five Personality Trait Inventory by K. S. Misra. (English)

UNIT- V Assessment related to Career: Comprehensive Interest Schedule, Assessment of Emotions: BDI-II, Assessment of aspiration: Level of aspiration measure (LOA). Career Preference Record by Vivek Bhargava.

Reference

1. Anastasi A. & Susana Urbina (2004) 7th Edition. Psychological Testing, Pearson Education Inc., New Delhi.
2. Aiken, L. R. (1997). Psychological testing and assessment .Allyn& Bacon.
3. Cohen, R. J., Swerdlik, M. E., & Phillips, S. M. (1996). Psychological testing and assessment: An introduction to tests and measurement. Mayfield Publishing Co.
4. Cronbach, L.J. Essentials of Psychological Testing.
5. Fernandez-Ballestros, R. 1st edition (2003) Encyclopedia of Psychological Assessment. Vol I and II. Sage Publications. New Delhi
6. Gregory, R.J. (2006). Psychological Testing: History, Principles, and Applications (4th Ed.). New Delhi: Pearson Education., Applications, and Issues. Australia: Thomson Wadsworth.
7. Kaplan, R.M. & Saccuzzo, D.P. (2007). Psychological Testing: Principles, Applications, and Issues. Australia: Thomson Wadsworth.
8. Parameswaran & Ravichandra (2003) Experimental Psychology. Neel Kamal Publications.
9. Whiston, S.C (1999). Principles and applications of assessment in counseling, Wadsworth, Belmont. Brooks- Cole
10. Woodworth, R.S. and Scholesberg (1972) Experimental psychology. Holt, Rinehart & Winston.

Note: it is an extra credit course (Optional). Course Fee and duration will be fixed by the department in consultation with the resource persons. Students need to pay Rs. 50 to the office of Controller of Examinations. The course will be conducted for minimum of 30 hours outside the regular time table. No CIA or Semester end exams will be conducted. Certificates will be issued by the Department for those who have completed the course

HUMAN RIGHTS AND SOCIAL LEGISLATION (Main Core-10) II MSW
SEMESTER – IV CODE:MSW430T

Learning Outcome: *The students will...*

- **Gain knowledge about human rights and social legislations**
- **Understand the different social legislations**
- **Acquire the skills of applying the human rights and social legislation**

UNIT 1: Human Rights: Concept, Scope - Universal Declaration of Human Rights - International Covenant on Economic, Social and Cultural Rights - International Covenant on Civil and Political Rights. Human Rights in the Constitution of India. Roles and Powers of National Human Rights Commissions. Responsibilities of State Human Rights Commissioner - Social Work profession and Human Rights.

UNIT 2: Contemporary Issues: Rights of Children, Women, Dalits, Refugees, and Victims of HIV/AIDS and Capital Punishment. Tools used for Social Defense: Law, Welfare Schemes, Advocacy, Networking, Campaigning and Social Action. NGOs and Human Rights: Amnesty I66-71International (AI), People’s Union for Civil Liberties and People’s Watch.

UNIT 3: Social Legislation: Meaning and Scope. Indian Penal Code, Family Courts, Lok Adalats, The Legal Aid, Public Interest Litigation and Right To Information Act (2005). Right to Education (RTE).

UNIT 4: The Special Marriage Act 1955, Adoption and Maintenance Act 1986, Juvenile Justice act 1986, Child Labor Prohibition and Regulation Act 1986, Bonded Labor Abolition Act 1976. The Maintenance and Welfare of Parents and Senior Citizens Act 2007.

UNIT 5: Protection of Civil Rights Act 1955. Prevention of Immoral Traffic Act 1986 Protection of Consumer Act. 1986. Transplant of human Organ Act 1994, Tamil Nadu Prohibition of Eve Teasing Act 1988, Tamil Nadu Prohibition of Ragging Act 1997.

Reference:

1. Aish Kumar Das. 2004. Human Rights in India. Sarup and Sons. New Delhi.
2. Chiranjivi J. 2002. Human Rights in India. Oxford University Press. New Delhi.
3. Kohli A.S. 2004. Human Rights and Social Work Issues. Society for Community Organisation. Madurai.
4. Muzafer Assadi, 2010, Human Rights Perspectives and Social Justice, Serials Publications, New Delhi.
5. Quinn Fredrick. 2005. Human Rights in Retreat. Society for Community Organisation. Madurai.
6. Sawant. P.B. 2004. Human Rights. Society for Community Organisation. Madurai.
7. Shantha Kumar. 2004. Human Rights, People's Watch. Madurai.
8. Susan C. Mapp. 2008. Human Rights and Social Justice in a Global World. Oxford University Press. New Delhi.
9. Tapan Biswal, 2007, Human Rights Gender and Environment, Viva Books Pvt Ltd, New Delhi
10. Tapan Biswal. 2006. Human Rights – Gender and Environment. Vira Publications. New Delhi.
11. Tapomoy Deb, 2009, Managing Human Resources in Industrial Relations, 1ed Anurag Jain for Excel Books, New Delhi
12. Tony Evans, 2011, Human Rights in The Global Political Economy, Viva Books Pvt. Ltd, New Delhi
13. UGC, 2001, Human Rights and Duties Education, Shri Prem Varma, New Delhi
Upendra Boxi. 2007. Human Rights in a Post Human World. Cambridge University Press. New Delhi.

DEVELOPMENT STRATEGIES (Main Core-11)

II MSW SEMESTER – IV CODE:MSW431A

Learning Outcome: *The students will...*

- Gain knowledge about development strategies
- Understand the functions and activities of different developmental strategies
- Acquire the skills of using the developmental strategies in different sectors
- Able to develop a strategy for development.

UNIT 1: Strategy Planning –Introduction, developing vision, mission, strategy, action plan, obtaining feedback for improvement, identifying action steps in bringing about community and system change.

UNIT 2: Self Help Groups: meaning- Characteristics- formation- animation. Federation of SHGs at the Panchayats, Cluster, Block and District. Maintenance of records in SHGs. Grading and evaluation of SHGs. Micro finance- meaning and characteristics- Philosophy of micro finance and workings of Micro finance. Application of Self-help Group and Micro-finance.

UNIT 3: Watershed Development – meaning, philosophy and objectives.Common guidelines for watershed development projects (revised edition 2011) – Institutional arrangements at National, State, District, Project implementation agency and Village levels.People’s Participation. Selection criteria.Project management – Preparatory, work and withdrawal phases. Financial outlay and fund flow. Monitoring and evaluation, Learning and outcomes.Application of watershed development programme.

UNIT 4: Wasteland Development – definition, meaning and categories. Remote sensing and GIS in wasteland mapping. Methodology of wasteland assessment.Wasteland generation process. Methods of wasteland reclamation – Afforestation, Reforestation, Providing surface cover, Mulching, Strip farming, Terracing, Contour ploughing, Leaching, and Changing agricultural practice. Integrated Wasteland Development Programme (IWDP) of India.Application of wasteland development programme.

UNIT 5: Entrepreneurship Development – meaning, characteristics. Personality and dynamics of entrepreneurs. Entrepreneurship Skill Development Programme (ESDP) of India: Industrial Motivational Campaign, Entrepreneurship Awareness Programme, Entrepreneurship-cum-Skill Development Programme, Management Development Programme. Functions of EDII-Chennai. Application of Entrepreneurship development programme.

Reference

1. Daniel A.V. 2011. Strategies for Agricultural Development. Vora publications. Bombay.
2. DanialLazer. 2008. Micro Training Poverty and Eradication. New Century publications. New Delhi.
3. Desai Vasant. 2008. Dynamics of Entrepreneurial Development. Sultan Anand& sons. New Delhi.
4. Giriappa. S. 2011. Water the Efficiency in Agriculture. Oxford Press. Calcutta.
5. Gupta C.B. 2004. Entrepreneurial Development. Sultan Anand& Sons. New Delhi.
6. Jayashree. 2005. Entrepreneurial Development. Marghan publications. Chennai.
7. Selvapathi K., 1995. An Economic Analysis of the Watershed Development. Sacred Heart College. Tirupattur.
8. Khan M. A. 2002. Water Shed Management for Sustainable Agriculture. Agrobias publications. Judhpur.
9. Lalitha.N. 2003. Self Help Groups in Rural Development. Dominant publications. New Delhi.
10. Poomani C. 2000. Functioning of MahalirThittam. Sacred Heart college. Tirupattur.
11. Sharma R. K. 2011. Entrepreneurship Development. Himalaya publications. Bombay.
12. UpendraNath Roy. 2005. People Participation in Watershed Management. Kanishka Publisher. New Delhi.
13. Usharani. K., 2008, Marketing Strategies and Finance Viability of Self Help Groups, Sarop& Sons, New Delhi.
VijayaAgarwal, 2005, Micro Finance An Introduction, ICFAI University, Hydrabad

ORGANISATIONAL BEHAVIOUR (Main Core-11)

II MSW

SEMESTER – IV

CODE: MSW431B

Learning Outcome: *The students will...*

- **Gain knowledge about organizational behaviour**
- **Understand the functions and activities of organizational behavior**
- **Acquire the skills of working with organized sectors and human resources**

UNIT 1: Organizational Behaviour: Brief History, Definition, Contributions of the Behavioral Sciences -Human Behavior at Work - Theories of Motivation – Systems Theory, EQ at Work - Stress and anxiety management, Frustration, Conflict. Job Satisfaction, Job Rotation, Job Clarification, Employee Morale, Job Monotony and Role Conflict.

UNIT 2: Team-work and Team building, Change Management, Leadership: Theories, Styles and power structure, Decision-Making - Employee Participation and Organizational Commitment.

UNIT 3: Organizational Development: Concept, Definition, theories and practice: OD and OB, OD Intervention techniques: Sensitivity Training, Quality Circles, Survey Feedback, Management of change - Concept of Organizational Culture and Organizational Climate – Organizational Diagnosis.

UNIT 4: OB Practices: 5S Model, HR Connect, Six Sigma and Lean Six Sigma, Total Productivity Management (TPM), Total Quality Management (TQM), Kaizen Groups, International Standard Organization (ISO), Emotional Intelligence vs Emotional Quotient (EI), Quality of Work life (QWL) - Work-life Balance.

UNIT 5: Relevance of OB in Social Work - Challenges involved in application and practice of OB. Behavioral changes in individuals and teams. – Case study presentations.

References

Avinash K Chitale And Rajendra Prasad Mohanty And Nishith Rajaram Dubey, 2013, Organizational Behaviour, Phi Learning Pvt Ltd, New Delhi.

Dipak Kumar Bhattacharyya, 2013, Organizational Behaviour, Oxford University Press, New Delhi.

Gareth R Jones, 2007, Organizational Theory Design Change, Dorling, Kindersley Ind Pvt Ltd, New Delhi.

Jai B P Sinha, 2008, Culture and Organizational Behaviour, Sage Publications, New Delhi.

Khanka S.S, 2013, Organizational Behaviour(Fourth Edition), S.Chand And Company, New Delhi.

Margie Parikh and Rajen Gupta, 2012, Organizational Behaviour, Tata Mcgraw Hill Publications, New Delhi.

Michael J Kavanagh and Mohan Thite, 2009, Human Resource Information Systems, Sage Publications, New Delhi.

Prasad L. M., 2014, Organizational Behaviour, Sultan Chand and Sons, New Delhi.

Richard L Daft, 2012, Understanding The Theory And Design Of Organisations,, Cengage Learning India Pvt India, New Delhi.

Shuchi Sharma, 2013, Organizational Behaviour, Tata Mcgraw Hill Publications, New Delhi.

Stephen P Robbins and Timothy A Judge And Neharika Vohra, 2013, Organizational Behaviour (Fifteenth), Dorling Kindersley Ind Pvt Ltd, New Delhi.

Udai Pareek, 2010, Understanding Organizational Behaviour(Second), Oxford University Press, New Delhi

NGO MANAGEMENT (Main Core-11)

II MSW

SEMESTER – IV

CODE: MSW431C

Learning Outcome: *The students will...*

- Gain knowledge about establishing and managing a nongovernmental organization
- Understand the functions and activities of a nongovernmental organization
- Acquire the skill of working with nongovernmental organization

UNIT 1: Understanding about NGO as nonprofit organizations involved in development work. Registering an organization, Strategic Planning of NGOs- Developing Vision, Mission and Goals and translating them into programs and projects. Interfacing with community, community based organizations, corporate and government. Importance and strategies of Networking of NGOs.

UNIT 2: Programme Planning and project planning - The project cycle - Project cycle phases – identification, design, implementation, evaluation. Project Cycle Management. Detailed operational plan, GANTT chart - Role of Operational planning in running program and projects. Writing Concept note.

UNIT 3: Fund Raising: Fund Raising strategy & techniques. Classification of donors, Creating donor profile. Developing appropriate marketing tools, Presentation to donors, developing a funding proposal, Developing and maintaining donor relationship. Documentation- Maintaining records and data banks.

UNIT 4: Monitoring & Evaluation: Concept & Need. Role of Logical Framework Analysis (LFA) in monitoring and evaluation. Developing Objectively Verifiable Indicators and Means of Verification - Gathering quantitative & qualitative information - Reporting information for action and accountability. Auditing: Social Auditing, Financial Auditing and Data Quality Auditing.

UNIT 5: Finance Management: Budgeting, accounting and auditing. Banking procedures & practices. Maintenance of books, accounts and financial documents and records. Cost benefit analysis - Allocations and restrictions in budget. Maintaining inventory. Financial Reporting to donors and other stakeholders.

Reference

1. Asok Kumar Sarkar, 2008, Ngo's and Globalization, Rawat Publications, New Delhi.
2. Chandra Prasanna. 2003. Projects: Planning, Analysis, Selection, Financing, Implementation and
Review. 5th Edition. Tata Mcgraw Hill Pub.Co. Ltd. New Delhi.
3. Emmanuel S. Fernando, 1999, Fund 100, Jupiter, Mumbai.
4. Gangrade K.D, Soorya Moorthy.R. 2006. Ngos in India. Prem Rawat Publication. New Delhi.
5. Ghosh.K..A and Prem Kumar. 1997. Project Management. Anmol Publishing Ltd. New Delhi.
6. Joel S.G.R.Bhose, 2003, Ngo and Rural Development, Concept Publishing Company, New Delhi.
7. Jose Murickan SJ & R.Mohan Raj & Kurian K. Katticaren, 2000, Paradigm Shifts In Development
Cooperation, Indian Social Institution and Bangalore.
8. Malleswari B., 2010, Micro- Finance and Women Empowerment, Serials Publications, Coimbatore
9. Michael Norton & Murray Culshaw, 2008, Getting Started in Fundraising, Sage Publications, New
Delhi.
10. Vijay Padaki & Manjulika Vaz, 2003, Institutional Development in Social Interventions, Sage
Publications, New Delhi.
11. Winfo, 2004, a Hand Book for Ngo's On Fund Raising, Winfo, Coimbatore.

LIVELIHOOD AND SOCIAL AUDIT (Main Core-12)

II MSW

SEMESTER-IV

CODE: MSW432A

Learning Outcome: *The students will...*

Understand the concept, need, importance and principles of rural livelihood and social audit.

Gain knowledge on rural livelihood and the various methods involved in social auditing

Acquire skills to practice social accounts and audit.

Unit- 1: Sustainable Livelihood: Context of Poverty eradication - (Concept - Poor, Multidimensional aspect of Poverty, Tools of Poverty Assessment, historical development of poverty eradication and alleviation programs) Livelihood – Concept, Sustainable livelihood – principles, approaches (UNDP, DFID, CARE, OXFAM) and frameworks. Livelihood mapping: Tools and techniques for livelihood mapping and sub sector analysis

Unit- 2: Institutionalized Livelihoods: Livelihood promotions: By different agencies (Government and Non-governmental organizations - Local and International Organizations) – Major livelihood programs in India (National Rural Livelihood Mission (NRLM), Pudhu Vazvu Thittam, Mahalir Thittam) – Challenges in livelihood promotions; Livelihood strategies: Livelihood portfolio for rural poor, Agriculture, Migration, Diversification, Sectoral approach.

Unit-3: Social Accounts: Social Accountability-Concept; Social accounting- Concept – History, Scope, objectives and importance. Principles of social accounting – Models of social accounting – Approaches – Steps involved in Social accounting - Benefits and challenges of social accounting, Distinction between financial accounting and social accounting.

Unit-4: Community Social Audits: Social Audit: Concept, Scope, Objectives. Principles of social audit: Transparency, Participation, Representative Participation and Accountability. Types of social audit. Stages in social audit: Preparatory stage, Implementation stage and Follow up – Benefits and challenges of social audit – Social Audit vs Financial Audit – Community Audit: Role of gram panchayat and gram sabha in social audit

Unit-5: Skills for Social Worker: Use of existing Livelihood frame works in the community, Practical use of tools and techniques for social Accounting and auditing - Social Impact Assessment (SIA), Social Accounting and Auditing (SAA) Participatory Assessment and Planning for SL (PAPSL), Rapid and Participatory Livelihood Security Assessment (RLSA) and Community Audit and Reporting, Writing the books of accounts and audit report for Institutions (Corporates-CSR, Educational Insititutions-ISR, NGOs). Documentation and Reporting.

References

1. Aggarwal, Nomita. 2003. Social auditing of environmental laws in India. New Century Publications. New Delhi.
2. Auret, Diana and et.al. 2009. Participatory social auditing: a practical guide to developing a gender-sensitive approach. Institute of development studies. Brighton.
3. Ball, Amanda and Stephen O. Osborne. 2011. Social accounting and public management: accountability for the common good. Routledge Publisher. New York.
4. Basu, S.K. 2009. Fundamentals of Auditing. Dorling Kindersley (India) Pvt. Ltd. New Delhi.
5. Baumgartner, Ruedi. 2004. In search of sustainable livelihood systems. Sage publications, New Delhi.
6. Costa, Ericka and et. Al. 2014. Accountability and Social Accounting for social and non-profit organizations. Emerald group publishing limited. Bingley.
7. Dagoon, Jesse D. 2003. Teaching strategies in livelihood and vocational education today. Rex Books store inc. Manila.
8. Lont, Hotze and Otto Hospes. 2004. Livelihood and microfinance. Eburon academic publishers. Delft.
9. Niehof, Anke and Lisa Price. 2001. Rural livelihood systems: a conceptual framework. Upward Publisher. Wageningen.
10. Pagare, Dinakar. 2010. Principles and practice of auditing. Sultan Chand and Sons, New Delhi.
11. Prasuna, D G. 2005. Auditing: the emerging landscape. The ICAI University press. Hyderabad.
12. Premavathy, N. 2012. Practical auditing. Sri Vishnu publications. Chennai.
13. Rakodi, Carole and Tony Lloyd-Jones. 2002. Urban livelihoods: A people-centered approach to reducing poverty. Earthscan publications limited. London.
14. Sankaran, S. 2012. Indian economy: problems, policies and development. Margham publications.

Chennai

15. Yanovsky, M. 2009. Social Accounting Systems. Transaction Publishers. New Jersey.

HUMAN RESOURCE DEVELOPMENT (Main Core-12)

II MSW

SEMESTER – IV

CODE: MSW432B

Learning Outcome: *The students will...*

- **Gain knowledge about human resource development**
- **Understand the approaches and activities of human resource development**
- **Acquire the skills of developing human resources in different sectors**

UNIT 1: HRD: Concept, Objectives, Approaches & Principles – Systems & strategies in HRD – HRD Interventions: Organizational Goal setting process - Key Result Areas (KRA) and Key Performance Indicators (KPI) - Performance Measurement Systems – Feedback sessions - Coaching, Mentoring, Career planning, Career development, Reward system.

UNIT 2: Approaches to Measuring Human Resources: Competitive Benchmarking, HR Accounting, HR Auditing, HR Effectiveness Index, HR Key Indicators, HR Management by Objectives.

UNIT 3: Talent Development: Concept and importance - Training Need Analysis at Individual and Organizational level: Designing and conducting Training programs - Types of Training: On the Job and Off the Job Training- Coaching Apprentices, Job Rotation.

UNIT 4: Training & Development: Methods: role play, structured and unstructured role plays, in-basket exercise, simulation, case study and sensitivity training. Evaluation of Training Program. Kirk Patricks model- The Cost/Benefit Analysis of training- Using the results to improve training and development function. Benefits and Types of Training in HRD. Improving training utility by following up Training Action Plans.

UNIT 5: Employee Empowerment: Concept, Definition & Objectives of employee empowerment – Prerequisites – Types & benefits – Strategies - Ways to employee empowerment – Employee Counselling. Role of Counselors in Organizations. Developing Positive Employee Relationship – Balance Score Card.

References:

1. Arun Kumar, 2000, International Encyclopaedia of Management Training and Development Anmol Publications Pvt.Ltd, New Delhi
2. Bhatia S K, 2008, Emerging Human Resource Development (HRD), Deep & Deep Publications Pvt.Ltd, New Delhi.
3. Uday Kumar Halder, 2010, Human Resource Development, Oxford University Press, New Delhi.
4. Denisi, Griffin, 2008, Human Resource Management, Houghton Mifflin Company, New York.
5. Rishipal, 2011, Training and Development Methods, S. Chand Competition, New Delhi
6. Khanka S. S., 2003, Human Resource Management, S, Chand & Company Ltd, New Delhi.
7. Jon M. Werner, Randy L. Desimone, 2009, Human Resource Development, Cengage Learning, New Delhi.
8. Nair L G, Latha Nair,1999, Personal Management and Industrial Relations, S. Chand & Company Ltd, New Delhi.
9. Rao T V, 2009, Human Resource Development, SAGE Publications, New Delhi.
10. Raymond A Noe, Amitabh Deo Kodwani, 2012, Employee Training and Development, Tata McGraw-Hill Edition, New Delhi.
11. Tapomoy Deb, 2006, Human Resource Development (Theory and Practice), Ane Books India, New Delhi.
12. Vinod N Patel, Girish K Rana, 2007, Personal Management, Oxford Book Company, Jaipur.

COUNSELING & CAREER GUIDANCE (Main Core-12)

I MSW SEMESTER – IV CODE:MSW432C

Learning Outcome: *The students will...*

- **Gain knowledge about counseling and career guidance**
- **Understand the methods and steps of counseling and guidance**
- **Acquire the skills of extending counseling services to the needy**

UNIT 1: Counseling and Guidance: Concept, Need and Scope - Needs and concerns of adolescents related to health, development and career - Counseling in educational settings: Educational planning - Student appraisal – Assessment instruments & techniques. Promoting partnership of Schools, Teachers and Families. Career Choices of Adolescents and Parental concerns- emerging issues.

UNIT 2: Marital and Pre – marital Counseling: De addiction and Substance abuse counseling. HIV& AIDS Counseling. Sexual and reproductive health & Adolescent sexual reproductive rights. Promoting safe sexual behavior and life style among adolescents. Enhancing adolescent maternal health among married adolescents. Counseling adolescents to cope with stress, anxiety, depression, suicide and other high risk behaviours.

UNIT 3: Career Planning: Factors important for career Choices and Career Planning - Steps in Career Planning - Basic internal and external information required for planning a career - Career Options available - Options available after X, Options available after XII, Options for Vocational Skill training. Career Development- Steps to implement Career Development Plan - Psychological Assessment in Career Counselling, Corporate Counselling.

Unit 4: Personality and Career Testing: Career Related Assessment: Strong Career Interest inventory -**Personality Test:** 16 Personality factors (16PF), Adjustment Inventory for College Students (AICS), **Intelligence Test:** Wechsler Adult Intelligence Scale (WAIS).

Unit 5: Psychological Testing: Social Readjustment Rating Scale (SRRS), Perceived Stress Scale (PSS)

Reference:

1. Bharti Satsangi, 2015, Educational Counseling And Guidance, Rajat Publications, New Delhi
2. Collin Feltham And Windy Dryden, 2010, BreifCounseling(Second), Tata Mcgraw Hill Publications, New Delhi
3. Edward Neukrug, 2012, Counseling Theory And Practice, Cengage Publications, New Delhi
4. Elizabeth Reynolds Welfel And Lewis E Patterson, 2011, The Counseling Process(Sixth), Cengage Publications, New Delhi
5. Jeffrey A Kottler And David S Shepherd, 2009, Counseling Theories And Practices, Cengage Publications, New Delhi
6. Jim Barrett, 2010, Career Aptitude And Selection Tests(Third), Kogan Page Publishers, New Delhi
7. John Antony D., 2011, Types Of Counseling, Guru Publications, Tamilnadu
8. Richard Nelson Jones , 2008, Basic Counseling Skills(Second), Sage Publications, New Delhi
9. Richard Nelson Jones, 2012, Basic Counseling Skills(Third), Sage Publications, New Delhi
10. Samuel T Gladding, 2011, Counseling A Comprehensive Professtion(Sixth), Dorling Kindersley Pvt Ltd, New Delhi.

PROJECT MONITORING AND EVALUATION (Main Elective-3) (30 Hours Only)

II MSW

SEMESTER IV

CODE: MSW433A

Learning Outcome: The students will gain...

Knowledge about monitoring and evaluation systems and their use in project cycle management

Learn methods and skills to carry out monitoring using logframe matrix

Knowledge to plan and carry out evaluation studies and measure the results of the project

Unit 1: Project - Concept, Process in developing projects. Action research – concept, key elements, tools –concept and designing of questionnaire, interviews and need surveys. Data collection. Compiling and data analysis. PRA – concepts, tools and methods.

Unit 2: Planning & Implementation: Planning– concept and process – Objectives, Current situation, Activities/Actions, and Resources. Developing a funding proposal. Implementation – concept, different ways of organizing for different purpose, Task allocation, and Role taking. Coordination, communication, accountability,

Unit 3: Monitoring – meaning, tools in monitoring - performance indicators, implementation schedule. Barriers in monitoring. problem solving. Identifying and choosing solutions. Monitoring team/follow-up team.

Unit 4: Evaluation: Concept, process – examining project proposal and plans, generating evaluation indicators, validating, data collection, analyzing data and conclusions, Writing an effective Evaluation report.

Unit 5: Evaluation and Monitoring Tools: Developing Terms of Reference – Meaning, guiding principles and values. Developing Logical Framework Analysis–concept and features. LFA framework, process in developing LFA.

Reference:

1. Barton, T. (1997). Guidelines for Monitoring and Evaluation – How are we doing? CARE International, Uganda
 2. Casley D J and Kumar K (1988) The Collection, Analysis, and Use of Monitoring and Evaluation Data, A Joint Study by The World Bank, IFAD and FAO, London: The John Hopkins University Press.
 3. Curry S and Weiss J (2000) Project Analysis in Developing Countries, Second Edition, MacMillan Press, Basingstoke.
 4. DFID (1995) Stakeholder Participation and Analysis, London: Social Development Division, DFID
 5. Feuerstein M.T (1986) Partners in Evaluation, Evaluating development and community programmes with participants, MacMillan Education, London.
 6. Guijt, Irene; Jim Woodhill (2002). Managing for Impact in Rural Development: A Guide for Project M&E. International Fund for Agricultural Development.
 7. Handbook on Monitoring and Evaluating for Results, Evaluation Office, UNDP, 2002
 8. Margoluis, R. and Salafsky, N. (1998). Measures of Success: Designing, Managing, and Monitoring Conservation and Development Interventions. Island Press: USA.
- Roche, Chris (2004). Impact Assessment for Development Agencies. Oxfam, London

SKILL MATRIX AND COMPETENCY MAPPING (Main Elective -3) (30 Hrs Only)

II MSW

SEMESTER IV

CODE: MSW433B

Learning Outcome: The Student will....

Gain the concept and essential features of job description.

Gain knowledge on skill matrix and skill gap analysis

Understand the concept and factors for competency mapping

Acquire the skills for preparing job description and conduct management games.

Unit-1: Job Description: Concept; Essential Elements of Job Description; Concept of Task-Statement; Uses of Job Description; Roles and Responsibilities; Essential and Non-Essential Functions of a Job.

Unit-2: Skill Matrix: Concept of Skill Matrix; Skill Matrix Grid; Identifying and Addressing Skill Gaps; Machine Utility and Employee Capability. Concept of 'Skill Based Matrix'.

Unit -3:Competency Mapping: Concept; Characteristics; Classification of Competencies; Need for Competency Mapping; Competency Mapping for Management Staff; KSA factors and Competency Mapping; Factors Affecting Competency Mapping.

Unit-4: Process of Competency Mapping: Competency Identification; Tools for Identifying Competencies; Criticality of Competencies; Levels of Competence.

Unit – 5: Practical Assignment – Writing Job Descriptions and Identifying Competencies Required for 4 to 5 different roles. Management Games for Managers and Executives (Play and Learn) Skill Lab – Demonstration of Competencies and skills

References:

1. Adhikary M., 2008, Emerging Human Resource Development, Deep & Deep Publications, New Delhi.
2. Denisi & Griffin, 2008, Human Resource Management, Houghton Mifflin Company, New York.
3. Jon M.Werner & Randy L.Desimone, 2012, Human Resource Development, Cengage Learning India Pvt.Ltd, New Delhi.
4. Rao P. L., 2010, International Human Resource, Excel Books, New Delhi.
5. Rao T.V., 2008, HRD Score Card 2500 Based On Hrd Audit, Sage Publications, New Delhi
6. Rao V.S.P., 2011, Human Resource Management (3rd Edition), Excel Books , New Delhi
7. Wayne F.Cascio & Ranjeet Nambudiri, 2013, Managing Human Resources (8th Edition), Mcgraw Hill Education Pvt.Ltd, New Delhi

SOCIAL WORK WITH FAMILIES AND CHILDREN

(Main Elective-3) (30 Hours Only)

II MSW

SEMESTER IV

CODE: MSW433C

Learning Outcome: The students will

Gain knowledge on functions, interaction and issues concerning adults and children in Indian families

Gain knowledge and skills in family intervention

Understand the needs of the children and programmes for children

Unit I: Understanding Family: Definition, Family functions, Family norms, Family practices. Family life education: Scope, Focus. Positive parenting and Oppressive parenting. Trends in the changing family systems.

Unit II: Family Issues: Separation and divorce, Lack of adequate child care, infertility - Single parent families, Children in single parent Families. Family Violence: Wife battering, Husband abuse, Child abuse, Elder abuse, Parent abuse.

Unit III: Family Intervention: Finding employment for jobless families, Handling stressors of urban families, Support to adoptive parents and adoptive children. Methods of assessment & Rehabilitation. Application of family therapy models.

Unit IV: Children: Importance of early attachments to parents in childhood - developmental derailments and disruptions of children - Educational Status and needs of children and adolescents- School Social Work with children, parents, teachers and administrators.

Unit V: Intervention with Children: Child Abuse-dimensions and interventions; Child trafficking-dimensions and interventions; Working Children & Children of sex workers – Interventions. State and Central Government programmes for children

Reference

1. Anjali Gandhi(1996), School Social Work, Common wealth Publishers, New Delhi
2. Asha Rane(1994) Street Children: a challenge to the Social Work Profession, TISS, Bombay
3. Dandekar(1996) The Elderly in India, Sage, New Delhi
4. Desai and Raju (2000) Gerontological Social Work in India: Some issues and perspectives, BR Publishers, New Delhi
5. Devi, Laxmi(ed)1998, Child and Family Welfare, Anmol Publications, New Delhi
6. Harsh Mander & Vidya Rao (1996) An agenda for Caring: interventions for Marginalized groups, VHAI, New Delhi
7. Khargiwala (1993) Family dynamics: social work perspectives, Anmol, New Delhi
8. Krishnan & Mahadevan (1992) The Elderly Population in the Developed World: Policies, Problems and Perspectives, BR Publishing
9. Tripathy S Ned(1996) Child Labour in India, Discovery Publishing House, New Delhi
10. UNICEF (1994), The Child and the Law, UNICEF, New Delhi.

ENVIRONMENTAL SOCIAL WORK

(Main Elective 4) (30 Hours Only)

II MSW

SEMESTER – IV

CODE:MSW434A

Objectives

To help the students to learn basic facts about Ecology, Environment and Energy resources.

To increase the knowledge on various issues on Environment and the roles of Movements for the Environment Protection.

To provide an understanding roles and responsibilities of Social Workers to protect the nature.

UNIT–I: Eco system & Environmental Issues: Environment degradation and pollution of Natural Resources- Air, Soil, Water, Population, Sanitation, Housing, Encroachments over Common Property Resources, Energy crisis and Rural Poverty.

UNIT –II: Environment Consciousness- NGOs, Social Workers and Ecological Movements: Global level, People’s initiatives to save their environment- Chipko Movement - Save forests movement – Mitti Bachao Andolan - Movements against big dams-Narmada and Tehri - Eco farming- Natural farming efforts.

UNIT–III: Environment Action and Management: State and the Environment preservation - Rio Summit and its implications - Government Policies and programmes - Grassroots Organization - Women and Conservation of Environment -Panchyats and Environment. Environment Management: Role of Traditional - State controlled - people controlled and jointly managed systems - Waste Management.

UNIT – IV: Environment Protection Laws and Role of Social Worker: The Environment Protection Act 1986 - Air Pollution Act 1987 - Water Pollution Act 1974. Power and functions of Central and State Pollution Control Boards: Type of offences by companies, procedures, and penalties. (Latest amendments may be considered while teaching these laws).

UNIT – V:Environment and Field Action Visit of a local area for documenting environmental assets- River, forest grass land, Hill etc., Visit to a polluted site, Study of flora and fauna, Study of simple eco system, Forest conservation, Standards and tolerance levels – Unplanned urbanization- Environmental movements in India - Role of NGOs in Environmental issues – Government agencies in environmental protection – Social work initiatives at different levels.

References:

1. Abbasi. S.A. 1998. Renewable energy sources and their Environmental Impact. Prentice Hall London.
2. Agarwal S.K. 1993.Environmental protection. Himalaya Publishers, New Delhi.
3. Andromeda. 1995. New Science encyclopedia: Ecology and environment. Oxford Publishers. London
4. Benny Joseph. 2005. Environmental studies. Tata McGraw Hill Publishers. New Delhi:
5. Cutter Susan L. 1998. Environmental Risks and Hazards. Prentice Hall London.
6. Dash Sharma P. 1998. Environment Health and development. Anmol Publishers. New Delhi.
7. Gadgil, Madhav and RamchandraGuha, 1995 Ecology and Equity; the use and Abuse of Nature in Contemporary India, New Delhi, Penguin Publishers.
8. GuhaRamchandra, 1991 The Unquiet woods, Ecological Change and Peasant Resistance in the Himalayas, New Delhi: Oxford University Press
9. Gupta Sunil. 1997. Environment Population and resources. Anmol Publishers. New Delhi.
10. Kannan 1991. Fundamentals of Environmental pollution. S. Chand. New Delhi.
11. Krishan. 1994. Fundamentals of Environmental pollution. S. Chand and Company. New Delhi
12. Luoma Samuel N. 1984. Introduction to environmental Issues. Macmillan Publishers. Calcutta.

PERFORMANCE MANAGEMENT (Main Elective-4) (30 Hrs Only)

II MSW

Semester IV

Code: MSW434B

Objectives

To help the students to learn basic facts about performance management and performance plan.

To increase the knowledge on the importance of feedback in improving performance.

To provide an understanding of the role of employee's performance appraisals.

Unit-I: Concept of Performance Management and Developing Performance Plan:

Definition and basic concept of performance and performance management; Determinants of Performance – Setting relevant and realistic goals with employees; Development and contents of a performance plan for group/team and individuals; Strategies in developing performance plan. Models and theories of performance management. Balance Score Card. Performance Management and Human Resource Management

Unit-II: Feedback and Performance: Developing system to source feedback (Positive, Negative and Just Right); Classification of Feedback (Qualitative and Quantitative); Evaluating and Using Feedback for improving employees performance.

Unit-III: Employees Performance Appraisals (Performance Reviews) Guidelines for conducting Performance Appraisals and Reviews; Conducting Employee 360 Degree Performance Reviews: Trends in Performance Appraisal

Unit-IV: Reward Management: Methods and techniques in rewarding employees performance; Reward Management; Standard format for performance appraisal; Software Applications for performance appraisal.; Linking performance with Compensation.

UNIT V: Performance Problems: Employees Performance Problems/Issues; Factors leading to employees performance problems; Mentoring, Coaching and Training non-performers; Improving employee commitment. Managing Team Performance: Types of teams and Implications for Performance Management – Purpose and Challenge of Team Performance Management – Rewarding Team Performance Implementing Performance Management System: Factors affecting Implementation – Pitfalls of Implementation – Traditional Practices in the Industry

References:

1. Andrian Murton, Margaret Inman & Nuala Osullivan (2011), Human Resource Management, Great Britain, London.
2. Appannaiah Reddy Anitha (2004), Personal and Human Resource Management, Himalaya Publication House, New Delhi.
3. David A Decenzo, Stephen P Robbins (2010), Human Resource Management (10th edition), John Wiley and Sons Inc, U K
4. JayantMukherjee (2012), Designing Human Resource Management System a Leaders Guide, Sage Publications Pvt, Ltd, New Delhi.
5. Jeffrey A. Nello (2001), Strategy Human Resource Management, Cengage Learning India Pvt.Ltd, New Delhi.
6. Jeffrey A. Nello (2011), Strategic Human Resource Management (3rd edition), Cengage Learning India Pvt.Ltd, New Delhi.
7. Lowell H Lambeston, Leslie minor (2012), Human Relations Strategies for Success (4th Edition), Tata McGraw-Hill Education Pvt.Ltd, New Delhi.
8. Michael Armstrong (2011), Strategic Human Resource Management (4th Edition), Kohan Page India Pvt.Ltd, New Delhi
9. Mohan Thite (2008), Managing People in the new Economy, Sage Publications Pvt.Ltd, New Delhi.
10. Nick Wilton (2012), An Introduction to Human Resource Management, Sage Publications, Pvt.Ltd, New Delhi
11. Randoll, S. Schuler (1984), Personal and Human Resource Management (2nd Education), West Publication Company, New York.
12. Raymond Noe, Hollenback, Garhar and Wright (2012), Fundamentals of Human Resource Management (3rd edition), Tata McGraw Hills Education Pvt.Ltd, New Delhi.
13. Richard I, Henderson (1984), Performance Appraisal (2nd edition), Prentice-Hall, Inc, New Jersey
14. Robert L Mathis, John H Jackson, 2003, Human Resource Management (10th edition), Cengage Learning India Pvt.Ltd, New Delhi
15. Seetharaman S & B. Venkateswara Prasad (2012), Human Resource Management, SciTech Publications Pvt. Ltd, Chennai

SOCIAL ENTREPRENEURSHIP

II MSW

SEMESTER-IV

CODE: MSW434C

Learning Outcome: *The students will...*

- Gain knowledge about Social Entrepreneurship
- To understand and acquire the skills for entrepreneurship
- Acquire the skills of applying the skills to run a successful enterprises

Unit 1: Social entrepreneurship – concept and definition. Social entrepreneur – concept and definition. Social enterprise – concept, definition and characteristics. Need of social enterprise. The spectrum of social enterprise - Challenges.

Unit 2: Steps in Enterprise: Decision to be self-employed with values, selection of product, process technologies, location of the enterprise, forms of business organizations, preparation of project report,

Unit 3: Statutaory Requirements: Registration and Statutory Licenses, Finance, Land and building, Procurement of machinery, recruitment of personnel, Installation of machinery, power connection/water supply, procurement of raw materials, production,

Unit 4: Marketing: costing and pricing policy, repayment of loans, profit generation, avoiding sickness, modernization and up gradation of technology

Unit 5: Institutionalised Supports – PMEGP Scheme, Financial Schemes operated by SIDBI, Credit Guarantee Fund Trust, Industrial Promotional Organization – TIIC, TSIDCL, MSME, DIC, and NSIC. Check list or schematic representation of setting up social enterprise.

Reference

1. Alex Nicholls (2006), Social Entrepreneurship, New Models of Sustainable Social change, New York: Oxford University Press.
2. David Bornstein (2007). How to change the world: Social entrepreneurs and the power of New Ideas, New York: Oxford University Press.
3. Fred Setterberg, Kary Schulman (1985), Beyond Profit: Complete Guide to Managing the Non Profit Organizations, New York: Harper & Row.
4. Gregory Dees, Jed Emerson, Peter Economy (2002), Enterprising Non Profits – A Toolkit for Social Entrepreneurs, New York: John Wiley and Sons.
5. Peter Drucker (1990), Managing the Non Profits Organizations: Practices and Principles, New York: HarperCollins.
6. MSME (2009). A Guide Book for New Entrepreneurs, Chennai: MSME Development Institute.
7. Moore, Richard (2017). Social Enterprise Toolkit. Dublin: Irish Social Enterprise Network

References:

1. Asha Kaul, 2005, The Effective Art Of Time Management, ICFAI University Press, Hyderabad
2. Charles J Stewart And William B Cash Jr, 2010, Interviewing Tata Mcgraw Hill Companies, New Delhi.
3. Diana Bonet Romero, 2011, The Business Of Listening(Fourth), Viva Books Pvt Ltd, New Delhi
4. Donald Shandler, 2011, Motivating The Millennial Knowledge Worker, Viva Books Pvt Ltd, New Delhi.
5. Gopaldaswamy Ramesh AndMahadevanRamesh, 2010, The Ace Of Soft Skills, Dorling Kindersley, New Delhi.
6. Hari Mohan Prasad AndRajnish Mohan, 2012, How To Prepare For Group Discussion And Interview, Tata Mcgraw Hill Companies, New Delhi.
7. Herb Kindler,2011, Conflict Management(Fourth), Viva Books Pvt LtdmNew Delhi.
8. Gangal J.K., 2012, Competitive English, Nirja Publishers, New Delhi.
9. MagasudhaRavinuthala, 2005, The O.P.Singh, 2012, Art Of Effective Communication In Group Discussion And Interview, S.Chand And Company Ltd, New Delhi.
10. Mark Thomas, 2008, Gurus On Leadership, Viva Books Pvt Ltd, Hariyana.
11. Singh O.P., 2012, Art Of Effective Communication In Group Discussion And Interview, S.Chand And Company Ltd, New Delhi.
12. Patrick L Townsend And Joan Gebhardt, 2004, Recognition,Gratitude And Celebration, Crisp Publications, New Delhi.
13. Sharma R.K, 2007, How To Speak And Write Correctly, Swastik Publishers, New Delhi
14. Rakesh K Mittal, 2006, The Power Of Positive Management, Sterling Publications, New Delhi.
15. Robert Maddux And Barb Wingfield, 2011,Team Building(Fifth), Viva Books Pvt Ltd, New Delhi.

CIA Components for Employability Skill Paper (100 Marks)

1. Self – Analysis presentation (SWOC): 10 Marks
2. Aptitude Test: 20 Marks
3. Group Discussion: 10 Marks
4. Snap test: 10 Marks
5. End Semester (Mock Interview): 50 Marks

Learning Outcome: *The students will...*

- **Gain experience by applying the theoretical knowledge in the field**
- **Understand the functions and activities of field placement organization**
- **Acquire of the skills of applying the class learning into practice**

In the Fourth semester field work, the students are placed in agencies according to their specialization and they undergo the field placement training under the close supervision of the agency personnel.

The students get hands on experience of the day –to- day functioning of the agency. They assist the agency in their routine functions of the organization and participate in all the professional activities. It provides them an opportunity to link theory with practice.

The students are encouraged to make mini research studies, analyze data and present their findings. The students also undertake any assignments given to them by the agency; they may also undertake any research for the organization.

The Concurrent Field Work is for a period of a month (Total of 24 to 26 days). At the completion of the field work the students are required to submit the record for valuation and guidance.

The CA marks are awarded by the supervisor out of 50 marks for the quality, regularity, initiatives, leadership, participation and team work.

At the end of the semester Viva Voce is conducted by an external examiner and marks are awarded out of 50

Internal Components (50 Marks):

| | |
|---------------------------------------|------------|
| Presentation of Field Work Experience | : 10 Marks |
| Record Quality | : 15 Marks |
| Initiatives Taken and Progress Shown | : 15 Marks |
| Subject Areas Covered | : 10 Marks |

Viva Voce Components (50 Marks)

| | |
|---------------------------------------|------------|
| Knowledge Gained | : 10 Marks |
| Skills Acquired | : 15 Marks |
| Responsibilities and Initiative Taken | : 15 Marks |
| Presentation and Communication | : 10 Marks |

RESEARCH PROJECT –II (Core)

II MSW

SEMESTER – IV

CODE:MSW436J

Learning Outcome: *The students will...*

- Gain knowledge in designing and implementing a research methodology.
- Gain skills in applying research software to process and analyze the data.
- Acquire skills to interpret data and derive results and discussions
- Understand the process of preparing a research project.
- Acquire the skills of undertaking a research project

Each student is assigned with a research supervisor. The students have to get the guidance and carryout the following steps and complete the research project.

1. Finalization of Methodology Chapter.
2. Analysis and Interpretation of Data using SPSS
3. Main Findings and Suggestions
4. Summary and Conclusion

The supervisor internally evaluates the work of the student out of 50 marks for above components also considering the quality, punctuality and regularity of consultation and learning interest.

The student submits the bound copy of the Research Project on or before the deadline fixed by the Department. Viva Voce is conducted by an external examiner along with the concerned Research Supervisor. The entire Research work will be taken for the final assessment and the marks are awarded out of 50. Plagiarism Check Report has to be attached at the end of the report. Originality Certificate has to be kept in the report.

The supervisor internally evaluates the work of the student out of 50 marks for the above components, considering the quality, punctuality and regularity of consultation and learning interest.

Internal (50 Marks)

| | |
|--|------------|
| Regularity in Submitting Reports | : 10 Marks |
| Consultation Received from the Supervisor | : 15 Marks |
| Progress Shown | : 15 Marks |
| Quality of Reports (Library and other resources used and Language Clarity) | : 10 Marks |

The VIVA components (50 Marks)

| | |
|--------------------------------|------------|
| Methodology | : 10 Marks |
| Chapter IV | : 10 Marks |
| Chapter V | : 10 Marks |
| Chapter VI | : 10 Marks |
| Presentation and Communication | : 10 Marks |

Research Process II

| | |
|----|---|
| 36 | Actual data collection |
| 37 | Code book preparation |
| 38 | Code sheet preparation |
| 39 | Variable declaration in SPSS |
| 40 | Data entry in SPSS |
| 41 | Data cleaning |
| 42 | Analysis and table generation in SPSS |
| 43 | Writing chapter -IV (Analysis and Interpretation) |
| 44 | Writing chapter – V (Main findings and suggestions) |
| 45 | Updating chapter – II (Review of literature) |
| 46 | Writing/updating chapter – III (Methodology) |
| 47 | Writing / updating chapter – I (Introduction) |
| 48 | Writing chapter – VI (Summary and Conclusion) |
| 49 | Plagiarism Check (Chapter – 1, 2, 3, 4, 5, 6,& Tool) |
| 50 | Preparing Bibliography |
| | Preparing Preliminaries |
| 51 | Certificate of Originality |
| 52 | Certificate |
| 53 | Declaration |
| 54 | Acknowledgement |
| 55 | Preface |
| 56 | Table of content (chapters) |
| 57 | List of Tables |
| 58 | List of Figures |
| 59 | Plagiarism Report & Receipt of Plagiarism Check |
| 60 | Research report in the accepted format of the department as a bound copy |
| 61 | Article for Publication (minimum one citation from all faculties of the department) |

BLOCK FIELD WORK - II(Optional)

II MSW SEMESTER – IV CODE: MSW438F

Learning Outcome: *The students will...*

- **Gain experience in a social work field by being in an open or closed setting**
- **Understand the techniques and approaches adopted by the organization**
- **Apply the knowledge gained, in the field of social work**

During the summer holidays the second year students go for one month field placement training preferably in their respective field of specialization. The students are placed in villages or hospitals or schools or NGOs or government offices or counseling centers or welfare organizations or service organization or industries during the summer holidays according to their field of specialization.

During the placement the students are expected to learn about the vision, mission, philosophy, administration, strategies, program, activities, and achievements and also involve with the activities of the organization to whatever extent possible.

Students should get daily activity sheets signed by the concerned persons in the

organizations. They have to write daily records of their learning and submit to the department once they complete their field placement. Successful completion is certified by the department and communicated to the Controller of Examination. This is optional for students to undertake and 4 credits are attached

BBA

Paper – I: Fundamentals of Management

Semester – I

5 Hours

Code: B108

5 Credits

Objectives:

- The objective of this course is to expose the students to the theories of management, organizational theory, and the practice of management in contemporary organizations from a conceptual, analytical and pragmatic perspective.
- Acquire the knowledge of Functional Management
- To learn about the managerial idea in the field of Management

Methodology:

- Lectures, Case studies, Application exercises, Group or Class learning activities, Experiential Exercises

Unit - I: Introduction: Management: Meaning – Definition –Nature - Concept of Management and Administration – Levels of Management - Role of Managers –Functional Management - Modern Theories (System and Contingent) - Contribution of Fayol, Fallet, Elton Mayo and Drucker – Principles of Management – Management as an Art, a Science, a Profession and a Discipline

Unit - II: Functions of Management: Functions of Management – Planning – Nature, Characteristics and Importance – Advantages and Limitations – Steps in Planning – Elements – Objectives – Concept of MBO – MBE - Policies – Procedures – Rules – Strategies – Programmes.

Unit - III: Organizing: Organizing: Formal and Informal Organization – Organizational Structure – Principles of Organization – Types of Organization - Authority and Responsibility – Delegation and Decentralization – Departmentation – Decision Making – Steps in Decision Making.

Unit - IV: Staffing: Directing – Leadership – Types of Leadership – Importance of Leadership – Types of Leadership Styles – Theories –Motivation – Definition - Motivational Theories (Maslow, Herzberg X,Y) – Types - Span of Management.

Unit - V: Controlling: Controlling – Meaning – Definition - Techniques and Importance – Requirements of Effective Control System – Coordination – Definition – Principles of Coordination – Techniques – Problems – Advantages – Steps for Effective Coordination.

Text Book:

1. Jayashankar, Principles of Management, Prassana Publications. 2012

References:

1. Koontz & Weirich, “Essentials of Management: An International perspective”, 8th Edn. Tata McGraw-Hill, New Delhi, 2009.
2. Koontz H. “ Essentials of Management 5E, Tata McGraw-Hill, New Delhi, 1994.
3. Stephen P. Robbins & David A. Decenzo, “ Fundamentals of Management”, Pearson Education, New Delhi, 3rd Edn. 2001
4. L.M. Prasad, Principles of Management, Sultan Chand Publications, 2007
5. Dinkar Pagare, Business Management, Sultan Chand Publications, 2003

Web Resources

www.shrm.org

www.shrmindia.org

www.ipma-hr.org

www.ahrd.org

Paper II: Fundamentals of Organization

Semester – I4 Hours

Code: B1094 Credits

Objectives:

- To impart to the students an understanding of business concepts with a view to prepare those to face emerging challenge of managing business.
- To Comprehend different forms of organization and ethical issues in business.
- To create awareness about trade associations.

Methodology:

- Lectures, Case Studies, Group and Class learning activities, Experiential Exercises

----- **Unit - I:**

Introduction to Business: Meaning of business – Definition - characteristics – Objectives – Classification of business activities – Difference between Business and profession – Motives of Business - Qualities of Successful Businessmen

Unit - II: Ethic and Social Responsibility of Business: Meaning – Definition – Characteristic – Importance of business ethics – Meaning of social responsibility of business – Need.

Unit- III: Forms of Business Organization – I: Sole Trader – Definition - Features - Merits – Demerits. Partnership –Definition - Features – Merits – Demerits –Types of Partners. Joint Hindu Family System – Definition - Features – Merits – Demerits

Unit - IV: Forms of Business Organization – II: Joint Stock Companies –Definition – Features - Merits – Demerits – Kinds of Companies – Difference between private and public limited companies – Difference between partnership and company. Co-operative Societies –Definition – Features – Merits – Demerits – Types.

Unit - V: Trade Association: Meaning – Definition – Features – Functions – Advantages – Trade Associations in India – Chamber of Commerce – Functions – Benefits – Similarities – Differences.

Practical work (As Assignment): Collecting pictures of classification of business activities, Unethical practices, forms of business organizations i.e., sole trader, Partnership deed, JHF, JSC – share certificate, directors, quorum, co-operative society – types.

NOTE: Students are requested to collect original or Xerox copies of the documents and affix them on A₄ Sheet and submit as assignment.

Text Book:

1. C.D. Balaji & Dr. G. Prasad, Business Organisation, Margham Publications, 2007

References:

1. Radhan Katherasan, Business Organization, Prassana Publications, 2006
2. Mishra, Business Organization, Allied Publishers Private Limited, 2006
2. M.C. Shukla, Business Organization and Management, S. Chand & Co, 2007

3. William R. Spriegai, Business Organization, Prentice Hall International, 2002
4. Prakesh Jagadesh, Business Organization and Management, 2002
5. Bushan Y.K, Business Organization, Sultan Chand Publications, 2008

Web Resources:

<https://books.google.co.in> www.sebi.gov.in
www.soletrader.com www.mca.gov.in

Paper III: Business Practical - I

Semester – I

1 Hour

Code: PB102

1 Credit

The thrust of Business Lab – I is to develop oral communication skills among students etc.

Evaluation

The students will be evaluated for this course for a total of 100 marks. Out of this, the Faculty in-charge of this course will assess the students for a maximum of 45 marks on the basis of the performance of the students in activities assigned to them. 5 marks on the basis of attendance

The students will appear for a viva-voce examination at the end of the semester in which they will be assessed for a maximum of 25 for their presentation of theoretical inputs and current practices in management.

Course Teacher in Consultation with HOD the activities can be prepared.

| | |
|----------|--|
| Internal | Record Work – 50 marks |
| External | Viva Voce – 25 marks Report – 25 marks |

Panel of Examiners

1. Head of the Department– Chairman
2. Faculty in charge of the course – Member

Paper – IV: Accounting for Managers

Semester - II

5 Hours

Code: B208

5 Credits

Objectives:

- To Provide an in depth understanding of the Accounting Principles
- To learn fundamental aspects of accounting

- To develop the financial management skills and to become a finance manager in future

Methodology:

- Class Room teaching of each of the units followed by regular exercises, surprise tests and Practical assignments

Unit - I: Introduction to Accounting: Definition of Accounting, Book Keeping – Difference between Book Keeping and Accounting- Users of Accounting information – Basic Concepts and Conventions of Accounting - Classification of Accounts – Golden Rules of Accounting (Theory). Accounting Equation (Simple Problem)

Unit - II: Basic accounts: Books of prime entry (Journal). **Subsidiary Books:** Purchase Book, Sales Book, Purchase Return Books, Sales Return Books, Cash Book (single column) and Petty Cash Book only - Preparation of ledger Accounts- Trail balance. (Simple Problems).

Unit - III: Final accounts: Meaning – Preparation of Trading A/c – P & L A/c – B/S- Closing and adjusting entries. **Bad debts:** Provision for bad and doubtful debts – Provision for discount on debtors and on creditors (only its appearance on P & L A/c & Balance Sheet).

Unit – IV: Rectification of error: Meaning of error – Error at different stages of accounting – Classification of error – Errors disclosed by the trial balance and not disclosed by the trial balance – Steps to locate error – Suspense account – Rectification of errors.

Unit - V: Single Entry: Meaning – Advantages - Single Entry Vs Double Entry – Defects of Single Entry – calculation of profit or loss under Net worth Method – Preparation of opening and closing capital. (Except conversion method)

Text Book:

1. Reddy & Moorthy, Financial Accounting, Margam Publications, 2015

References:

1. V.A. Patil, J.S. Korlanalli: Principles of Accountancy, 12th Edition, R. Chand and Co. Publishers, 2012
2. R.L. Gupta: Advanced Accountancy, 2nd Edition, Sultan Chand & Sons, 2015
3. Reddy & Moorthy: Financial Accounting, Margam Publications, 2008

Web Resources:

www.accountingprincipal.com [Www. icaai.org](http://www.icaai.org)

www.financialstandards.com

Blue Print (70% Problem and 30% Theory)

| | Unit 1 | | Unit 2 | | Unit 3 | | Unit 4 | | Unit 5 | |
|-----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Section A | Q1 T | Q2 P | Q3 T | Q4 P | Q5 T | Q6 P | Q7 T | Q8 P | Q9 T | Q10 P |
| Section B | Q11a T | Q11b P | Q12a P | Q12b P | Q13a P | Q13b P | Q14a T | Q14b P | Q15a T | Q15b P |
| Section C | Q16 - p | | Q17 P | | Q18 P | | Q19 P | | Q20 P | |

T- Theory, P - Problem

Paper – V Business Correspondence

Semester - II

4 Hours

Code: B209

4 Credits

Objectives:

- Understand the critical and important role of Business Letters
- Imbibe meaning of Business Communication and the general principles of communication.
- Identify different types of organizational communications.
- Learn the mechanical structure of letters and drafting of others forms of communications.

Methodology:

- Class Room teaching, Surprise Test, Letter Writing etc

-----**Unit - I:**

Introduction: Communication in Business – Meaning and Importance – Essentials of Effective Business, Types of Communication – Oral and Written Communication – Principles of effective communication –Types of Letter – Structure, Physical Appearance, Kinds of Business Letters

Unit - II: Trade Letters: Trade Letters – Enquires – Offers – Quotations – Orders – Confirmation – Execution – Refusal and Cancellation of an order, Acknowledging the Receipt of Goods and Payments – Claims – Complaints and Adjustments – Collection Letters – Circular Letters

Unit - III: Export and Import Letters: Letters relating to Export and Import – Agency Correspondence – Opening of an account, Payment of Insurance Premium, Request for a Loan and Overdraft – Dishonor of Cheque – Letter of Credit.

Unit - IV: Letters of Application: Letters of Application – Application for a situation – Status Enquires and Recommendations, Appointment Letter.

Unit - V: Report Writing: Report Writing: Meaning, Importance, Characteristics of a Good Reports by Individuals and committees, Drafting of Report for Press, E-Mail, Cell Phones, Pagers, Video Conferencing and Internet.

Text Book:

1. Radha Katherisan, Business Communication, Prassana Publications, 2011

References:

1. L. Gartside, Modern Business Correspondence, Macdonald & Evans Ltd, 2002
2. Ramesh and Pattenshetty, Business English and Correspondence, S. Chand & Co, 2002
3. A.N. Kapoor, Business Communication, S. Chand & Co ltd, 2004
4. R. Sandhanam, Business Communication, Margham Publications, 2009
5. Locker & Stephen, Business communication, Building critical skills, Tata mcgraw Hill, 2000
6. Asha Kaul, Business Communication, PHI Learning Private Limited

Web Resources:

1. www.Anebooks.com

2. www.ddpbooks.com

Paper - VI: Business Practical - II

Semester – II

1 Hour

Code: PB202

1 Credit

-
1. Preparation of invoice, receipts, voucher, delivery challan, Entry pass, Gate pass - debit and credit notes.
 2. Preparation of transaction from the receipts, vouchers - credit notes and debit notes.
 3. Preparation of application for shares and allotment - letter for share - transfer forms.
 4. Drawing, endorsing and crossing of cheques - filling up of pay in slips - demand draft application and preparation of demand drafts.
 5. Making entries in the pass book and filling up of account opening forms for SB account, current account and FDR's.
 6. Drawing and endorsing of bills of exchange and promissory notes.
 7. Filling up of application forms for admission to cooperative societies.
 8. Filling up loan application forms and deposit challan.
 9. Filling up jewel loan application form, procedure for releasing of jewellery in jewel loans and repayment.
 10. Preparation of agenda and minutes of meetings-both general body and board of directors.
 11. Filling up of an application form for LIC policy, filling up of the premium form - filling up the challan for remittance of premium.
 12. Preparation of an advertisement copy, collection of advertisement in dailies and journal, critically evaluating the advertisement copy.
 13. Filling up income-tax returns and application for permanent account number.
 14. Filling up of Railway Tickets forms.
 15. Transactions through present online system.

NOTE: Students may be requested to collect original or Xerox copies of the documents and affix them on the record note book after having filled up. Drawing of the documents should not be insisted.

Distribution of marks: Record Note Book 45 marks, Attendance – 5 marks

Internal Examination – 50 marks (Viva Voce and Written Examination)

Panel of Examiners

1. Head of the Department– Chairman
2. Faculty in charge of the course – Member

Paper – VII: Human Resource Management

Semester – III

5 Hours

Code: B319

5 Credits

Objectives:

- This subject provides the platform to the students of management to appreciate the critical managerial functions, processes and tasks of HRM in an organization.
- To appreciate the methods and mechanics to bring out the best in people directing their energies towards corporate goals with personal satisfaction.
- To impart knowledge in Human resource planning and Development

Methodology:

- Teaching methodology would be 'learning centric' and not necessarily 'teaching centric'. This may mean, it would be consultative and participative involving role modeling and fieldwork, case studies, role-plays, simulation exercises, group discussions and structured and unstructured group work. Eminent competent professionals from HR and other industrial realms will interact with the students besides the faculty.

-----**Unit - I: Introduction:**

Introduction to HRM- Difference between personal mgt and HRM- Human resource planning- objectives-importance-process -Job Analysis- Job Description-Job Specification-Job evaluation- Job Design-methods and technique of job design-Recruitment-sources-process-Selection-method-placement-Induction.

Unit - II: Career Planning: Career Planning – Need Process – Stages – Development – Need Assessment – Executive Development -Objectives-Importance-Process-Training-Need-importance-Steps -Internal Mobility and Separation-Promotion-types-purpose-Transfer-need-types-Demotion-separation-various forms of separation.

Unit III: Job Evaluation: Job Evaluation-objectives-procedure-advantages-methods-Wages and Salary - Principles - Objectives –Structure- Components - Determination - Factors for formulation of wage and salary-Incentives and Benefits-types

Unit - IV: Performance Appraisal: Performance Appraisal- purpose-process-Potential Appraisal – HRA - HRIS- Employee Grievance-Social Security.

Unit- V: International HRM: Human Resource Management in a changing Environment-International Human Resource Management-Managing Human Resources in Virtual Organization

Text Book:

1. S.S. Khanka, Human Resource Management, S. Chand, 2016

References:

1. C.B. Memoria, Personnel Management, Himalaya Publishing House, 2009
2. K. Aswathappa, Human Resource and Personnel Management, Tata Mcgraw Hill Publications, 2006
3. C.B. Gupta, Human Resource Management, Sultan Chand & Sons, 2006
4. Gary Dasseler, Human Resource Management, Pearson Prentice Hall, 2006

Web Resources:

<http://forum.hrdiscussion.com>

<http://network.hrmtoday.com/forum>

<http://www.citeman.com>

www.citeHR.com

Paper - VIII: Principles of Marketing

Semester – III

4 Hours

Code: B320

4 Credits

Objectives:

- To understand the conceptual foundations of Marketing Management as a functional area of business.
- To understand the application of marketing concepts in making strategic decisions
- Students gain better understanding of modern approaches in marketing

- To identify the concepts of marketing research

Methodology:

- The methodology includes, explaining the basics and advanced methodologies for understanding the core concepts of marketing management in practice by lecture mode and case discussion, field based mini projects and terms papers, complemented with assignments.

Unit - I: Concepts of Marketing: Definition of Market – Classification of Markets – Features of Marketing – Importance of Marketing – Objectives – Selling Vs Marketing - Approaches to the study of Marketing - Marketing Environment – Modern Marketing Concept – Role of Marketing in Economic Development

Unit - II: Marketing System: Marketing System – Problems – Process - Marketing Mix – Elements – Problems - Marketing Functions – Buying and Selling – Elements of Buying – Problems of Buying – Purchasing Methods.

Unit - III: Product & Pricing: Product – Features – Classification – Commercial and Industrial Goods - Product Planning and Development – Product Mix – Product Life Cycle – Market Segmentation – Meaning – Basis / Types - Pricing – Objectives and Methods.

Unit - IV: Branding & Promotion: Basic Understanding of Brands – Definition – Branding Concepts – Functions of Brand – Significance of Brands – Types – Brand positioning – Strategic – Packaging – Promotional Programme – Need, Importance, Objectives & Types.

Unit - V: Distribution: Channels of Distribution – Functions – Importance - Types – Agent – Wholesalers – Retailers – Case Studies in Marketing

Text Book:

1. R.S.N. Pillai and Bagavathi, Modern Marketing, Principles and Practices, S. Chand, 2009
2. Rev. Fr. Angelo Joseph, Dr. S. Sasikumar and R. Veerappan, Principles of Marketing, JPS Publications, 2021.

References:

1. Philip Kotler and Kevin Lane, Marketing Management, PHI Learning, Pearson Education, 2008
3. Dr. N. Rajan Nair and Sanjith R. Nair, Marketing, Sultan Chand & Sons, 2009
4. Rajam Saxena, Marketing Management, Tata Mcgraw Hill Publishing Co, 2006
5. Philip Kotler, Marketing Management, Prentice Hall of India, 2008
6. S.A. Sherlekar, Principles of Marketing, Himalaya Publishing House, 2007

Web Resources:

www.marketingpower.comwww.marketingreseach.com

www.marketinglinks.comwww.target.com

Paper - IX: Cost & Management Accounting

Semester-III

5 Hours

Code: B321

4 Credits

Objectives:

- To enable the students to acquire the knowledge on cost and management Accounting
- Import the knowledge of cost accounting
- To help the student to apply cost accounting practice.
- Apply basic ratio of a company.

Methodology

- Class Room teaching of each of the units followed by regular exercises and surprise tests & Practical assignments

Unit - I: Introduction to cost Accounting: Meaning of cost, costing, cost accountancy - Objectives of cost Accounting – Classification of cost – Methods of costing – Advantages of cost accounting - Cost Accounting Vs Financial Accounting –Limitations.

Unit - II: Cost Sheets & Tender and Quotations: Elements of cost – Classification of overheads - Cost Sheets (without returns) - Tender and Quotations. (Simple Problems).

Unit - III: Introduction to Management Accounting: Meaning, Definition and functions of Management Accounting - **Financial statement analysis:** Comparative statement- Common size statement- Trend analysis (Problems).

Unit – IV: Ratio Analysis: Meaning, Definition of Ratio – Classification of Ratio – i) Profitability Ratio ii) Liquidity Ratio iii) Turnover Ratio: Debtors turnover Ratio – Creditors Turnover Ratio - Stock turnover Ratio Only (**Excluding preparation of final accounts**).

Unit – V: Marginal Costing: Meaning, definition of Marginal cost- Advantage and limitations-Concept of Variable Cost – Fixed Cost- Contribution- P/V ratio, MOS, Angle of Incidence-Break Even Analysis - Marginal cost equations. (Excluding Absorption Costing). Calculation of P/V ratio, BEP, MOS

(Simple problems). Computation of BEP – Computation of sundry items and when two consecutive period’s figures are given (Problems).

Text Book

1. TS Reddy and Y. Hariprasad Reddy – Cost and Management accounting – Margam publication, Chennai.

Reference Book

1. Dr. S. N. Maheswari, principles of cost and management accounting – S. Chand & Sons, New Delhi.
2. S.P. Gupta, Management Accounting, Sahitha bhawan, 2007
3. P. Saravanavel, Management Accounting Principles &Practice, marham,2009

Web Resources:

www.accountingforanement.com <http://www.business.com> www.icai.org

Blue Print for Question Paper

| | Unit 1 | | Unit 2 | | Unit 3 | | Unit 4 | | Unit 5 | |
|-----------|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Section A | Q1 T | Q2 T | Q3 T | Q4 P | Q5 T | Q6 P | Q7 T | Q8 P | Q9 P | Q10 P |
| Section B | Q11a T | Q11b T | Q12a P | Q12b P | Q13a P | Q13b P | Q14a P | Q14b P | Q15a T | Q15b P |
| Section C | Q16 – T/P | | Q17 P | | Q18 P | | Q19 P | | Q20 P | |

Paper - X: Economics for Management

Semester – III

5 Hours

Code: B322

4 Credits

Objectives:

- This course is intended to provide a basic foundation on the principles of managerial economics & to demonstrate the application of economic theory to business decisions.
- Knowing the role & responsibilities of Managerial Economists.
- Import the knowledge of forecasting.
- Application of cost control & cost reduction.

Methodology:

- Class sessions comprise a mixture of lectures, interactive discussions, case presentations, and problem solving. In addition to in-class exams and homework assignments, each student will undertake a short econometric project.

Unit - I: Nature: Nature, Scope and Methods of Managerial Economics: Meaning – Nature and Scope of Managerial Economics – Relation to other Branches of Knowledge – Role and Responsibilities of Managerial Economist

Unit - II: Demand: Demand and Analysis and Forecasting: Meaning – Types of Demand – Law of Demand – Determinants of Demand – Elasticity of Demand – Demand Forecasting – Methods – Theory of Consumer Behavior – Managerial Utility Analysis – Indifference Curve and Analysis

Unit - III: Price and Output Decisions: Price and Output Decisions under Different Market Structures: Pricing Methods and Strategies - Objectives - Factors - General Considerations of Pricing - Methods of pricing - Meaning of Market – Market Forms - Price and Output decisions under Perfect Competition, Monopoly, Monopolistic and Oligopoly Competitions

Unit - IV: Cost & Production Analysis: Cost and Production Analysis: Cost Concepts and Classification – Cost Output Relationship – Production Function – Types of Production Function – Law of Variable Production – Economics and Dis Economics of Scale – Break Even Analysis

Unit - V: Macro Economic and Business Decisions: Macro-Economic and Business Decisions: National Income and Business Policies – Business Cycle and Business Policies – Inflation and Deflation – Monetary and Fiscal Policies – Balance of Payments and Business Decisions

Text Book:

1. R. Veerappan & Saroj Kumar, Managerial Economics, Thakur Publishers, 2013

References:

1. M.L. Jhingan & J.K. Stephen, Managerial Economics, Vrinda Publications, 2004
2. R.L. Varshney & K.L. Maheshwari, Managerial Economics, Sultan Chand & Sons, 2007
3. H.L. Ahoja, Modern Economics, S. Chand, 2008
4. Paul A. Samuelson and William D. Nordhaus, Economics, 18th Edition, Tata McGraw Hill, 2005
5. William Boyes and Michael Melvin, Textbook of Economics, Bixtantra, 2005

Web Resources:

www.managementstudyguide.com

www.managementparadise.com

www.referenceforbusiness.com

www.economywatch.com

Paper - XI: Business Practical - III**Semester-III****1 Hour****Code: PB303****1 Credit**

Objective

- To familiarize students with various communication methods that exists in business and to train them for smooth transition from campus to corporate.

Unit –I: Overview of Corporate: Overview of corporate –History of corporate –campus and corporate distinction –overview of BPO Industry in India and world –Enhancing the reading ability of students (at a speed of minimum 150 words per minute with appropriate stress, voice modulation and correct pronunciation). Students should be exposed to the practice of reading news papers viz., The Hindu, Indian Express, Business Line, Economic Times etc., and magazines like business world, etc., Enhancing the spontaneous writing skill of the students –writing articles on simple topics given – preparing speeches –preparing reports on various events / functions held in the college.

Unit –II: Speaking Skills: Enhancing the spontaneous speaking skill of the students–self introduction at various forums and during interviews –Effective Public Speaking (EPS) –Role playing. Mock interviews for recruitment –mock press meets.

Unit– III: Presentation Skills: Enhancing the presentation skill of the students – Individual seminar presentation and Group seminar presentation each group may consist of 3 or 4 students.

Unit–IV: Group Communication Skills: Enhancing the interpersonal communication skill of the students –Group Commission (Students may be organized into 4 and 5 groups). All the groups may be given a management problem relating to real life experiences of trade and industry in the country or the

world. They will be asked to find group solution through discussion and the group leader will present the same to the audience in the class.

Unit –V – Corporate Etiquette: Corporate etiquette –Dressing and grooming skills –Workplace etiquette –Business etiquette –Email etiquette –Telephone and meeting etiquette –Presentation skills. Professional competencies: analytical thinking –listening skills –time management –team skills –stress management –assertiveness –Facing group discussion and interview.

Evaluation Pattern

Report – 45 marks Attendance – 5 marks

External Exam – Record – 25 marks Viva Voce – 25 marks

Panel of Examiners

1. Head of the Department– Chairman
2. Faculty in charge of the course – Member

Text Book:

1. RajendraPal & Korlahalll, Essentials of Business Communication, Sultan Chand & Sons, 2008.

References:

1. Namrata Palta, The art of Effective Communication, Lotus Press, New Delhi, 2007.
2. S.K. Mandal, Effective Communication and Public Speaking, Jaico Publishing.

Allied Paper - III: Legal Aspects of Business

Semester – III

6 Hours

Code: B323

4 Credits

Objectives:

- To give an exposure to important commercial laws, the knowledge, that is essential for an understanding of the legal implications of the general activities of a modern business organization.
- To understand the legal frame work related to contract
- To learn the basic business law concepts and apply in the practice in the business

Methodology:

- Lectures, Case studies, Assignments, Presentation of legal reports
-

Unit - I: Contract: Evolution –Need for Law- Def of Law-scope-sources of Law of contract- Nature and kinds of contract-introduction-Definition of Contract- types- essential elements of valid contract-classification of contract-offer and Acceptance-rules and essential elements of offer and Acceptance

Unit - II: Discharge and Remedies: Discharge of contract-Remedies for Breach of Contract-Agreements not Declared void-Void agreements-wagering Agreements - Contingent Contract

Unit - III: Contract of Indemnity & Guarantee: Contract of Indemnity and Guarantee-Essentials of a Valid contract of indemnity – Kinds of Guarantee – Rights of Surety - Bailment –Essentials – Rights and Duties of Bailor and Bailee - Pledge-Rights-Duties and Liabilities

Unit - IV: Company: Joint Stock Company – Definition – Characteristics – kinds – Introduction to Companies Act 2013 – Objectives – Features - Distinction between a Private Company and a Public Company – Privileges of a Private Company – Formation of a company – Incorporation – MOA - AOA

Unit - V: Formation & Winding Up: Certificate of Incorporation – Certificate of Commencement of Business – Shares – Debentures – Powers, Duties and Liabilities of Directors – Meetings - Modes of Winding up

Text Book:

1. R.S.N. Pillai & Bagavathi, Business Law, S. Chand, 2009
2. N.D. Kapoor, Elements of Company Law, Sultan Chand & sons, 2006

References:

1. N.D. Kapoor, Elements of Mercantile Law, Sultan Chand & Sons, 2006
2. Dr.M.R. Sreenivasan, Business Law, Margham Publications, 2011
3. P.K. Goel, Business Law for Managers, Bizentra Publishers, 2008
4. P.P.S. Gogna, Mercantile Law, S. Chand & Co., Ltd, 2008

Web Resources:

www.legalindia.in

www.legalserviceindia.com

www.supremecourtfindia.nic.in

www.mca.gov.in

www.netlawman.co.in

Paper – XII: Research Methods

Semester-IV

5 Hours

Code: B422

5 Credits

-----**Objectives:**

- To understand the concept of research and to have an insight on mode of doing research
- Students can integrate the research concepts and tools to make the managerial decision problems
- Students can get adequate theoretical and practical background of Business research

Methodology:

- The methodology is predominantly by Problem Solving, lecture mode and case discussion, complemented with a mini-project work.

Unit - I: Introduction to Research Methodology: Meaning – Objectives - Types of Research – Significance of research - Research Process -Criteria for good research – Problems faced by researcher in India. What is a research problem? – Selecting the problem – Techniques involved in defining a problem.

Unit - II: Research design: Meaning – Need – Features. Sample design: meaning – steps of sample design – types of sampling design.

Unit – III: Measurement and scaling: Classification of measurement scale – Goodness of measurement scale – Scaling – Scale classification bases – Scaling techniques.

Unit - IV: Methods of data collection & Data analysis: Collection of primary data –Difference between Schedule and Questionnaire – Guidelines for constructing Questionnaire/Schedule- Collection of Secondary data. Data preparation process- What is a Hypothesis? – Null and Alternative Hypothesis – Type I and Type II Error.

Unit - V: Interpretation and Report writing: Meaning & techniques of Interpretation – Precautions – Significance of report writing –Steps in writing report– Layout of the research report – Types of report – Precautions for writing research report.

Text Book:

1. C.R.Kothari, Research Methodology, New Age International Publishers, 2009

References:

1. Dr.S.Shajahan, Research Methodology for Management, Jaico Publication, 2005
2. Panneerselvam, R., Research Methodology, PHI Learning Pvt. Ltd.,New Delhi, 2004
3. R.Cauvery, Research Methodology , S.Chand, 2005
4. Cooper & Schindler, Business Research Methods, Tata Mc Graw Hill, 2006

Web Resources:

www.stattutorials.com

www.analyzemath.com/statistics.html

www.imrbint.com

www.burns-stat.com/pages/tutorials.html

Paper - XIII: Production Management**Semester – IV****4 Hours****Code: B423****4 Credits**

Objectives:

- To make the students understand the decision-making process in planning, scheduling and control of production and operation functions
- To know the concepts of production Management
- To familiarizes the students in the concepts of production and Material analysis

Methodology:

- The methodology is predominantly by Problem Solving, lecture mode and complemented with applications of case discussion.

Unit - I: Introduction:

Introduction – Production Concepts – Functions – Scope and Significance of Production Management – Production Procedure - Functions of Production Manager – Types of Production System - Product Design – Product Life Cycle – Characteristics – Types of Design – Factors affecting the design of a Product.

Unit - II: Plant Location and Layout: Plant Location – Factors Affecting – Objectives - Site Location – Rural - Urban – Town – Suburban – Recent trends in Location of Industries – Plant Location Trends – Plant Layout – Principles – Types.

Unit - III: Production Planning and Control: Production Planning and Control – Elements – Functions – Objectives – Maintenance – Types – Break Downs – Preventive – Production Planning & Control Techniques - Routing – Relative Advantages – Maintenance – Scheduling – Quality Control – Quality Circle – TQM.

Unit - IV: Material Management: Material Management – Definition – Functions – Importance – Objectives – Functional areas - Integrated Material Management Advantages of the combined materials and purchase department – Codification of Materials – Systems of Codification - Material Handling – Principles – Material handling Equipment.

Unit - V: Storekeeping: Storekeeping – Objectives – Functions – Store Responsibilities – Location of Store House – Bin Card – Stock Cards – Purchasing Procedures – Dynamic Purchasing – Vendor Rating – Vendor Development

Text Book:

1. Saravanavel & Sumathi, Production & Materials Management, Margham, 2009

References:

1. Martand T. Telsand, Production Management, S. Chand , 2005
2. Pradeep Kumar & Kadar Nath, Produ Codification of Materials ction Management, Prentice Hall Publications, 2004
3. Sharma Gagan Deep, Gurshamji Singh & Harpreet Singh, Production and Operations Management, Kalyani, 2004s
4. Aswathappa K and Shridhara Bhat K, Production & Operational Management, Himalaya Publishing, 2008
5. Pannerselvam. R, Production and Operations Management, Prentice Hall India, 2008

Web Resources

www.google.com

<http://www.informaworld.com/smpp/title>

<http://www.tandf.co.uk/journals/titles/00207543.asp>

www.scirp.org

<http://www.springerlink.com/content/f780526553631475/>

Paper - XIV: Financial Management

Semester – IV

5 Hours

Code: B424

4 Credits

Objectives:

- To familiarize oneself with the techniques used in financial management.
- Knowledge about capital structure, cost of capital, impact of dividend decisions in the corporate world
- Understand the different financing decision and estimate the value of different financial instruments.

Methodology:

- Assignment after completion of each chapter, class room lectures for all chapters, to solve problem self made with all features will be used
-

Unit - I: Introduction to Financial Management: Definition, Scope of Financial Management- Objectives of financial management- Profit maximization Vs Wealth maximization. Finance manager - Functions and roles of Financial Manager. (Theory only)

Unit - II: Capital Structure: Meaning, Definition – determinants – optimal capital structure- factors affecting capital structure- **Theories of Capital Structure:** NI, NOI, MM Approaches(Theory only).

Unit - III: Leverage: Meaning, Financial, Operating and Combined leverage (Including Problem). Sources of finance: Short-term and Long-term sources of finance (Theory only).

Unit - IV: Capital budgeting: Meaning and Definition of capital budgeting, Objectives, Significance and Advantages of capital budgeting. (Theory)

Methods of Capital Budgeting: Pay Back Period Method, ARR Method, NPV Method, Internal Rate of Return Method and Profitability Index Method Only. (Including problems).

Unit - V: Dividend Policy: Meaning of dividend, Types of Dividend– Factors influencing dividend policy – Stability of dividend (Theory).

Dividend Theories: Walter, Gordon Model (Including Simple Problem)

Text Book

1. S.N. Maheswari, Financial Management, Sultan chand & sons, 2007

References:

1. I.M. Pandey, Financial Management, Tata McGraw Hill, 2007
2. Khan and Jain, Financial Management, Tata McGraw Hill, 2008
3. Srivasatava, Mishra, Financial management, oxford university press, 2008
4. Prasanna Chandra, Financial Management, Tata McGraw Hill, 2008

Web Resources:

www.reportjunction.com

www.investorindis.com

www.fma.org

www.fmsfindia.org

| | Unit 1 | | Unit 2 | | Unit 3 | | Unit 4 | | Unit 5 | |
|-----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Section A | Q1 T | Q2 T | Q3 T | Q4 T | Q5 T | Q6 P | Q7 T | Q8 P | Q9 T | Q10 P |
| Section B | Q11a T | Q11b T | Q12a T | Q12b T | Q13a T | Q13b P | Q14a T | Q14b P | Q15a T | Q15b P |
| Section C | Q16 - T | | Q17 T | | Q18 P | | Q19 P | | Q20 P | |

Paper - XV: Industrial Relations and Labour Laws

Semester – IV

5 Hours

Code: B425

4 Credits

Objectives:

- Students are to be acquainted with the industrial relations frame work in our country.
- To Know the importance of the maintenance of industrial peace and effort to reduce the incidence of strikes, lockout and industrial strike are to be emphasized.

Methodology:

- Lectures, Case studies, field based mini projects, individual and group presentation on the given assignment.
-

Unit - I: Introduction to Industrial Relation: Meaning and concept – Definition – Nature –Theories – Objective – Importance – Factors for good industrial relation – Causes for poor Industrial relation – Industry relation system – Actors in the Industrial Relation System.

Unit - II: Industrial Disputes: Historical background of labour disputes in India – Meaning – Definition – Causes of Industrial Dispute – Strikes – Causes – Types – Lockouts – Measures for improving Industrial Relation – Meaning of industrial discipline – Voluntary Level.

Unit - III: Trade Union & Collective Bargaining: Definition – Features – Objective – Functions – Importance – Structure – Reasons for joining Trade Union – Trade unionism in India –Suggestions for the growth of Trade Union – Collective Bargaining: Meaning – Characteristics - Types – Process – Condition – Importance – Procedure of collective bargaining – Levels.

Unit – IV Factory Act 1948: Objective – Scope – Definition – Factory – Manufacturing Process – Worker – Occupier – Inspecting Staff – Power of Inspector – Duties – Certifying Surgeons – Health – Safety and welfare measures – Working hours – Employment of young persons – Holiday and Annual Leaves.

Unit – V: The Child Labour (Prohibition and Regulation) Act, 1986: Introduction - The Declaration of the Rights of Child, 1959 - Objective and Scope, Definitions - Prohibition of Employment of Children in certain Occupations and Processes – Regulation of Conditions of Work of Children

Text Book:

1. M.R. Sreenivasan, Industrial Relations & Labour Legislations, Margham Publications, 2015

References:

1. Industrial Relations and Labour Laws, B D Singh, Excel Books, 2008.
2. R.M.Srivasta, Industrial Relations & Labour Laws, Vikas Publications, 2014
3. N.D.Kapoor, Handbook of Industrial Law, Sultan Chand & Sons, 2015
4. Modern Industrial Relations and Labour Laws, Principles and Techniques, J.N. Jain & Ajay Bholra, Regal Publications, 2009.

Web Resources:

1. www.ilo.org,
 2. www.labour.nicnet.in,
 3. www.labourstart.org,
 4. www.ioe.org, www.icc.org
-

Paper - XVI: Basic Research Project

Semester – IV

1 Hour

Code: B427J

1 Credit

Objective:

- To understand the concept of research and to have an insight on mode of doing research

Group of students (2 to 4 students) (Or) Individual shall be required to prepare on the basis of investigations carried out by them in a particular area on possible solutions for a typical problem of current interest in the area of management. The report should demonstrate the capability of the students for some creative potential and original approach to solve the practical problems in to-days business. The report should include field studies, survey, interpretation, planning and design of improved integrated management systems, presented in a comprehensive manner with recommendations for solutions based on scientifically worked out data and viva will be conducted on the basis of the report. Report can have 25 pages as a minimum.

Evaluation Patten

- Group of Students should investigate the problems
- The mode of evaluating the student will consists of two parts. One of the basis of report writing and the other will be through Viva Voce
- The valuation of the Report writing will be examined by the Respective Guide and HOD of the department.
- Oral Presentation will be examined by the HOD and Respective Guide
- 80 Marks will be awarded for report writing and 20 Marks for oral examination

The following are the components for report writing

- Content - 50 Marks
- Layout- 15 Marks
- Methodology- 10 Marks
- Grammar- 5 Marks

Marks for Viva Voce

- Oral Presentation- 10 Marks
- Question & Answer - 10 Marks

***Internal Paper**

Allied Paper - IV: Organizational Behaviour

Semester – IV

6 Hours

Code: B426

4 Credits

Objectives:

- This course will enable students to describe specific theories related to Perception, Group and Organizational Change.
- Students can demonstrate effective team work behaviors.
- It will help them evaluate methods of motivating and rewarding individuals and group and integrate individual, group and organizational level concepts

Methodology:

The subject coverage goes with, among others, lectures, interactive discussion sessions, case-studies, experiential inputs of practitioners, observations, role-play and presentations

Unit - I: Introduction : Definition – Key elements of OB – Nature and Scope of OB – Need for studying OB – Contributing Disciplines to OB – Challenges faced by the Management – Organizational Behaviour Process – Models of OB – Personality - Concepts and determinants – Types and Theories – Influence of Personality on OB – Measurement of Personality

Unit - II: Individuals: Perception – Perception Vs Sensation – Perceptual Process – Factors affecting Perception – Perception and its application in OB – Attitudes – Concept and formation of attitudes – Types of Attitudes – Measurement of Attitude and Change of Attitude – Value – concept and types of Values – Formation of Values – Values and Perception

Unit - III: Group: Definition and Characteristics of Group – Reason for formation of Groups – Theories of Group Formation – Types of Groups – Stages of Group formation – Group Behaviour – Group Decision Making – Quality Circle – Work Teams

Unit - IV: Organizational Conflicts & Stress: Organizational Conflicts – Definition and Sources of Conflict – Types of Conflict – Aspects of Conflict – Conflict Process – Conflict Management – Stress – Symptoms of Stress – Measurement of Stress – Causes and Consequences of Stress – Coping with Stress

Unit - V: Organizational change & Development: Organizational Climate – Organizational Culture – Definition, Types, Functions – Organizational Change – Organizational Development – Characteristics – Objectives – Organizational Effectiveness.

Text Book

1. Jayasankar, Organizational Behaviour, Margham Publications, 2011

References

1. S.S. Khanka, Organizational Behaviour, S. Chand, 2008
2. Stephen P. Robins, Organizational Behaviour, PHI Learning / Pearson Education, 11th Editio, 2008
3. Fred Luthans, Organizational Behavior, McGraw Hill, 11th Edition, 2001
4. Schermerhon. Hunt and Osborn, Organizational Behaviour, John wiley, 9th Edition, 2008

Web Resources:

www.obweb.org

www.obmnetwork.com

www.humanmetrics.com

MBA

| Semester | Course Code | Title of the Course | Hours | Credits |
|-----------------|--------------------|--|--------------|----------------|
| I | MBA140T | Management Principles and Practices | 4 | 3 |

Unit I Introduction to Management(12 Hours)

Organization- Management- Meaning- Role of managers- Management and Administration -Evolution of management thought- Organization and the environmental factors-Management as an art, A Science , A profession and a Discipline.

Unit II Planning(12 Hours)

Nature and purpose of planning- Planning process- Types of plans- Objectives- Managing by Objective (MBO) strategies- Types of strategies – Policies – Decision Making- Types of decision- Decision making process- Steps in decision making -Rational decision making process- Decision making under different conditions.

Unit III Organising(12 Hours)

Nature and purpose of organizing- Organization structure-Formal and Informal Organisation Authority and Responsibility - Departmentation- Span of control- Centralization and decentralization- Delegation of authority- Staffing- Selection and Recruitment- Career development- Career stages- Training- Performance appraisal

Unit IV Directing (12 Hours)

Managing people- Communication- Hurdles to effective communication- Leadership – Types of leadership – Supervision – Nature and importance of supervision – Motivation (Maslow, Herzberg X and Y theories only) .

Unit V Controlling (12 Hours)

Process of controlling- Types of control- Budgetary and non-budgetary control techniques – Managing productivity- Cost control- Purchase control- Maintenance control- Quality control- Planning operations.

Text Books:

- Andrew J. Dubrin, Essentials of Management, Thomson Southwestern, 9th edition,2012.
- Harold Koontz and Heinz Weihrich, Essentials of management: An International & Leadership Perspective, 9th edition, Tata McGraw-Hill Education, 2012.

References:

- Samuel C. Certo and Tervis Certo, Modern management: concepts and skills, Pearson education, 12th edition, 2012.
- Don Hellriegel, Susan E. Jackson and John W. Slocum, Management- A competency-based approach, Thompson South Western,11th edition, 2008.
- Heinz Weihrich, Mark V Cannice and Harold Koontz, Management- A global entrepreneurial perspective, Tata McGraw Hill, 13th edition, 2010.

Stephen P. Robbins, David A.De Cenzo and Mary Coulter, Fundamentals of Management, Prentice Hall of India, 2012.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--------------------------|-------|---------|
| I | MBA141T | Economics for Management | 4 | 3 |

Unit - I: Managerial Economics, Demand and Supply Concepts (12 Hours)

Definition - Scope and Nature of Managerial Economics - Problems of an Economy. Demand and Supply: Meaning and Determinants of Demand. Law of Demand and Elasticity of Demand: Price - Income and Cross Elasticity. Meaning and Determinants of Supply: Law of Supply and Elasticity of Supply - Relation between Price and Quantity Supplied.

Unit - II: Production and Cost Concepts (12 Hours)

Production: Meaning and Factors. Law of Production: Law of Variable Proportions and Returns to Scale. Concepts of Costs: Short Run and Long Run Cost - Average and Marginal Costs - Total, Fixed and Variable Costs - Pricing Practices and Strategies.

Unit - III: Market Structure (6 Hours)

Market: Definition – Classification of Various Forms of Markets - Geographical Basis, Time Basis Classification and Situation Basis Classification - Types: Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly.

Unit - IV: Macro Environments (12 Hours)

Development Strategies in India’s Five Year Plans - Macro Economic Trends Since Post Liberalization, Infrastructure, Unemployment and Measures to Promote Employment in India, Poverty, Saving and Investment.

Unit - V: National Income (18 Hours)

National Income: Concepts, Methods of Measuring National Income - Difficulties in Measuring National Income – Inflation - Consumption Function and Investment Function - Wholesale Price Index (WPI) and Consumer Price Index (CPI) Monetary Policy and Fiscal Policy - Concept of Multiplier and Accelerator, Business Cycle, Balance of Payment.

Text Books

- Dr. D. M. Mithani, Managerial Economics, Himalaya Publishing House, 4th edition, 2009.
- Maheswari K.L and Varshney .R.L, Managerial Economics, Sultan Chand and Sons, 22nd revised edition, 2014.

References

- D.N. Dwivedi, Managerial Economics, Vikas Publication, 7th edition, 2009.
- Geetika, Ghosh and Choudhary, Managerial economics, Tata McGraw-Hill Education, 2nd edition, 2011.
- H. L. Ahuja, Economic Environment of Business-Macro Economic Analysis, S. Chand & Company Ltd, 1st edition, 2005.
- P.L. Mehta-Managerial Economics Analysis, Problems and Cases-Sultan Chand & Sons, 2006.

Petersen, Craig H. Lewis .W. Chris, Managerial Economics, Prentice Hall Publication, 4th edition, 2006.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--------------------------|-------|---------|
| I | MBA142T | Organizational Behaviour | 4 | 3 |

Unit I Focus and Purpose (12 Hours)

Definition, need and importance of organizational behaviour- Evolution of OB as a discipline – Nature and scope – Frame work – Organizational behaviour models.

Unit II Individual Behaviour (12 Hours)

Personality: types – Factors influencing personality – Theories – Learning : Types of learners – The learning process – Learning theories – Organizational behaviour -Misbehaviour – Types – Management Intervention. Emotional Intelligence – Attitudes: Characteristics – Components – Perceptions: Importance – Factors influencing perception – Interpersonal perception. Motivation: Types - Theories.

Unit III Group Behaviour (12 Hours)

Organization structure – Formation – Groups in organizations – Formal and Informal Group-Group Norms – Group dynamics – Group decision making techniques – Team building - Interpersonal relations.

Unit IV Leadership and Power (12 Hours)

Meaning – Importance – Theories (Leadership theories-Great man theory, situational leadership, behavioural leadership, Contingency theory, Trait theory) – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.

Unit V Dynamics of Organizational Behaviour (12 Hours)

Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behaviour. Organizational change – Importance – Stability Vs Change – Proactive Vs Reactive change – Stress: Types – Work Stressors – Prevention and Management of stress.

Text books:

- Stephen P. Robins, Organisational Behavior, PHI Learning / Pearson Education, Edition 17, 2016 (Global edition)
- Aswathappa, Organizational Behaviour Cases & Games, Jain Book Publications-2014.

References:

- Dr.S.S. Khanka, Organizational Behaviour, S. Chand Publications, 4th Edition, 2004.
- Fred Luthans, Organisational Behavior, McGraw Hill, 12th Edition,
- Mc Shane & Von Glinov, Organisational Behaviour, 4th Edition, Tata Mc Graw Hill, 2007.

Nelson, Quick, Khandelwal. ORGB – An innovative approach to learning and teaching. Cengage, 2nd edition. 2012
 Ivancevich, Konopaske & Maheson, Organisational Behaviour & Management, 7th edition, Tata McGraw Hill, 2008.
 Udai Pareek, Understanding Organisational Behaviour, 3rd Edition, Oxford Higher Education, 2011.
 Jerald Greenberg, Behaviour in Organization, PHI Learning. 10th edition. 2011.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--------------------------|-------|---------|
| I | MBA143T | Total Quality Management | 4 | 3 |

Unit - I: Concepts of Quality Management (12 Hours)

Definitions – TQM framework – benefits - awareness and obstacles. Customer focus: customer perception of quality - translating needs into requirements - customer retention. Dimensions of product and service quality - cost of quality.

Unit - II: Principles and Philosophies of Quality Management (12 Hours)

Overview and contributions of Deming, Juran, Crosby, Masaaki Imai (kaizen concept), Ishikawa, Taguchi techniques. Taguchi loss function - concepts of quality circle- Japanese 5s principles- 8d methodology.

Unit - III: Process Capability (12 Hours)

Process Capability: Meaning- Significance and Measurement- Lean Six Sigma. Concepts of Process Capability: Definitions- Reliability Concepts - Reliability in Series and Parallel - Product Life Characteristics Curve. Total Productive Maintenance (TPM): Relevance to TQM, Tero Technology - Business Process Re-engineering (BPR).

Unit - IV: Tools and Techniques for Quality Management (12 Hours)

Quality functions development (QFD): benefits - voice of customer - QFD process - house of quality (HOQ): building a HOQ - failure mode effect analysis (FMEA) - requirements of reliability - failure rate - FMEA stages – design - process and documentation. Seven management tools - bench marking and POKA yoke.

Unit-V: Quality Systems Organizing and Implementation (12 Hours)

Introduction to IS/ISO 9000 – 50001 - quality management systems: documentation, quality audits, TQM culture – world class manufacturing - customers, suppliers, global competitiveness and hallmarks of excellence.

Text Books

Dale H. Besterfield, “Total Quality Management”, Pearson Education Asia, Indian Reprint, 2006.
 Shridhara Bhat K, Total Quality Management – Text and Cases, Himalaya Publishing House, 2010.

Reference

Goetsch, D.L. & Davis. S, Introduction to Total Quality, 6th edition Pearson Publication, 2010.
 James R. Evans and William M. Lindsay, “The Management and Control of Quality”, South-Western (Thomson Learning), 8th Edition, 2011.
 Juran, J.M. & Gryna, F.M, Quality Planning and Analysis, Tata McGraw Hill, 3rd edition, 2004.
 Sandeepa Malhotra, Quality Management planning, Deep & Deep Publications, 2006.
 Subburaj, Total Quality Management, Tata McGraw hill, 2014.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------------|-------|---------|
| I | MBA144T | Accounting for Management | 6 | 4 |

Unit - I: Financial Accounting (15 Hours)

Financial Accounting: Introduction - Basics of Accounting Concepts – Conventions - Preparation of Trading Account - Profit and Loss Account and Balance Sheet with adjustments.

Unit - II: Analysis of Financial Statement (15 Hours)

Ratio Analysis: Classification of Ratios - Profit and Loss Ratios and Balance Sheet Ratios. Fund Flow Statement: Statement of Changes in Working Capital - Preparation of Fund Flow Statement & Cash Flow Statement- Cash from Operation - Preparation of Cash Flow Statement.

Unit - III: Budgetary Control (12 Hours)

Budgetary Control: Nature and Objectives of Budgetary Control - Limitations - Classification of Budgets: Fixed and Flexible Budgets - Zero Base Budgeting.

Unit - IV: Marginal Costing and Profit Planning (12 Hours)

Marginal Costing: Cost Volume Profit Analysis - Breakeven Point – Variance Analysis Material Cost Variance and Labor Cost Variance.

Unit - V: Computer in Accounting(6 Hours)

Significance of Computerized Accounting System – Codification and Grouping of Accounts - Prepackaged Accounting Software.

Text Books

- Dr. Maheswari. S. N., Management Accounting, Sultan Chand & Sons, 5th Edition, 2010.
 Reddy. T. S. & Hari Prasad Reddy, Financial and Management Accounting, Margam Publication, 3rd Edition, 2012.

References

- Ashish K, Battacharya, Introduction to Financial Statement Analysis, Elsevier, 2009.
 Horngren, Surdem, Stratton, Burgstahler Schatzberg, Introduction to Management Accounting, PHI learning, 2008.
 Jan Williams, Financial and Managerial Accounting – The basic of business Decisions, Tata McGraw Hill Publishers, 13th Edition, 2005.
 Khan M. Y. and Jain. P. K, Management Accounting, Tata McGraw Hill, 4th Edition, 2006.
 Pandey. I. M., Management Accounting, Vikas Publications, 3rd Edition, 2009.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---|-------|---------|
| I | MBA145T | Advanced Business Statistics for Management | 6 | 4 |

Unit - I: Introduction to Probability and Binomial Distribution

Introduction – Classical definition – Addition theorem – Multiplication theorem – Conditional probability – Binomial frequency distribution – Mean and standard deviation of binomial distribution – Mode of the binomial distribution. (Chapters 1 and 2)

Unit - II: Large Samples and Small Sample T-Test

Population – Sampling distribution – Central Limit Theorem – Test of hypothesis – Large sample tests – Confidence interval – Determination of sample size – Small sample t-test – Test for a specified mean – t-test for paired observations – Confidence interval for small samples (Chapters 7 and 9)

Unit - III: Small Samples- F Test and Small Sample Chi-Square Test

F-test for two sample standard deviations– ANOVA: One way classification – Two way classification – Chi-square test: Uses – Chi-square test for a specified population variance – Chi-square test for independence of attributes and goodness of fit – Comparing two populations. (Chapters 10 and 11)

Unit - IV: Correlation and Regression Analysis

Correlation: Correlation – Sample Correlation – Rank correlation – Concurrent deviation – Probable error – Examples. Regression: Deviation of Regression Lines –Properties of regression coefficients – Coefficient of determination – Standard error of an estimate – Multiple regression analysis. (Chapters 12 and 13)

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--------------------------|-------|---------|
| I | MBA146T | Managerial Communication | 4 | 3 |

Unit - V:
Time

Series Analysis

Time Series: Components of time series – Measures of trend –Moving average method – Measures of seasonal variation – Method of averages. (Chapters 17)

Text Books

- P.R.Vittal, Quantitative Techniques (for M. Com, M.B.A and others), Margham Publications, Chennai, Reprint 2013.
- S. P. Gupta & M. P. Gupta, Business Statistics, 14th enlarged edition, Sultan chand and sons, educational publishers, New Delhi, reprint 2007.

References

- Richard I Levin and David S. Rubit, Statistics for management 7-e, Pearson Education, New Delhi, 2002.
- Aczel A.D. and Sounder Pandian J., Complete Business Statistics, 6-e, Tata McGraw Hill, 2004.
- Anand Sharma, Statistics for Management, Himalaya Publishing house, 2-e, 2008.
- Anderson D.R., Sweeney D.J. and Williams T.A., Statistics for business and economics, 8-e, Thomson (South-Western) Asia, Singapore, 2002.
- Srivatsava TN, Swhailaja Rego, Statistics for Management, Tata McGraw Hill, 2008.

Unit I Personal Communication**(12 Hours)**

Day-to-day conversation with family members, neighbours, relatives, friends on various topics, context specific. Journal writing, SMS, Greeting Cards, situation based – accepting/declining invitations, congratulating, consoling, conveying information, oral reports, extempore, Book Review, Film Review

Unit II Business Correspondence**(12 Hours)**

Letter Writings: Job application letters, Letters of appointment, confirmation, promotion, Circulars, Memos and Office orders, Agenda and Minutes, Resume preparation

Unit III Work Place Communication**(12 Hours)**

e-mails, minutes, reports of different kinds – annual report, status report, survey report, proposals, memorandums, presentations, interviews, profile of institutions, speeches, responding to enquiries, complaints, resumes, applications, summarizing, strategies for writing.

Unit IV – Presentation and Employability Skills**(12 Hours)**

Importance, Characteristics, Presentation Plan, PowerPoint Presentation, Visual Aids. Interview skills – HR and technical – Types of interview, preparation for interview, mock interview, Group Discussion – Communication skills in Group Discussion, Structure of GD, GD process, successful GD techniques.

Unit V Writing For Media and Creative Writing**(12 Hours)**

Features for publication (Newspapers, magazines, newsletters, notice-board), case studies, short stories, travelogues, writing for children, translation, techniques of writing.

Text Books

Adler Ronald B., Elmhurst Jeanne Marquardt, Communicating at work, The McGraw-Hill Publications, 2014

Dr. J. John Love Joy, Dr. Francis M. Peter S.J, “Let’s Communicate – Basic English for everyone”, Vaigarai publications, 1st edition, Dindigul 2007.

References:

Dr. V. H. Baskaran, “Spoken English Made Easy”, Shakespeare Publication, 6th edition, Chennai 2009.

Ewald Helen Rothschild and Burnett Rebecca E., Business Communication, NJ: Prentice-Hall International Publications.

Raymond V Lesikar, John D Pettit, and Mary E Flatly, 2009. Lesikar’s Basic Business Communication, 11th ed. Tata McGraw-Hill, New Delhi.

E.H. McGrath, S.J. 2012, Basic Managerial Skills for All. 9th ed. Prentice-Hall of India, New Delhi.

Richard Denny, ‘Communication to Win; Kogan Page India Pvt. Ltd., New Delhi, 2008.

<https://www.hrhelpboard.com/contract-letters/increment-letter.html>

Course Objective

To Understand the Applications of Word, Excel and Power Point.

Course Outcome

Enhancement in the usage level of office tools.

MS-Word

Text Manipulations.
Usage of Numbering, Bullets, Tools and Headers.
Usage of Spell Check and Find and Replace.
Text Formatting.
Picture Insertion and Alignment.
Creation of Documents Using Templates.
Creation of Templates.
Mail Merge.
Copying Text and Picture from Excel.
Creation and Formatting Tables.

MS-Excel

Creation of Worksheet and Entering Information.
Aligning, Editing Data in Cell.
Excel Functions (Date, Time, Statistical, Mathematical, Financial Functions).
Changing of Column Width and Row Height (Column and Range of Column).
Moving, copying, Inserting and Deleting Rows and Columns.
Formatting Data in Cell.
Drawing Borders around Cells.
Working with Charts.
Pivot Table.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|-------------------------------|-------|---------|
| I | MBA146T | Business Application Software | | 1* |

MS
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Creating Presentation.
Adding Headers and Footers.
Changing Slide Layout.
Changing Slide Design.
Working with Fonts and Bullets.
Inserting Clipart.
Transition and Animation Effects.

References

A First Course in Computers, Sanjay Saxena, Vikas Publishing House; 1st Edition 2015.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| I | MBA146T | Field Training | | 1 |

rnau, M. Lambert and Steve Lambert, Microsoft Office Access 2007 Step by Step, Wiley India Private Limited, 2013.

Lisa A. Bucki, Microsoft Office 2013 Bible, Wiley India Private Limited, 2013.

Microsoft Office 2013: Advanced, Misty Vermaat, Delmar Cengage Learning.

Wallace Wang, Microsoft Office 2013 for Dummies, Wiley India Private Limited, 2013.

Introduction

Field training is an indispensable component in the training of **practicing professions**, since the educational process must involve learning by doing and opportunities to engage in practice so as to learn. Field training in management education serves as the primary arena for integrating knowledge and values with skills and the socialization of the professional person.

Academic programs tend to be fairly theoretical for the most part. MBA Field Training allows students to break away from it and get back into the Business world to try out some of the theoretical concepts they've learnt in the class room environment.

GENERAL GUIDELINES

Field Training is an Extra credit part of the first year MBA programme of the Sacred Heart College.

The duration for the training should not be less than a minimum of ten working days.

The training is aimed at the following objective:

- To provide an exposure of the Business Market to the student and hands-on experience in the field.

- To accelerate and enrich the educational process of the students.

During the training the student will be under the supervision of a faculty who will act as his guide and will provide guidelines for the Field work.

No student should try to copy or use information in such a way that will project false and baseless conclusions for the company.

All the students have to prepare and submit a written project report at the time of the examination after being reviewed by the supervisor.

WHY FIELD TRAINING?

Field training is an integral part of an educational development for students and young professionals striving for concrete practice.

This format effectively combines classroom training and practical work, inviting student to analyze and solve current and contemporary issues in the field. Field activities include data collection, surveying and interpreting.

Field Training Format

Title of the study. The title of the study should be short and precise.

General Introduction. A brief introduction of the study.

Statement of the problem. The research questions are included in this.

Field of study. A brief description of the organization/company/factory where the study is to be conducted.

Objectives. The general & specific objectives in precise terms.

Working Definitions. Definition of the terms used in the title and objectives by its direct applicability in the study area.

Hypothesis (if any). A testable statement connecting two or more variables for verification.

Research Design. The nature & type of the study.

Expected Outcome. Narrate what is going to happen by conducting this research.

Research Report Format

Outer Cover

Title Page

Letter from the organization/factory/company

Acknowledgement

Table of Contents

Chapter I:Introduction

Chapter II:Methodology

Chapter III :Main Findings

Chapter III:Suggestions

Chapter IV:Summary and Conclusion

Bibliography

Appendix

Note: The first nine titles of Field Training Format (1-9) are the preliminaries of the research report, which should be numbered in Roman small numbers.

Arabic numbers are used for the rest of the Field Training Format.

Outer Cover – the department designs for its color.

Title Page – Title of the project should be precise, revealing the basic thrust of the study.

The content and the format of Outer cover and the Title page are the same. A model is shown below.

Title

FIELD TRAINING REPORT

Submitted

To

SACRED HEART COLLEGE, (AUTONOMOUS)

TIRUPATTUR, VELLORE DISTRICT.

635 601

[Affiliated to Thiruvalluvar University]

in partial fulfillment for the

award of the degree of

Master of Business Administration

College Logo

By

Name & Register Number

Department of Business Administration

Month – Year

Evaluation of Field Training Project Report

The evaluation of the project report will be done with written report.

The assessment of the report is done on standard criteria.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|----------------------|-------|---------|
| II | MBA240T | Marketing Management | 4 | 3 |

Unit - I: Basics to Marketing Environment (12 Hours)

Marketing: Definitions – Conceptual Frame Work – Marketing Environment: Internal and External – Marketing Interface with Other Functional Areas – Production – Finance - Human Relations Management and Information System. Marketing in Global Environment – Prospects and Challenges.

Unit - II: Marketing Strategy (12 Hours)

Marketing Strategy: Formulations – Key Drivers of Marketing Strategies – Strategies for Industrial Marketing – Consumer Marketing – Services Marketing – Competitor Analysis – Analysis of Consumer and Industrial Markets – Strategic Marketing Mix Components.

Unit - III: Marketing Mix Decisions (12 Hours)

Product: Planning and Development – Product Life Cycle – New Product Development and Management – Market Segmentation – Targeting and Positioning – Channel Management – Advertising and Sales Promotions – Pricing Objectives - Policies and Methods.

Unit - IV: Buyer Behaviour(12 Hours)

Understanding Industrial and Individual Buyer Behaviour – Influencing Factors – Buyer Behaviour Models – Online Buyer Behaviour – Building and Measuring Customer Satisfaction – Customer Relationships Management – Customer Acquisition - Retaining and Defection.

Unit - V: Recent Trends in Marketing (12 Hours)

Online Marketing System: Digital Marketing – Social Marketing – Mobile Marketing. Green Marketing - Rural Marketing - Event Management - Ethics in Marketing.

Text Books

- Philip Kotler and Kevin Lane, Marketing Management, PHI Learning, Pearson Education, 14th Edition, 2014.
- Ramaswamy & Namakumari, Marketing Management Global Perspective, Indian Context Macmillan publisher India Ltd. 4th Edition, 2010.

References

- Arun Kumar, N Meenakshi, Marketing Management, Vikas Publishing, 2nd Edition, 2010.
- Saxena, Rajan, Marketing Management, Tata McGraw Hill Education Pvt. Ltd. New Delhi, 4th Edition, 2009.
- Duglas J. Darympia, Marketing Management, John Wiley and Sons, 6th Edition, 2008.
- Joel. R Evans & Barry Berman, Marketing Management, India Edition Cengage Learning, Chennai 2010.
- Paul Baisen et.al, Marketing, Oxford University Press, 2008.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------------|-------|---------|
| II | MBA241T | Human Resource Management | 4 | 3 |

Unit - I: Perceptive in HRM (12 Hours)

Evolution of HRM – The Importance of the Human Factor – Objectives of HRM – Inclusive Growth and Affirmative Action – Role of HR Manager – Human Resource Policies – Computer Applications in HRM – Human Resource Accounting and Audit.

Unit - II: The Concept of Best Fit Employee(12 Hours)

Importance of HR Planning – Forecasting HR Requirement – Internal and External Sources - Selection Process - Screening – Tests – Validation – Interview – Medical Examination –Induction – Importance – Practices – Socialization Benefits.

Unit - III: Learning and Executive Development (12 Hours)

Learning: Purpose - Types of Learning Methods – Benefits – Resistance. Executive Development Programmes: Common Practices – Benefits – Self Development – Knowledge Management.

Unit - IV: Sustaining Employee Interest(12 Hours)

Employee engagement: Compensation Plans – Reward – Motivation – Theories of Motivation – Career Management – Development of Mentor – Protégé Relationships.

Unit - V: Performance Management (12 Hours)

Talent management - Managing employee performance: Concept - Method of Performance Evaluation – Feedback – Industry Practices – Promotion – Demotion - Transfer and Separation – Implication of Job Change. The control Process: Importance – Methods – Requirement of Effective Control Systems Grievances – Causes – Implications – Redressal Methods.

Text Books

- Aswathappa, Human Resource Management, Tata McGraw Hill, 6th Edition, 2013.
- Decenzo and Robbins, Human Resource Management, Wiley, 8th edition, 2012.

References

- Biswajeet Pattanayak, Human resource management, PHI Publication, New Delhi, 3rd Edition, 2006.
- Gary Dessler, Human Resource Management, Pearson Education Limited, 13th Edition, 2014.
- John Bratton and Jeff Gold, Human resource management - Theory and practice, New York, 5th Edition, 2009.
- Seema Sanghi, Human resource management, Vikas Publication, 1st Edition, 2011.
- Wayne Cascio, Managing Human resource, Tata McGraw Hill Publication, 10th Edition, 2010.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
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|-----------|----------------|-------------------------------|----------|----------|
| II | MBA242T | Information Management | 4 | 3 |
|-----------|----------------|-------------------------------|----------|----------|

Unit - I: The Organization and Systems Concept (12 Hours)

Management and use of computers: Conceptual design - Data capturing - data storage and retrieval - data processing - Information reporting- Limitations. Classification of Information Systems: Operation Information Systems- Transaction Processing Systems- Process control Systems – Office Automation System - Types of Management Information Systems: Information Report Systems- Executive Information Systems- Decision support system - Types of Strategic Information Systems: Artificial Intelligence- Expert Systems.

Unit - II: Systems Analysis and Design(12 Hours)

System Analysis: Process - Decision table - Data flow Diagram (DFD) - Entity Relationship Model (ER) - System life cycle - Prototyping- Spiral Method - Logical and Physical Design - Stages of Systems Development life cycle. System design: system specifications - User Interface Design - Data Design- Process Design.

Unit - III: Functional Management Information Systems (12 Hours)

Marketing Information System - Operation Information Systems - Major Subsystems - Sales Information Subsystems - Space Selling Information Subsystems - Competitor Information Subsystems- Dispatch Information Subsystems- Personal Information Subsystems - Accounting and Financial Information System- Type of Systems- Advantages of Computerized package- Inter relationship accounting Information Systems- Manufacturing Information Systems- Source of Information- Major Steps- Process Specification- Product Design-Revenue generation.

Unit - IV: Database Management and Networking (12 Hours)

Database Management System: Models – Types. Introduction to Data Warehouses – architecture - Data mining and Data Marts. Knowledge Management: Types - Tools. Networking: Types – LAN – WAN - Network topologies. Introduction to E-Commerce and E-Business – Infrastructure - Issues in Internet.

Unit - V: Enterprise Resource Planning and Security Control (12 Hours)

Enterprise management System: Enterprise resource planning – ERP model and Modules - Benefits of ERP - ERP Product Evaluation - ERP Implementation. Information System Security: Information System Vulnerability - Controlling security threat and vulnerability - Computer Crimes - Software Piracy - Internet Privacy – Intranet - Disaster Management, Ethics in Information Technology.

Text Books

- Robert Schultheis and Mary Summer, Management Information Systems – The Managers View, Tata McGraw Hill, 4st Edition, 2011.
- Waman S Jawadekar, Management Information Systems, McGraw Hill, 5st Edition 2012.

References

- Dr. S. Shajahan and Mrs. R. Priyadharshini, Management Information System - New Age International Publishers, 1nd Edition 2010.
- Gordon Davis, Management Information Systems: Conceptual Foundations, Structure and Development, Tata McGraw Hill, 2nd Edition, 2014.
- Mohamed Azam, Management Information Systems, McGraw Hill, 1st Edition, 2012.

Kenneth C. Laudon and Jane Price Laudon, Management Information Systems – Managing the digital firm, PHI Learning / Pearson Education, PHI, Asia, 4th Edition 2012.

Haag, Cumming and McCubbrey, Management Information Systems for the information age, McGraw Hill, 5th Edition, 2013.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|----------------------|-------|---------|
| II | MBA242T | Financial Management | 4 | 3 |

Unit - I: Foundation of Finance(12 Hours)

Financial Management: Overview – Concepts – Objectives - Functions – Time Value of Money – Introduction to the Concept of Risk and Return of a Single Asset and of a Portfolio – Valuation of Bonds and Shares – Basics of option valuation.

Unit - II: Investment Decisions (12 Hours)

Capital Budgeting: Nature of Capital Budgeting- Principles and Techniques – Identifying Relevant Cash Flows. Evaluation Techniques: Pay Back – ARR – NPV – IRR - PI – Project Selection under Capital Rationing – Inflation and Capital Budgeting – Concept and Measurement of Cost of Capital – Specific Cost and Overall Cost of Capital.

Unit - III: Financial and Dividend Decision (12 Hours)

Leverage: Operating - Financial and Combined Leverage – Capital Structure: Concept – Importance - Designing Capital Structure - EPS Analysis – Cost of Capital: Redeemable and irredeemable debt valuation — Dividend Policy: Aspects of Dividend Policy – Forms of Dividend Policy – Forms of Dividends –Stock Splits.

Unit - IV: Working Capital Management (12 Hours)

Working Capital: Concepts – Needs – sources – Classification – Determinants - Issues and Estimation of Working Capital – Accounts Receivables Management and Factoring – Inventory Management – Cash Management – Working Capital Finance: Trade Credit - Bank Finance and Commercial Paper.

Unit - V Long Term Sources of Finance (12 Hours)

Capital market: Indian Capital and Stock Market - New Issues Market - Long Term Finance -Shares, Debentures and Term Loans - Hire Purchases - Venture Capital Financing - Private Equity.

Text Books

M. Y. Khan and P.K. Jain, Financial Management, Text, Problems and Cases, Tata McGraw Hill, 6th Edition, 2012.

I.M. Pandey, Financial Management, Vikas Publishing House, 11th Edition, 2015.

References

AswatDamodaran, Corporate Finance, Theory and Practice, John Wiley & Sons, 2nd Edition, 2008.

Bhabatosh Banerjee, Financial Management, PHI Learning publication, new delhi-2010.

Dr. R. Ramachandran& Dr. R. Srinivasan, Financial Management: Theories, Problems and Cases, Sri Ram publications, 3rd Edition, 2010.

Prasanna Chandra, Financial Management: Theory and Practices, McGraw Hill, 9th Edition, 2008.

Sirvastava and Mishra, Financial Management, Oxford University Press, 2nd Edition, 2008.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------------|-------|---------|
| II | MBA241T | Legal Aspects of Business | 4 | 3 |

Unit - I: Commercial Law (12 Hours)

The Indian Contract Act 1872: Definition of Contract - Formation of a Contract - Essential of a Valid Contract - Void Agreements - Performance of Contracts - Breach of Contract and its Remedies - Quasi Contracts. The Sale of Goods Act 1930: Sales Contract - Transfer of Title and Risk of Loss - Guarantees and Warranties in Sales Contract - Performance of Sales Contracts - Conditional Sales and Rights of an Unpaid Seller.

Unit - II Company Act 1956 (12 Hours)

Nature and Types of Companies - Major Principles - Formation - Memorandum and Articles of Association - Prospectus – Power - Duties and Responsibilities - Liabilities of Directors - Winding up of Companies- Corporate Governance.

Unit - III: Industrial Law (12 Hours)

An Overview of Factories Act 1948 - Payment of Wages Act 1936 - Trade Unions Act 1926 - Industrial Disputes Act 1947.

Unit - IV: Goods and Service Tax (12 Hours)

Overview of GST - Objectives of GST - Salient features of GST - Structure of GST - SGST, CGST, UTGST & IGST, GST Council, GST Format, GST Network, Registration, Introduction to - Levy of GST – Composition Scheme - Remission of Tax / Duty Time of Supply of Goods & Services - Value of Supply - Input Tax Credit.

Unit - V: Consumer Protection Act 1986, Competition Act 2002 and Cyber Law (12 Hrs)

Consumer Protection Act: Consumer Rights - Consumer Protection Council - Types of Consumer Dispute Redressal Agencies. Competition Act 2002 - Cyber Laws - IT Act 2000 - Introduction of IPR: Copy Rights - Trade Marks - Patent Act.

Text Books

N.D. Kapoor, Elements of Mercantile Law, Sultan Chand and Company, India, 13th Edition, 2010.

P.K. Goel, Business Law for Managers, Biztantra Publishers, India, 8th Edition, 2008.

References

Tulsian, P C, “Business Laws,” Tata McGraw Hill, New Delhi, 3rd Edition, 2009.

Akhileshwar Pathak, Legal aspects of Business, Tata Mcgraw Hill, 4th Edition, 2010.

Dr. Vinod, K. Singhania, Direct Taxes Planning and Management, 55th Edition, 2016.

P.P.S. Gogna, Mercantile Law, S. Chand & Co., Ltd, India, 4th Edition, 2008.

Sathish B, Business law, Matur Tata Mcgraw Hill, 8th Edition, 2009.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--|-------|---------|
| II | MBA241T | Applied Operations Research For Management | 4 | 4 |

Unit - I: Linear Programming

Concept of Linear Programming Model – Development of LP Model – Graphical Method – Linear Programming Methods (Simplex Method) – Duality (Chapter 2: Sections 2.2 – 2.5.1 and 2.7.1)

Unit - II: Transportation and Assignment Problem

Transportation: Mathematical Model – Types of Transportation - North West Corner Method, Least Cost Method, Vogel's Approximation Method – Assignment: Zero-One Programming Model – Types of Assignment – Hungarian Method (Chapter 3: Sections 3.2 – 3.4, Chapter 4: Sections 4.2 - 4.4)

Unit - III: Project Management

Phases of Project Management – Guidelines for Network Construction – Critical Path Method – Project evaluation and Review Technique (Chapter 10: Sections 10.2-10.4, 10.6)

Unit - IV: Decision Theory and Game Theory

Decision Theory: Decision under Certainty – Decision under Risk – Decision under Uncertainty – Game Theory: Game with Pure Strategies – Game with Mixed Strategies – Dominance property – Graphical Method for $2 \times n$ or $m \times 2$ (Chapter 11: Sections 11.2, 11.3, 11.4 (11.4.1-11.4.3), Chapter 12: Sections 12.1-12.5)

Unit - V: Replacement and Maintenance Analysis

Introduction – Types of Maintenance – Types of Replacement problem – Determination of economic life of an asset – Simple probabilistic model for items which completely fail (Chapter 13: Sections 13.1-13.5)

Text Book

R. Panneerselvam, Operations Research, Prentice Hall of India, New Delhi, 2nd Edition, 2011.

References

- Hamdy A.Taha, Operations Research, Prentice Hall of India, New Delhi, 2007.
- P.R. Vittal, Quantitative Techniques (for M. Com, M.B.A and others), Margham Publications, Chennai, Reprint 2013.
- KantiSwarup, P.K.Gupta, Manmohan, Operations Research, Sultan Chand & Sons, New Delhi, 2008.
- Sasieni, Arthur Yaspan, Lawrence Friedman, Operations Research Methods and Problems, Wiley International Edition, 1959.
- S.D. Sharma, Operations Research, Kedarnath Ram Nath & Co Publishers, 15th Edition 2007.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|-----------------------|-------|---------|
| II | MBA246T | Operations Management | 4 | 3 |

Unit- I: Fundamentals of Production and Operations Management (12 Hours)

Introduction – Nature – Importance - Scope - Functions - Strategies of Operations Management – Relationship between POM & other Functional Areas of Management – Effect of Time Element on POM - Manufacturing Systems and Layouts - Significance & Systematic View of Operations - Factors of Production-Operations Management as Multidisciplinary Subject- POM challenges - Recent Trends - Operations Strategy.

Unit - II: Production Planning (12 Hours)

Production Planning Techniques for Various Process Choices - Techniques of Production Control, Aggregate Planning Techniques - Process Planning: Steps in Process Planning. Computer Integrated Manufacturing – Computer Aided Design - Computer Aided Manufacturing –Flexible Manufacturing Systems-Production Planning & Control: Preplanning - Fore Casting - Scheduling - Dispatching – Routing – Expediting.

Unit - III: Plant Location (12 Hours)

Plant Location: Factors Influencing Plant Location- Importance of Environmental Health & Safety Factors in Deciding the Location of Plant - Reasons for Global Location - Cost Factor – Semi Quantitative Techniques - Return on Investment. Plant Layout: Principles - Flow Patterns - Types of Plant Layout. Capacity Planning: Types of Capacity - Capacity Decision - Capacity Planning Strategies.

Unit - IV: Basics of Operations Planning (12 Hours)

Inventory: Definition - Classification of Inventories - Purchase Model - Manufacturing Model - P & Q Systems - MRP-I & MRP-II - Just in Time - Selective Inventory Control Techniques - Statistical Quality Control – Work Study – Method Study. Maintenance Management: Types of Maintenance. Fundamentals and Functions of Purchasing: Vendor Rating - Stores Management: Functions - Store Records - Stock Verification.

Unit - V: Applications / Problems (12 Hours)

Make or Buy Decisions - Single Facility Location Problem - Gravity Location Problem - Sequencing (M Job 2 machines & M Job 3 Machines) - Purchase & Manufacturing Model with Shortages & without shortages - ABC Analysis - Individual Replacement - Time Study – Mean - Range - P Chart - C Chart - I Square and R Charts - Single Sampling Problems.

Text Books

Aswathappa K and ShridharaBhat K, Production and Operations Management, Himalaya Publishing House Revised 4th Edition, 2008.

Pannarselvam R, Production and Operations Management, Prentice Hall India, 2nd Edition, 2008.

References

Upendrakachru, Production & Operations Management, Excel books, 1st Edition, 2007.

Adam Jr. Ebert, Production & Operations Management, PHI Learning, 5th Edition, 1994.

Senthil. M, Production & Operations Management, Pearson Education, 6th Edition, 2013.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---|-------|---------|
| II | | SPSS (Statistical Package for Social Science) | | 2* |

Unit - I: Introduction

Introduction to SPSS - Data analysis with SPSS: general aspects, workflow, critical issues - SPSS: general description, functions, menus, commands - SPSS file management

Unit - II: Input and data cleaning and Data manipulation

Input and data cleaning Defining variables - Manual input of data - Automated input of data and file import - Data manipulation - Data Transformation - Syntax files and scripts - Output management.

Unit- III: Descriptive analysis of data

Frequencies - Descriptives - Explore - Crosstabs – Charts - Line chart Pie, chart Histogram, Frequencies tables, Bar chart.

Unit - IV: Statistical tests

Means - T-test – Chi Square – F – Test, One-way ANOVA – Two way ANOVA – Discriminant Analysis – Non parametric tests.

Unit-V: Correlation and regression

Linear correlation and regression - Multiple regression (linear) - Multivariate analysis - Factor analysis - Cluster analysis.

Reference:

1. How to Use SPSS: A Step-By-Step Guide to Analysis and Interpretation Brian C. Cronk 1 May 1999.
2. SPSS Basics: Techniques for a First Course in Statistics, Zealure C Holcomb, 2006.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|----------------------------|-------|---------|
| II | | PERSONAL AND SOCIAL SKILLS | | 1* |

Social Skills

Unit-I

Emotional maturity – Negotiation skills- Leadership skills- Characteristics of a good leader- Leadership Styles – Quality of leader- Teamwork and Teambuilding- Characteristics of good team building- Team effectiveness- Importance of Team building- Benefits of Team-Groups VS Teams- Stages of Team Development – Types of Teams- Creating effective teams - Managing remote teams and virtual Teams.

Unit-II

Strategic Planning – Coaching – Counseling – Mentoring – Delegation - Dispute Resolution- Diplomacy - Giving Feedback - Managing Difficult Conversations – Supervising – Managing -Performance Management- Talent management - Crisis management.

Personal Skills

Unit-III

Self Esteem- Importance of self Esteem - Classification of Self Esteem - Self-awareness - Self Leadership-Self Assessment- Self Confidence - Goal setting – Need of setting goal - Method of setting goal.

Unit-IV

Attitude – Personality Development - Emotional Intelligence- -Emotion Management-Stress management- Tolerance of Change and Uncertainty-Taking Criticism- Resilience-Assertiveness- Competitiveness- Adaptability- Work-life balance-Friendliness-Enthusiasm-Empathy.

Unit-V

Creativity- Characteristics of creative people - Blocks of Creativity – Creative thinking – Troubleshooting - Decision making- Problem Solving - Critical thinking-Innovation - Design Sense - Artistic Sense.

GUIDELINES FOR PERSONAL AND SOFT SKILL PAPER

A guideline for personal and soft skill paper is optional paper which is offered by the department for the students during the second semester of MBA programme. A course on Soft skill paper is intended to improve the communication skills, enrich personality development, Computing skills, Quantitative aptitude and knowledge of the students. This course is focused to enhance the employability skill of the students. It will also help to bridge the gap between the skill requirements of the employer or industry and the competency of the students.

Any student can opt for this paper on basis of student's willingness and one credit will be included in overall consolidated mark sheet.

Material for personal and soft skill paper will be given by the concerned teacher.

Examination for this course will be held according to convenient date and time.

A written examination for 2 hours for 50 marks will be conducted. The paper will be evaluated as per the evaluation scheme.

Question paper model

Part – A 10 x 2 Marks = 20 Marks

Answer any ten questions out of 15. Each question carries 2 marks

Part – B 5 x 6 Marks = 30 marks

Answer any five Questions out of 8. Each question carries 6 marks

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| II | | In Plant Training | | 1* |

Introduction

All the MBA Professionals need to have a clear, thorough knowledge and details about the research. It is needed to plan project training and evolve an action plan for achieving the objectives of the research and to prepare the In plant training report.

General Guidelines

On the project training is an Extra credit part of the 2 year MBA programme of the Sacred Heart College.

The period for the training is 10 Days.

The training is aimed at the following objectives:

To provide an exposure of project to the student and hands-on experience in a corporate environment.

During the training the student will be under the supervision of a faculty who will act as his guide and will provide guidelines for the work.

No student should try to copy or use information in such a way that will project false and baseless conclusions for the company.

All the students have to prepare and submit a written project report at the time of the examination.

Why In plant training?

In Plant Training is the best way to practice what you have learnt. The purpose of including In Plant Training in the Programme is to provide you an opportunity to investigate a problem applying management concept in a scientific manner. It enables you to apply your conceptual knowledge in a practical situation and to learn the art of conducting a study in a systematic way and presenting its finding in coherent report. As managers, you are constantly seeking information to base your decision. How well you collect, synthesize and make the data meaningful is what you learn through this process.

Research Proposal Format

Title of the study. The title of the study should be short and precise.

General Introduction. A brief introduction of the study.

Statement of the problem. The research questions are included in this.

Field of study. A brief description of the place where the study is to be conducted.

Objectives. The general & specific objectives in precise terms.

Working Definitions. Definition of the terms used in the title and objectives by its direct applicability in the study area.

Hypothesis (if any). A testable statement connecting two or more variables for verification.

Research Design. The nature & type of the study.

Expected Outcome. Narrate what is going to happen by conducting this research.

Research Report Format

Outer Cover

Title Page

Table of Contents

Chapter I:Introduction

Chapter II:Company Profile

Chapter III :Methodology

Chapter III:Main Findings

Chapter IV:Suggestions

Chapter V:Summary and Conclusion

Bibliography

Appendix

Note: The first nine items are the preliminaries of the research report, which should be numbered in Roman small numbers.

Arabic numbers are used for the other items.

Outer Cover – the department designs for its color.

Title Page – Title of the project should be precise, revealing the basic thrust of the study.

The content and the format of Outer cover and the Title page are the same. A model is shown below.

Title

IN PLANT TRAINING REPORT

Submitted

To

SACRED HEART COLLEGE, (AUTONOMOUS)

TIRUPATTUR, VELLORE DISTRICT.

635 601

[Affiliated to Thiruvalluvar University]

in partial fulfillment for the

award of the degree of

Master of Business Administration

College Logo

By

Name & Register Number

Department of Business Administration

Month – Year

Evaluation of In Plant Training Project Report

The evaluation of the project report will be done with written report.

The assessment of the report is done on standard criteria.

| Semester | Course Code | Title of the Course | Hours | Credits |
|-----------------|--------------------|----------------------------|--------------|----------------|
| III | MBA340T | Managerial Ethics | 4 | 3 |

UNIT I: Understanding Ethics:

Introduction: Ethicality in humans, Moral development in humans- theories, concepts and approaches: Utilitarianism-Deontology-Virtue Ethics-Ethics of care-Egoism-Natural Law-Social contract theory- Rawls's theory of justice-Moral relativism.

UNIT II: Sense of Business Ethics:

Definition and meaning of business ethics- nature of business ethics- ethical values – importance of values in business- ethical decision making – ethical decision process and framework-work culture- role of employees: Need for ethical behavior- moral & conflicts-ethical dilemma: resolutions in ethical dilemma- emerging ethical issues-ethical issues beyond borders.

UNIT III: Corporate Governance:

Theories of corporate governance: Agent theory- Steward-Stakeholder and sociological Theory-perspectives of corporate governance- Business Malpractices- code of Ethics - code of conduct-regulations relating to corporate governance- Roles and Responsibilities (BOD; Executive, roles of Independent directors; Auditors ; Regulatory bodies) -whistle blowing.

UNIT IV: Business Disciplines:

Business Disciplines – Ethics of Marketing & advertising– Ethics of Finance & Accounting -Ethics of IT / ICT / Internet– Ethics of HR and related aspects-behavior of business to its employees, colleagues and competitors -Production related ethical issues Corporate Scandals – Causes, Consequences and Cures -International standards in business ethics.

UNIT V: Environmental Ethics Awareness:

Business response to environmental problems – environmental ethics-ethics and social responsibility-triple bottom line approach - Connecting people with their communities and inspiring positive change (case studies)- Corporate citizenship- global Millennium development goals.

Textbooks

S.A. Sherlekar, Ethics in Management, Himalaya Publishing House, 2009.

W.H. Shaw, Business Ethics, Cengage Learning, 2007.

References

Larue Tone Hosmer and Richard D., The Ethics of Management, Irwin Inc., 1995.

Joseph A. Petrick and John F. Quinn, Management Ethics - integrity at work, Sage, 1997.

Chakraborty, S.K., Management by Values, Oxford Univ. Press.

Balasubramanian, R., Corporate Governance, IIM Bangalore.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|----------------------|-------|---------|
| III | MBA341T | Strategic Management | 4 | 3 |

Unit - I: Strategy and Formulation Process (12 Hours)

Strategic Management: Origin of Strategy - Definition – Need – Dimensions - Strategy vs Structure – Strategic Planning – Strategic Decision Making Process – Benefit and Risks of Strategic Management - Elements of Business Strategies - Conceptual Framework for Strategic Management - the Concept of Strategy and the Strategy Formation Process.

Unit - II: Strategic Management Process(12 Hours)

Strategic Management Process –Establishing Organizational Direction-Vision of the Company – Business Vision Models – Mission and Setting Objectives and Goals - Business Policies and Strategies – Strategic Intent and the Concept of Strategic Pyramid - Corporate Ethics.

Unit - III: Environmental Scanning and Analysis(12 Hours)

Environmental Scanning and Analysis: Strategically Relevant Components of Internal and External Environment – Approaches of the Environmental Scanning -Industry and Competitive Analysis – Analysis of Resources and Competitive Capabilities-Environmental Scanning Techniques - Organizational Capability Profile - Strategic Advantage Profile - Corporate Portfolio Analysis - SWOC Analysis - GAP Analysis - Mc Kinsey's 7s Framework - GE 9 Cell Model - Distinctive Competitiveness - Selection of Matrix - Balance Score Card - Case Study CG Matrices.

Unit – IV: Generic Competitive Strategies (12 Hours)

Generic Competitive Strategies – Stability – Expansion – Retrenchment - Conglomerate and Their Variants - Corporate Strategy - Integration Strategies – Outsourcing Strategies – Offensive and Defensive Strategies - Strategic and Competitive Advantage - New Business Models for Global and Internet Economy – Strategy Clusters and Models Relating to Portfolio Analysis – Strategic Alliances and Collaborative Partnerships – Merger and Acquisition – Diversifications.

Unit - V: Strategy Implementation (12 Hours)

Strategy Implementation – Building Core Competencies and Competitive Capabilities-Developing Policies and Procedures for Implementation - Designing and Installing Supporting and Rewarding Systems - Evaluating and Monitoring Implementation - Strategic Issues-Managing Technology and Innovation - Strategic Issues for Non Profit Organizations. New Business Models and Strategies for Internet Economy – Strategy evaluation.

Text Books

- Thomas L. Wheelen, J.David Hunger and KrishRangarajan, Strategic Management and Business policy, Pearson Education.,13th Edition, 2013.
- AzharKazmi, Strategic Management & Business Policy, Tata McGraw Hill, 3rd Edition, 2010.

Reference

- N. Chandradekaran & P. S. Ananthanarayanan Strategic Management, 2nd Edition 2015.
- Vipin Gupta, Kamala Gollakota, R. Srinivasan, Business policy and Strategic Management concept and application, PHI learning, 2nd Edition, Chennai.2007

Arnoldo C. Hax and Nicholas S. Majluf, the Strategy Concept and Process – A Pragmatic Approach, Pearson Education, 2nd Edition, 2005.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--------------------------------------|-------|---------|
| III | MBA342T | INTERNATIONAL BUSINESS MANAGEMENT | 4 | 3 |

Unit - I: Fundamentals of IBM (12 Hours)

International business – Evolution – Influences - stages - modes of entering International business - International Business opportunities - Goals – advantages – problems, Theories of International Trade – Mercantilism – Theory of absolute cost advantage – comparative cost advantage – relative factor endowments theory – global strategy rivalry theory – porters national competitive Advantage.

Unit - II: Globalization (12 Hours)

Emergence of world Economy – LPG — General Agreement on Tariffs and Trade (GATT) – Establishment of world trade organization – The Uruguay Round Package – Organizational WTO and trade liberalization - structure of WTO - WTO and Anti-dumping Measures – India and WTO - Regional trade blocks – Economic Integration – European Union – NAFTA – ASEAN – SAARC - BREXIT and its implications.

Unit - III: International Trade(12 Hours)

Introduction to Foreign Exchange Management – Exchange market, Foreign Direct Investment - Meaning – Factors Influencing FDI – Benefits – trends – FDI in India and third world nations, LDC’s - International Trade – Tariff and non-tariff barriers – subsidies – import quota – Voluntary export restraints, International Marketing through Internet.

Unit - IV: MNC’s Control and Evaluation. (12 Hours)

MNC’s in India - Structural design of MNCs - Control of MNCs – Approaches to control – The role of information systems – performance measurement – Mechanics of measurement – Various performance indicators – evaluation and evaluation systems.

Unit - V: Conflict in International Business & Negotiations (12 Hours)

IMF – World Bank – FPI - Function and Criticism Factors – Politics of Lending - causing conflict – conflict resolution actions – The role of negotiations in international business – The role of international agencies in conflict resolution - Contemporary Issues in International Business.

Text Books

P. Subba Rao, International Business, Himalaya Publishing House, 5th Edition 2016.

Michael R. Czinkota, Iikka, A. Ronkainen and Michael M. Moffett, “International Business” Wiley Publications, 9th Edition, 2015.

References

Don Ball and Wendell McCulloch, “International Business”, Irwin McGraw Hill, New York, 11th Edition, 2012.

Roger Bennett, “International Business”, Pearson education, 2nd Edition, 2014.

Richard M. Hodgetts and Fred Luthans, “International Management”, Tata McGraw Hill, New Delhi, 6th Edition, 2005.

Francis cherunilam, International Business, PHI Learning, 5th Edition, 2015.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------------|-------|---------|
| III | MBA343T | BUSINESS RESEARCH METHODS | 4 | 3 |

Unit - I: Basics of Research (12 Hours)

Business Research: Definition and Significance – The Research Process. Types of Research: Exploratory - Causal Research - Theoretical and Empirical Research – Cross – Sectional and Time – Series Research – Research Questions / Problems – Research Objectives – Research Hypotheses – Characteristics – Research in an Evolutionary Perspective – The Role of Theory in Research.

Unit - II: Research Design and Measurement(12 Hours)

Research Design: Definition – Types of Research Design – Exploratory and Causal Research Design – Descriptive and Experimental Design – Different Types of Experimental Design – Validity of Findings – Internal and External Validity – Variables in Research – Measurement and Scaling – Different Scales – Construction of Instrument – Validity and Reliability of Instrument.

Unit - III: Data Collection (12 Hours)

Types of Data: Primary Vs Secondary Data – Methods of Primary Data Collection – Survey Vs Observation – Experiments – Construction of Questionnaire and Instrument – Validation of Questionnaire. Sampling Plan: Sampling Size – Determinants of Optimal Sample Size – Sampling Techniques – Probability Vs Non-probability Sampling Methods.

Unit - IV: Data Preparation and Analysis(12 Hours)

Data Preparation: Editing – Coding – Data Entry – Validity of Data – Qualitative Vs Quantitative Data Analysis – Bivariate and Multivariate Statistical Techniques – Factor Analysis – Discriminant Analysis – Cluster Analysis – Multiple Regression and Correlation – Multi-dimensional Scaling – Application of Statistical Software for Data Analysis.

Unit - V Report Design, Writing and Ethics in Business Research (12 Hours)

Research Report: Contents of Reports - Report Format – Title of the Report - Executive Summary – Chapterization – Contents of Chapter – The Role of Audience – Readability – Comprehensiveness – Final Proof. Ethics in Research: Ethical Behaviour of Research – Subjectivity and Objectivity in Research.

Text Books

- Donald R. Cooper and Pamela S. Schindler, Business Research Methods, Tata McGraw Hill, 12th Edition, 2013.
- Uma Sekaran and Roger Bougie, Research Methods for Business, Wiley India Limited, 5th Edition, Reprint 2012.

References

- Alan Bryman and Emma Bell, Business Research Methods, Oxford University Press, 3rd Edition, 2011.
- K.N. Krishnamoorthy, AppaIyer Sivakumar and M. Mathirajan, Management Research Methodology, Pearson Education, 2006.
- Kothari C.R, Research Methodology. New Delhi: Wiley & Sons, 1999.
- Ranjit Kumar, Research Methodology, Pearson Education, 2nd Edition, 2009.

William G Zikmund and Barry J Babin, Business Research methods, Cengage Learning, New Delhi, 8th Edition, 2012.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| III | MBA344A | Digital Marketing | 4 | 3 |

Unit- I: Fundamentals of Digital Marketing (12 Hours)

Digital marketing - the online environment - Digital Marketing Strategies and Target Markets, Content Marketing – Content creation – Content Channel Distribution, Understanding SEO -Search engine friendly website - Structure - SEO and key phrases - Link popularity - Benefits and challenges.

Unit- II: Online Advertising (12 Hours)

Search Advertising - Advertising in search - Targeting options - Bidding and ranking - Tracking - Setting up a campaign, Online advertising - display advertising - Types - Payment models – ads on online - Targeting and optimising – Tracking, Affiliate Marketing - building blocks - Setting up a campaign, Video Marketing - Video content strategy - Video production - Video promotion.

Unit- III: Social Media Marketing (12 Hours)

Social Media Channels - Social networking - Content creation - Bookmarking and aggregating - Tracking campaigns, Social Media Strategy - solve business challenges – Process - online brand attack recovery, Email Marketing - Email strategy and planning – Process, Mobile Marketing - Mobile messaging channels - Mobile commerce - mobile towards online marketing - Mobile analytics.

Unit- IV: Web Development and Design (12 Hours)

User Experience Design - Understanding UX design - Mobile UX, Web design - Web development - Mobile development – building a website, Writing for Digital -Types of web copy - HTML for formatting - SEO copywriting - online copywriting.

Unit- V: Data Analytics (12 Hours)

Data analytics - working with data - tracking and collecting data - setting objectives, goals and KPIs - analyzing data, conversion optimisation - designing tests – process of conversion optimisation.

Text Books

- Rob Stokes, The essential guide to marketing in a digital world, Kindle Edition, 5th Edition, 2014.
- Dave Chaffey and Smith, E marketing excellence planning and optimizing your digital marketing, Routledge, 4th edition, 2012.

References

- Alan Charles Worth, Internet Marketing a practical approach Butterworth-Heinemann Elsevier, 2005.
- Damian Ryan and Calvin Jones, Understanding digital marketing: marketing strategies for engaging the digital generation, kogan page, London. 2014
- Dentsu, Social Media Handbook, Popular PrakashanPvt Ltd, 2010.
- Homlon, Akins, Quickwin Digital Marketing, 1st Edition, PHI Learning, 2012.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| III | MBA343T | Micro Finance | 4 | 3 |

Unit - I: Foundation of Micro Finance (12 Hours)

History- Definition- Micro finance products and services- Key principles- Need- Nature of microfinance- Microfinance tools- Role of Grameen bank- Micro finance credit lending models- Micro finance distribution models- Regulations and supervision.

Unit - II: Marketing & Risks in Microfinance institutions (12 Hours)

Background and definition- Strategies for sustainability- major elements in the marketing program- marketing research in micro finance- benefits of marketing research- marketing environment for micro finance. Financial Evaluation – Analysing & Managing Financial Performance of MFIs: Analyzing financial statements - Financial performance ratios - Liquidity & capital adequacy – Revenue models of Micro finance. Operational Evaluation: Managing operational risks – Internal Control - Business Planning – Impact Assessment – CVP Analysis – Operating Expenses - Operating Efficiency

Unit - III: Credit Rating, Impact assessment and Development in microfinance (12 Hours)

Credit rating models in MFIs: GIRAFE Rating model-PEARLS rating model-CAMEL Rating model- Micro Rate rating model- The Philippine Coalition and CRISIL Rating model. Impact assessment: Impact assessment of microfinance- Approaches of impact assessment- Methods. Development in microfinance: Microfinance and Women empowerment- Microfinance and health- Micro entrepreneurship and Business development- Microfinance and Education.

Unit - IV: Micro Finance in India (12 Hours)

Challenges to Microfinance movement – Demand and Supply of Micro financial services – State Intervention in rural credit – RBI Initiatives - NABARD & SHG – Bank Linkup & Programs- – Governance and the constitution of the Board of various forms of MFIs – Intermediaries for Microfinance –State sponsored Organizations.

Unit - V: Issues, Trends and Frontiers of Micro Finance (12 Hours)

Issue – Role of Technology - Strategic issues in Micro finance - Sustainability - Opening new markets – Gender issues.

Text Books

- Indian Institute of Banking and Finance, Micro Finance: Perspectives and Operations, Macmillan India Limited, 2011.
- Debadutta Kumar Panda, Understanding Microfinance, Wiley India, 2010.

References

- Joann Ledgermood, micro finance- An intuitional & financial perspective, World Bank publication, December 1998.
- Beatriz and Jonathan, the Economics of Micro Finance, Prentice Hall of India, 2010.
- Mike Goldberg, Eric Palladini, Managing risk & creating value with Micro Finance, World Bank publication, April 21, 2010.
- Jonathan Morduch, Beatriz Armendariz, an overview of micro finance, MIT press publication, 2005.
- Ananya Roy, Microfinance & the making of development, Taylor & Francis, 2010.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
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|------------|----------------|---|----------|----------|
| III | MBA344C | Enterprise Resource Planning (ERP) | 4 | 3 |
|------------|----------------|---|----------|----------|

Unit – I: Introduction to ERP (12 Hours)

ERP: Defining ERP - Origin and need for an ERP System - Benefits of an ERP system - Reasons for the growth of ERP market - Roadmap for successful ERP implementation - Reasons for the failure of ERP implementation. ERP and related technologies: BPR – MIS - DSS - EIS - Advantages of EIS - Disadvantages of EIS - Data warehousing - Data mining - On-line analytical processing - PLC management – SCM - ERP security.

Unit – II: ERP Implementation (12 Hours)

ERP implementation life cycle: ERP tools and software - ERP selection methods and criteria - ERP selection process - ERP vendor selection - ERP implementation lifecycle - Pros and cons of ERP implementation - Factors for the success of an ERP implementation.

Unit –III: ERP in Action & Business Modules (12 Hours)

Operation and maintenance – Performance - Maximizing the ERP system. Business modules: Finance – Manufacturing - Human Resources - Plant maintenance - Materials management - Quality management – Marketing – Sales - Distribution and service.

Unit –IV: ERP Vendors (12 Hours)

ERP vendors - Types of ERP vendors. SAP-AG: products and technology R/3 overview - SAP advantage - Baan Company. Oracle corporation: Oracle application - Vertical solutions - Microsoft corporation - Ramco systems - Systems software associates Inc. (SSA) - QAD - People soft - JD Edwards - Lawson Software – Epicor - Intuitive.

Unit – V: Future Direction (12 Hours)

Future directions in ERP: New trends in ERP - ERP to ERP II - Implementation of organization-Wide ERP - Development of new markets and channels - Latest ERP implementation methodologies - ERP and E-business - Market snapshot - The SOA factor.

Text Books

- Alexis Leon, ERP Demystified, Tata McGraw-Hill, 2nd Edition, 2007.
- Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill, 2008.

References

- Daniel E O’Leary, Enterprise Resource System: Systems, Lifecycle, Electronic Commerce, Risk, Jose Antonio Fernandez, the SAP R/3 Handbook, TMH, 1998.
- Mahadeo Jaiswal and Ganesh Vanapalli, Enterprise Resource Planning, Macmillan India, Reprint 2009.
- Vinod Kumar Grag and N. K. Venkitakrishnan, ERP - Concepts and Practice, Prentice Hall of India, 2nd Edition, 2006.

| Semester | Course Code | Title of the Course | Hours | Credits |
|-----------------|--------------------|---------------------------------------|--------------|----------------|
| III | MBA344D | COUNSELING SKILLS FOR MANAGERS | 4 | 3 |

Unit - I: Concept of Counseling (12 Hours)

Counseling –meaning – objectives - Emergence and Growth of Counseling Services - Approaches to Counseling - theoretical approaches to counseling.

Unit - II:Counseling Process and Counseling Skills(12 Hours)

Counseling Process – Beginning - Developing and terminating a counseling relationship and follow up. Counseling skills – skills – relationship - Sympathy Vsempathy - problem solving - decision making - behavior modification skills. Models in counseling – Gerad Agent Model - Skill model.

Unit - III: Qualities of A Counselor (12 Hours)

Qualities required for a counselor - Counselor’s Attitude and Skills of Counseling - Assessing Clients problems.

Unit - IV:Counseling Strategies, Interventions and Ethics (12 Hours)

Selecting Counseling Strategies and Interventions - Changing Behaviour through Counseling - Counseling ethics - code of ethics and practice of counseling - Dealing with ethical issues in counseling.

Unit - V:Application Of Counseling (12 Hours)

Life span counseling - counseling with different age groups - Special Problems in counseling - Application of Counseling to Organizational - Performance counseling.

Text Books

- Carroll Michael, Workplace Counseling: A Systematic Approach to Employee Care, Sage publications: New Delhi, 14thEdition,1996.
- NarayanaRao, S, Counseling & Guidance, New Delhi, Tata McGraw- Hill Publishing company Ltd, 2nd edition, 1991.

References

- Dave Mearns, Person centered counseling training, Sage Publication, New Delhi, 1997.
- Maclennam, Nigel, Aldershot, Grover, Counseling for managers, 1996.
- Moursund, J, The Process of Counseling and Therapy .2nd ed. Englewood Cliffs, New Jersey, Prentice Hall Inc., 1990.
- Phil Joyee and Charlotte Sills, Skills to gestalt counseling and psychotherapy, Sage Publication, New Delhi, 2002.
- Ray Wolfe and Windy Dryden, Handbook of counseling Psychology, Sage Publication, New Delhi, 1996.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--------------------------------|-------|---------|
| III | MBA344E | MARKETING OF HOSPITAL SERVICES | 4 | 3 |

Unit I Understanding Services Marketing (12 Hours)

Introduction - services in modern economy - classification of services - differences in goods versus services - reasons for growth in services sector - services triangle.

Unit II Consumer Behavior in Services (12 Hours)

Customers interact with service operations - purchase process - customer's needs and expectations - difficulty in evaluation of services - service business system - the search for customer loyalty - understanding CRM - CRM systems.

Unit III Service Product and Revenue Management (12 Hours)

Planning and creating services: identifying and classifying supplementary services, branding service products, new service development, objectives and foundations for setting prices, methods of service pricing, revenue management.

Unit IV Communication-Mix and Distribution of Services (12 Hours)

Challenges and opportunities in communicating services: objectives for marketing communications, branding and communications. Distribution in a service context: options for service delivery, decisions about place and time, service delivery in cyberspace.

Unit V Managing Service Delivery and Service Quality (12 Hours)

Blue printing services - service process redesign - the customer as co-producer - fluctuations in demand for services - integrating service quality and productivity strategies - measuring and improving service quality.

Text Books

- Services Marketing-People, technology and strategy by Christopher Lovelock, Jochen Wirtz and Jayanta Chatterjee, Pearson education 2006.
- Services Marketing by K.Rama Mohana Rao, Pearson education 2005

References

- Services Marketing-Integrating customer focus across the firm by Valarie A Zeithaml & Mary J Bitner,2005
- Services Marketing by S.M. Jha, Himalaya publishers, 2006.
- Essentials of Healthcare Marketing by Eric N.Berkowitz, Jones& Barrett publishers, 2006.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|------------------------------|-------|---------|
| III | MBA345A | BRAND AND PRODUCT MANAGEMENT | 4 | 3 |

Unit- I Basic Concepts of Brand Management (12 Hours)

Understanding brands – Characteristic of branding - Product Branding - Line Branding - Range Branding - Umbrella- Branding - Source/Double Branding - Endorsement Branding.

Unit- II Branding (12 Hours)

Evolution of Brands and Historical Perspective - Definition and Conceptual clarity - Brand Identity - Brand Identity Levels - Brand Dimensions - Brand Equity: Definition and Meaning - Brand Awareness - Brand Image/Constellation - Brand Loyalty.

Unit- III Managing Brands (12 Hours)

Selecting a brand name - Brand Extension Decision - Family Vs. Individual Brand Name - Multiple Branding - Private vs. national branding - Important factors in conception and various stages of growth and maturity of brands.

Unit- IV Product Planning and Lifecycle (12 Hours)

Product Concept – Product Classifications – Product Mix – Product Life Cycle – PLC pattern – Product-line decisions - Style , Fashion and fad life Cycles - Marketing strategies concerning the stages of product life cycle.

Unit- V New Product Development (12 Hours)

New product development and launching - Idea generation - Screening ideas - Concept development and testing - Marketing Strategy Development - Product leadership - Power brands - Emerging trends in brand and product management.

Text Books

Aaker David, Managing Brand Equity, New York, Free Press, 1st Edition, 1991.

G. Cooper, Product Leadership, Perseus Books, 2nd Edition 1999.

References

C. Merle Crawford , C. Anthony Di Benedetto, New Products Management, McGraw Hill/Irwin, 2004.

Cowley, Don Understanding Brands London, Kogan page, 2006.

Kapferer, J N Strategic Brand Management New York, Free Press, 2000.

Linda Gorchels, The Product Manager's Handbook, McGraw-Hill, 2000.

YLR. Moorthi, Brand Management – The Indian Context, Vikas Publishing House, 2006.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| III | MBA345B | CORPORATE FINANCE | 4 | 3 |

Unit - I: Industrial Finance (12 Hours)

Indian Capital Market: Introduction – Concepts – Objectives - Benefits – Basic problem of Industrial Finance in India – Equity - Debenture financing - Advantages and Disadvantages and cost of various sources of Finance - Finance from international sources - Financing of Exports & Imports – Role of EXIM bank - Commercial banks and Financial Institutions – Finance for rehabilitation of sick units.

Unit - II: Short Term and Long Term Working Capital Finance (12 Hours)

Concepts-objectives – features - Estimating working capital requirements (Problems) – Approach adopted by Commercial banks - Commercial paper- Public deposits and inters corporate investments.

Unit - III: Financing Decision(12 Hours)

Over view of financing choices – Difference between debt and equity – equity and debt financing options – Hybrid securities – Internal Vs External financing – Financing mix; Trade off and theories.

Optimal financing mix; operating income approach (Problems) – Cost of capital approach – leverage and the return differential.

Unit - IV: Investment Decision(12 Hours)

Concept – Investment decision roles – Comparing investment decision roles – Discounted cash flow measures – Project interaction, side benefits and side costs – Appraisal of risky investment – Investment in cash and marketable securities – Investment returns and corporate strategy.

Unit - V: Valuation (12 Hours)

Valuation: Principles and practices – Discounted cash flow valuation- Cash flow to the form, estimating operating earnings and tax rate (Problems) – Relative valuation; Standardized value and multiply – Determinants of multiply – Re- concealing different valuation: Discounted cash flow valuation-Relative valuation. Value enhancement; Tools and techniques.

Text Books

- Richard A.Brealey, StewartC.Myers and Mohanthy, Principles of Corporate Finance, Tata McGraw Hill, 8th Edition, 2008
- Aswath Tamodaran, Corporate Finance (Theory & Practice), Wiley Publication, Second Edition, 2004.

References

- Brigham and Ehrhardt, Corporate Finance - A focused Approach, Cengage Learning, 1st Edition, 2008.
- M.Y Khan, Indian Financial System, Tata McGraw Hill, 5th Edition, 2008
- Smart, Megginson, and Gitman, Corporate Finance, 1st Edition, 2008.
- Krishnamurthi and Viswanathan, Advanced Corporate Finance, PHI Learning, 2010.
- Stephen A. Ross, Corporate financing, McGraw hill publication, 11th Edition, 2010.
- I.M.Pandey, Financial Management, Vikas Publishing House Pvt., Ltd., 11th Edition, 2008.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| III | MBA345C | Quality Management | 4 | 3 |

Unit - I: Policy and Organization of Quality(12 Hours)

Introduction to quality: History and importance of quality – Defining quality– Quality as a management framework – Quality and competitive advantage – Three levels of quality – Quality and personal values - Quality concept and objectives - Quality organization and programmes - Quality circles - Training for quality - Quality related budgets and costs - Value engineering.

Unit - II: Quality in Engineering Design and Manufacture(12 Hours)

Design objectives - National and international engineering design standards - Statutory provisions and obligations - Quality control in design - Control of engineering changes and design – Modifications.

Unit - III: Quality Functions in Manufacturing and Statistical Quality Control (12 Hours)

Vendor Quality / Supplier Quality - Out materials - Quality of bought - Out services - Inspection - Metrology - Functional testing - Managing non - conformance. Process capability analysis - Acceptance sampling - The quality problem solving process.

Unit - IV: Total Quality Management (12 Hours)

Strategic quality planning - Introduction to TQM - Organizing for TQM - Benefits of TQM – Kaizen - Benchmarking - Organizing for TQM quality circles - Benchmarking for quality improvement - TQM in service organizations - Training for TQM - Implementing a TQM program -TPM.

Unit - V: ISO: 9000 ISO: 14000 and Other Quality Standards (12 Hours)

ISO – 9000 - Baldrige award - Balanced score card - ISO - 9000 vs the Baldrige Award. ISO 14000 - Management systems for health and safety - Auditing and certification process - Six sigma initiatives.

Quality Management Standards: (Introductory aspects only)

The ISO 9001:2000 Quality Management System Standard - The ISO 14001:2004 Environmental Management System Standard - ISO 27001:2005 Information Security Management System - ISO / TS16949:2002 for Automobile Industry - CMMI Fundamentals & Concepts - Auditing Techniques - Planning for an audit - Developing a Check - list - Conducting an Audit - Writing an Audit Report - Auditor Ethics - Value - addition process during Internal Audit - Mock Audits – Quiz.

Text Books

Howard S. Gitlow, Alan J. Oppenheim, Rosa Oppenheim, David M. Levine, Quality Management, Mc-Graw-Hill -Irwin, New York, 3rd Edition, 2005.

James R. Evans and William M. Lindsay, Managing for Quality and Performance Excellence, South-Western College Publications , Cengage Learning, New Delhi, 9th Edition, 2012.

References

Feigenbaum, A. V., Total Quality Control, McGraw-Hill, New York, 1991.

J.M. Juran, Quality Control Hand book, McGraw-Hill, New York, 4th Revised Edition, 1988.

Omachonu, V. K., Ross, J. E., Principles of Total Quality, Lucie Press, Yang, 2nd Edition, 1998.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---|-------|---------|
| III | MBA345D | EMOTIONAL INTELLIGENCE FOR MANAGERIAL EFFECTIVENESS | 4 | 3 |

Unit I: Concept of emotion:(12 Hours)

Understanding Emotions, Sources of Emotions, Types of Emotions, Bodily changes in emotions, Psychology of Emotions. Theories of emotion: James Lange, Schachter singer, Canon-Bard. Opponent Process: Moods and emotions.

Unit II: Concept of emotional intelligence:(12 Hours)

Concept of Emotional Intelligence. Training on EI through the use of Models– Daniel Goleman Model, Salovey and Mayer’s model, Reuven Bar-On Model, Using techniques for Emotionally Intelligent Communication Johari Window, Neuro-Linguistic Programming (NLP).

Unit III: Characteristics of emotional intelligence(12 Hours)

Emotions and the Tripartite Brain, Emotional Competencies, Executive EQ, Emotions and Enneagram, Rational Emotive Therapy, Emotional Transformation, Emotions and Childhood, Emotions and Attitudes.

Unit IV: Measuring emotional intelligence(12 Hours)

Measuring Emotions, Emotional Quotient, Emotional Intelligence, Developing Emotional Intelligence, Social Intelligence- Tips to Develop Social Intelligence- Emotional and social competency inventory. Emotional self-awareness, expression and detection of emotions, emotional patterns in verbal communication.

Unit V: Application of E.I in workplace(12 Hours)

Recognizing and handling potentially emotional situations at workplace, Emotional Labour, promotions, rewards, grievance handling, industrial unrest, disciplinary approaches, transfers, migration and firing.

Text Books:

- Goleman, Daniel. (2011), The Brain and Emotional Intelligence: New Insights, 1st edition, More Than Sound LLC.
- Dianne Coleman (2016), Developing Emotional Intelligence: How to Improve Your EQ and Achieve Success, Kindle Edition, Amazon Digital Services LLC

Reference Books

- Paul Whitman, (2016), Emotional Intelligence: Develop Absolute Control Over Your Emotions and Your Life for Everlasting Success, Create space Independent Publishing Platform.
- Robin Lawson, (2016), Emotional Intelligence: Learn What Emotional Intelligence Is, Why It Is Important, and Learn How to Improve It (Emotional Intelligence, Emotional Intelligence books, Emotional Intelligence at work), Kindle Edition, Amazon Digital Services LLC
- Adele B. Lynn (2007), Quick Emotional Intelligence Activities for Busy Managers: 50 Team Exercises That Get Results in Just 15 Minutes, 1st edition, AMACOM.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|-------------------------|-------|---------|
| III | MBA345E | MEDICAL CARE MANAGEMENT | 4 | 3 |

Unit - I: Patient Centric Management (12 Hours)

Concept of patient care: Patient - centric management - Organization of hospital departments - Roles of departments/managers in enhancing care – Health promotions - Trust – Patient counseling - Patient satisfaction – Patient Loyalty.

Unit - II: Quality in Patient Care Management (12 Hours)

Focus on quality - Systems approach towards service quality – service quality framework - Key theories and concepts - Models for quality improvement - Patient safety and patient risk management.

Unit - III: Patient Classification Systems and Role of Case Mix (12 Hours)

Patient classification system - Types - ICD 9 (CM, PM) (International Classification of Diseases) - Case mix classification systems - DRG (Diagnosis-Related Group) - HBG (human beta-glucuronidase) - ARDRG (Australian refined diagnosis-related groups) - Case mix innovations and Patient empowering classification system.

Unit - IV: Hospital Administration (12 Hours)

Role of Medical Superintendent - Hospital Administrator - Resident Medical Officer - Night Duty Executive - Public and guest relation - Importance in patient care - Information Regarding Patients - Code of Press Relations - Medical Information - Patient Information Booklets - Attendants' Management.

Unit - V: Medical Records & Legal Responsibilities (12 Hours)

Medical record - Definition, Types, Importance - Flow chart of function - Statutory requirements of maintenance - Coding - Indexing And Filing - Computerization Of Record - Report and Returns - Management of Medical Records Department - Role Of Hospital Managers & Mrd Personnel In Medical Record Keeping-Legal Responsibilities - Essential Documents - State Licensure, Civil Rights, Authority Of Examination, Treatments, Autopsy, Responsibilities of Medical Staff, Tort Liability, Insurance, Use of Investigational Drugs.

Text Books

- Goel S L & Kumar R., Hospital Core Services: Hospital Administration of the 21st Century. Deep and Deep Publications, New Delhi, 6th Edition, 2016.
- Gupta S & Kant S. Hospital & Health Care Administration: Appraisal and Referral Treatise. Jaypee: New Delhi, 5th Edition, 2015.

References

- Kelly D L. Encyclopedia of Quality Management in Hospitals & Health Care Administration. Vol. 1-6. Pentagon Press, Chicago, 4th Edition, 2016.
- Kilpatrick AN O & Johnson J A, Handbook of Health Administration & Policy. Marcel DekkesInc, New York, 3rd Edition, 2016.
- Arun Kumar A., Encyclopedia of Hospital Administration & Development, Volume I. Anmol Publications Ltd: New Delhi, 2nd Edition, 2015.
- Ransom S B. Joshi M S & Nash D B. The Health Care Quality Book: Vision, Strategy & Tools. Standard Publishers Distributors, Delhi, 2nd Edition, 20012.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|-----------------------------|-------|---------|
| III | MBA345D | Project - Summer Internship | | 1* |

Summer placement (summer internship programme, i.e., now popularly known as SIP), is an integral part of the academic curriculum of MBA. For the successful completion of the MBA studies, students have to undergo the SIP as part of their curriculum. After completion of the first year, i.e., at the end of the second semester and before the commencement of the third semester, the students are required to undergo internship with an organization for hands on experience. The duration of the SIP is four to five weeks.

SIP aims at widening the student's perspective by providing an exposure to real life organizational and environmental situations. This will enable the students to explore an industry/organization, build a relationship with a prospective employer, or simply hone their skills in a familiar field. SIP also provides invaluable knowledge and networking experience to the students. During the internship, the student has the chance to put into practice whatever he/she learned in the first year of MBA. This SIP will help them to apply their class room learning in an actual professional working environment.

Some of the suggested areas for summer internships can be in the areas of strategy formulation, business process reengineering, MIS, ERP implementation, retail/investment banking, industry analysis, new product launching, sales and distribution, market research and advertising, etc. However, this is not an exhaustive list of areas but can be varied to suit the requirements of the organizations where the student has to undergo internship.

Thereafter, the student should prepare a internship report and submit one copy to the organization and one to the institute. The student should also obtain a certificate from the organization/industry/factory where the SIP was done and attach the same with the copy submitted to the institute.

The Controller of the Examinations will arrange for viva of the SIP reports submitted by the students. For the purpose, the Controller of the Examination will appoint one external examiner from other institute and one internal examiner the department who will organize viva and the examination. The student is expected to make a 15 minute presentation before the examiners regarding the SIP report. The total marks for the SIP report will be 100 and it carries six credits.

Format of Summer Internship

Contents

About The Company

Mission of the company

Mission is to Maximize Share of owners value

Objective

Profile

Company Stock

Operating Management Structure

Social Responsiveness

History of the Company

Company Year by Year from the beginning of the company.

Financial Report of the company

Financial Strategies

Debt Financing

Share Repurchase

Dividend Policy

Risk Management

Foreign currency

Interest Rates

Performance tools

Departments

Sales and Marketing

Finance Department

Technical Department

Production Department

- Production Rate

Logistic Department

Purchase Department

Administration Department

Human Resource Department

Welfare Measures

Selection and Recruitment etc.

Brands of the Company (If Applicable)

Future Plans of the Company

Conclusion

Annexures

Note: Students have to choose from the above format whatever is relevant for their field of study. They can also include any other topics which come under their area of study which are available in the organization/industry/factory.

Evaluation

The valuation of the report writing and oral examination will be done by internal examiner.

80 Marks will be awarded for report writing and 20 Marks for oral examination.

The following are the components for Marks

Viva Voce - 20 Marks

Report Writing - 80 Marks

- Content
- Grammar
- Log Book
- Mid-Month Review

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| III | MBA347P | SOFT SKILLS | 2 | 1 |

Unit - I: Leadership Skills and Stress Management (6 Hours)

Leadership concepts: Qualities – Challenges involved in Leadership – Ways of effective communication - Understanding Stress – Personality Type & its Implication on Stress - Coping Strategies of Job Stress – Stress and Job Performance

Unit - II: Presentation Skills (6 Hours)

Mock Presentation – Framing for Presentation – Preparing a presentation – Delivering a Presentation – Deliver & Review Presentation.

Unit - III: Time Management Skills(6 Hours)

Time planning and Prioritizing – Key to set up Goals – Efficiency in Time Management – Action Planning.

Unit - IV: Goal Setting (6 Hours)

Objectives of Goal setting - Steps – Advantages of Goal setting – Information Seeking – Prioritization – Barriers of Goal setting – Time line for Goal setting.

Unit - V: Negotiation (6 Hours)

Approaches - Issues and Common Biases – Gender and Win- win strategy – Improving Negotiation Skills.

Text Books

Shiv Khera, “You Can Win” – Macmillan Books, 2012

Stephen Covey, “7 Habits of highly effective people “, 2011

References

Tim Hindle, “Reducing Stress”, Essential Manager Series DK publishing, 2005
Dr R L Bhatia, “Managing Time for a competitive edge”, 2007
Robert Heller, “Effective leadership”, Essential Managers DK publishers, 2010.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--|-------|-----------|
| III | | APTITUDE AND EMPLOYABILITY SKILLS | | 1* |

Unit - I

Problems on Trains - Time and Work - Profit and Loss - Problems on Ages - Average - Permutation and Combination - Problems on H.C.F and L.C.M - Square Root and Cube Root Problems - Alligation or Mixture - Probability - Banker’s Discount.

Unit - II

Time and Distance- Simple Interest and Compound Interest - Partnership - Calendar - Problems on Numbers – Numbers, Decimal Fraction - Odd Man Out and Series- Height and Distance- Percentage - Ratio and Proportion- Boats and Streams - Volume and Surface- Race and Games- Data Chart - Table Chart - Bar Chart - Pie Chart

Unit-III JOB SKILLS

Job hunting skills- Interview-Types of Interview - Before interview- During the Interview-Interview preparation –Interview process- Self Introduction-Salary Negotiation-Resume Building-Resume Vs Curriculum Vitae – Business letter.

Unit-IV

Presentation Skills-Creating effective PowerPoint Presentation-Public SpeakingSkills-Body language - Greetings-Personal grooming and Business Etiquettes-Types of Etiquettes.

Unit-V

Group discussion- Do’s and Don’ts in group Discussion-Team work activity and its importance-Importance of Role playing games.

Text Books

[R S Agarwal](#), Quantitative Aptitude for Competitive Examinations, S. Chand Publications, 2017.

[Kapil Dev, Vishnu P. Singh\) C. Subhas](#), Employability Skills, Computech Publications Ltd, 2017

References

Employability Skills for Getting the Job You Want, Student Aid Publications, 2017.
[Abhijit Guha](#), Quantitative Aptitude for All Competitive Examinations, Mc Graw Hill, 6th Edition, 2017.

Guidelines for aptitude and employability skill paper

The paper is offered on an optional basis in the fourth semester of the MBA programme. The students on opting this paper will have to undergo a written exam at the end of the semester and on the successful completion of it with a minimum pass mark of 50 they will be awarded 1(one) credit.

Question paper pattern

Objective questions with choice based answers are to be given in the question paper.

No. of questions = 50

Marks allocated for each question=2

Total marks=100

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|------------------------------|-------|---------|
| IV | MBA440T | EXPORT AND IMPORT MANAGEMENT | 4 | 3 |

Unit - I: Foundation of Export and Import (12 Hours)

Export-Import Policy - Concept – Objectives – Policy Framework for India’s Foreign Trade in Pre and Post-liberalization Era- Infrastructural Support for India’s Foreign Trade Policy (ASIDE) - Export Promotion Councils - Commodity Boards and Product Development Authorities- Support Organizations and Services – Indian Institute of foreign Trade (IIFT), Indian Trade Promotion Organization (ITPO) - Export Inspection Agencies - Indian Council of Arbitration – Federation of Indian Export Organizations (FIEO).

Unit - II: Export Documentation and Procedures (12 Hours)

Exports - Meaning – Methods – Direct and Indirect Exporting, Registration – Setting up Export Company- IEC Number – GSTIN - RCMC - Export License - Electronic Data Interchange (EDI) - Export Sales Contracts terms and Conditions - Procedures of documentation – Pro forma Invoice - Commercial Invoices - Shipping Bills - Certificate of Origin - Packing List – ARE - 1 Form - Mate's Receipt - Bill of lading - GR Form – Bill of Exchange – Special Consular Invoice, Export Procedure – Pre-shipment, Shipment and Post-shipment procedure.

Unit - III: Import Documentation and procedures (12 Hours)

Imports – Liberalization – Negative list – Categories of importers – Selecting the Commodity Market - State Trading Corporation of India - Schemes for importers - Transport Documents – Bill of Entry- Airway Bill – Packing List – Freight declaration - Inspection Certificate - Bill of Exchange - GSP (Generalized system of preference) Certificate – Certificate of Measurement – Bill of Entry, Import Procedure – Pre-Import Procedure – Legal Dimensions of Import procedure – Retirements of Import Procedure – Customs Clearance of imported goods – warehousing of imported goods – Exchange control Provisions for Imports.

Unit - IV: Methods and Planning to Export and Import (12 Hours)

Export Pricing - Methods of payment - Letter of Credit, Risks in Cargo, Credit and Foreign Exchange - Excise and Custom Clearance – Methods and procedure for Quality control and Pre-shipment Inspection, Marine Insurance Policy and its procedure – Role of clearing and forwarding agents – Shipping and customs formalities – online generation of shipping bill, Export Finance – pre-shipment

and post shipment finance - Role of EXIM Bank and Commercial Banks, Import - Managing Risks Involved in importing.

Unit - V: Schemes of Trade (12 Hours)

Export Incentives schemes - Duty Exemption Schemes – Schemes for Import of Capital Goods - Procedures for New - Second Hand Capital Goods (EPCG), Foreign Trade Financing and Insurance Schemes- Pre and Post shipment Finance - Export Credit Schemes - Import Financing Schemes- - Export Credit and Foreign Exchange Covers - Export Credit and Guarantee Corporation (ECGC)- Financial Guarantees - Export – Trading - Star trading - Superstar Trading Houses- Objective Criteria and Benefits- Procedures and Documentation- Policy for EOU - FTZ- EPZ units -Objectives - Criteria and Benefits - Procedures and Documentation.

Text Books

- Dr. Khushpat S. Jain, Export import procedures and documentation, Himalaya Publishing House, 2016.
- M. I. Mahajan, Export policy, procedure and documentation, Snow white Publication, 25th Edition, 2016.

References

- Dr. Justin Paul and Dr. Rajiv Aserkar Export Import Management, Second Edition, Oxford University Press, 2016.
- S. Rathore and J. S. Rathore, Export Management, Himalaya Publishing House, 2015.
- M. D. Jitendra Export procedures and documentation, Rajat publications, 2015.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|----------------------------------|-------|---------|
| IV | MBA441A | CUSTOMER RELATIONSHIP MANAGEMENT | 4 | 3 |

Unit - I: Basic Concepts of CRM(12 Hours)

Definitions - Concepts and Context of relationship Management – Evolution - Transactional Vs Relationship Approach – CRM as a strategic marketing tool – CRM significance to the stakeholders.

Unit - II: Understanding Customers (12 Hours)

Customer information Database – Customer Profile Analysis - Customer perception, Expectations analysis – Customer behavior in relationship perspectives - individual and group customer’s - Customer life time value – Selection of Profitable customer segments.

Unit - III: CRM Structures (12 Hours)

Elements of CRM – CRM Process – Strategies for Customer acquisition – Retention and Prevention of defection – Models of CRM – CRM road map for business applications.

Unit - IV: CRM Planning and Implementation(12 Hours)

Strategic CRM planning process – Implementation issues – CRM Tools- Analytical CRM – Operational CRM – Call center management – Role of CRM Managers.

Unit - V: Trends in CRM (12 Hours)

e- CRM Solutions – Data Warehousing – Data mining for CRM – An introduction to CRM Software packages: ZOHO CRM - DQUIP'S CRM- KREATO CRM - PACT CRM.

Text Books

Alok Kumar et.al, Customer Relationship Management: Concepts and applications, Biztantra, 2008.
 G.Shainesh, JagdishN.Sheth, Customer Relationships Management Strategic Prespective, Macmillan, 2005.

References

Assel, Consumer Behavior, Cengage Learning, 6th Edition.
 Francis Buttle, Customer Relationship Management: Concepts & Tools, Elsevier, 2004.
 H.Peeru Mohamed and A.Sahadevan, Customer Relation Management, Vikas Publishing 2005.
 Kumar, Customer Relationship Management - A Database Approach, Wiley India, 2007.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|-----------------------------|-------|---------|
| IV | MBA441B | INTERNATIONAL TRADE FINANCE | 4 | 3 |

Unit - I: Foundation of International Trade Finance (12 Hours)

Definitions and benefits – Foreign trade and Foreign Exchange – Balance of payment – Recent Changes in global financial market – Functions of foreign exchange department – Current trends in India.

Unit - II: International Exchange Systems (12 Hour)

Special need for Finance in International Trade – INCO Terms (FOB, CIF, etc.) – Payment Terms – Letters of Credit – Pre Shipment and Post Shipment Finance – Forfeiting – Deferred Payment Terms – EXIM Bank – ECGC and its schemes – Import Licensing – Financing methods for import of Capital goods.

Unit - III: Foreign Exchange Market and finance of international trade(12 Hours)

Concept – Features of foreign exchange market – Transactions in interbank markets – Quotations in interbank market – Interbank rates and arbitraging – Determination of exchange rate – Factors determining spot exchange rates – Purchasing power parity theory – Determination of forward rates. Financing exports: Role of commercial banks- Packing credit advances- Pre-shipment credit in foreign currency- Advance against duty drawback- other services to export.

Unit - IV: Foreign Trade Contracts, Documents and Sources of external fund (12 Hours)

International trade contracts: Export procedures- Entering into export contract- methods of payments- Letters of credit: meaning- mechanism of a letter of credit- evaluation of letter of credit- types. Documents used in foreign trade; Bill of Exchange – Marine insurance policy – Certificates and other documents .Transport documents; Bill of lading – Multimodal transport documents. Inco terms; Need and scope – Contract terms – Comparison of Inco terms. Sources of external funds: Non-resident deposits and investment-Definition-Nonresident deposit accounts- Resident foreign currency accounts- Investment by Non-residents. International financial markets: Background- Features- Interest rate in Eurocurrency market- Euro credits- Eurobonds- Eurocurrency deposits- Euro notes.

Unit - V: Exports & Import Bank of India**(12 Hours)**

Export Import bank of India – Lending to Indian exporters – Lending to foreign government and companies – Loans to commercial banks in India – Non learning service. Export credit insurance; Whole turn over policies – Specific policies – Maturity factoring facility. Export promotion measures; Institutions for export promotions – Export promotion measures – Incentive and facilities to exports. Financing imports; Trade regulations – FEMA regulations – Opening a letter of credit – Establishing a letter of credit – Payment of import bills.

Text Books

JeevaNandam .C, Foreign Exchange and Risk Management, Sultan Chand and Publications, 12th Edition, 2009.

Apte P.G., International Financial Management text and Cases, Tata McGraw Hill, 6th Edition, 2011.

References

Alan C. Shapiro, Multinational Financial Management, PHI Learning, 4th Edition, 2008.

Eun and Resnik, International Financial Management, Tata McGraw Hill, 4th Edition, 2008.

Jonathan Reuvid, Jim Sherlock, International financial management, Kogan publication, 3 Editions, 2011.

Jeff Madura, International Corporate Finance, Cengage Learning, 8th Edition, 2008.

www.EXIM.com.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|----------------------|-------|---------|
| IV | MBA441C | Logistics Management | 4 | 3 |

Unit – I: Foundation of Logistic Management(12 Hours)

Introduction to logistics management – Definition – Scope – Functions - Objectives - Integrated logistics management - Role of logistics in the Supply Chain - Logistics & Customer Service - Role of logistics in competitive strategy - Logistics organization & performance measurement - ERP – SAP – ORACLE.

Unit – II: Inventory Planning**(12 Hours)**

Inventory planning- Inventory costs - Classifying inventory - Nature & importance of warehousing - Types of warehouses - Warehousing functions - Warehouse layout & design. Material handling – Objectives - Guidelines & principles - Selection of material handling equipments. Packaging - Role of packaging - Packaging materials - Consumer & industrial packaging - material handling efficiency.

Unit – III: Transportation**(12 Hours)**

Transportation - Role of transportation in logistics - Transportation selection decision - Basic modes of transportation – Rail – Road – Water – Air – Pipeline - Characteristics of different modes –Transport economics - Inter modal operations

Unit – IV: Containerization**(12 Hours)**

Containerization- Concept – Types – Benefits - Types of carriers - Indirect & special carriers - Role of intermediaries - Shipping agents - Brokers- Freight management - Route planning - Role of ports – ICDs - CONCOR - Global shipping options

Unit – V: Reverse Logistics**(12 Hours)**

Reverse logistics – Scope - Design - e-logistics- Logistics information system-Automatic identification technologies - RFID Bar coding - Logistics outsourcing - 3PL & 4PL - Global logistics – Operational and Strategic issues.

Text Books

Bowersox Donald J, Logistics Management – The Integrated Supply Chain Process, Tata McGraw Hill, 2010.
 Sople Vinod V, Logistics Management – The Supply Chain Imperative, Pearson Education, 3rd Edition, 2012.

References

Agrawal D K, Textbook of Logistics & Supply Chain Management, Macmillan India Ltd, 1st Edition, 2003.
 Ailawadi C Sathish & Rakesh Singh, Logistics Management, PHI, 2nd Edition, 2005.
 Lemay Stephen et al., Logistics, Prentice Hall India, 1st Edition, 2002.
 Coyle et al., the Management of Business Logistics, Thomson Learning, 7th Edition, 2004.
 Ronald H. Ballou, Business Logistics and Supply Chain Management, Pearson Education, 5th Edition, 2007.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---|-------|---------|
| IV | MBA441D | STRATEGIC HUMAN RESOURCE MANAGEMENT AND DEVELOPMENT | 4 | 3 |

Unit - I: Human Resource Development (12 Hours)

Meaning – Strategic framework for HRM and HRD – Vision - Mission and Values – Importance – Challenges to Organizations’ – HRD Functions - Roles of HRD Professionals - HRD Needs Assessment - HRD practices – Measures of HRD performance – Links to HR - Strategy and Business Goals – HRD Program Implementation and Evaluation – Recent trends – Strategic Capability - Bench Marking and HRD Audit.

Unit - II: Cross Cultural HRD (12 Hours)

Domestic Vs International HRM - Cultural Dynamics - Culture Assessment - Cross Cultural Education and Training Programs – Leadership and Strategic HR Issues in International Assignments - Current challenges in Outsourcing - Cross border Merger and Acquisition - Repatriation etc - Building Multicultural Organization - International Compensation.

Unit - III: Career and Competency Development (12 Hours)

Career Concepts – Roles – Career stages – Career planning and Process – Career development Models– Career Motivation and Enrichment –Managing Career plateaus- Designing Effective Career Development Systems – Competencies and Career Management – Competency Mapping Models – Equity and Competency based Compensation.

Unit - IV: Coaching, Counseling and Wellness(12 Hours)

Need for Coaching – Role of HR in coaching – Coaching and Performance – Skills for Effective Coaching – Coaching Effectiveness– Need for Counseling – Role of HR in Counseling - Components of Counseling Programs – Counseling Effectiveness – Employee Health and Welfare Programs – Work Stress – Sources - Consequences – Stress Management Techniques.- Eastern and Western Practices - Self Management and Emotional Intelligence.

Unit – V: Technology in HRM(12 Hours)

e- Employee profile– e- selection and recruitment - Virtual learning and Orientation – e - Training and development – e- Performance management and Compensation design – Development and Implementation of HRIS – Designing HR portals – Issues in employee privacy – Employee surveys online.

Text Books

Jeffrey A Mello, Strategic Human Resource Management, Cengage Learning, Southwestern, 3rd edition, 2007.

Randy L. Desimone, Jon M. Werner – David M. Mathis, Human Resource Development, Cengage Learning, 8th edition, 2007.

References

- Bernadin, Human Resource Management, Tata McGraw Hill, 7th Edition, 2006.
- Chris Brewstes, Paul Sparrow, Guy Vernon, International Human Resource Management, Chartered Institute of Personnel and Development, 2nd Edition 2007.
- Robert L. Mathis and John H. Jackson, Human Resource Management, Cengage Learning, 2007.
- Rosemary Harrison, Employee Development, University Press, India Ltd, New Delhi, 4th Edition 2007.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--------------------------------------|-------|---------|
| III | MBA441E | Health Insurance and Medical Tourism | 4 | 3 |

Unit - I: Basics of Health Insurance (12 Hours)

History of Health Insurance - Principles of Health Insurance - Health Insurance Products - Group Insurance Products. Product design: Development and Evaluation - current trends in Health Insurance - International and Indian scenario - Concepts of insurance - life and nonlife.

Unit - II: Operations in Health Insurance (12 Hours)

Operations in Health Insurance: Introduction to Claims management - significance of claims settlement - nature of claims from various classes of insurance - role of Third Party Administrators.

Unit - III: Economic and Financial Management (12 Hours)

Economic and financial management of Health Insurance - Risk assessment - underwriting and premium setting - tax planning.

Unit - IV: Marketing and Servicing (12 Hours)

Marketing and servicing of Health Insurance - Different elements of insurance marketing - uniqueness of insurance markets – Distribution Channels for selling insurance: role of regulatory authority in supervising promotional activities.

Unit - V: IT Applications and Legal Framework (12 Hours)

IT Applications and Legal framework in Health Insurance – Documentation - ethical issues.

Text Books

- Kenneth Black, Jr., Harold D. Skipper, Jr., Life and Health Insurance, 13th edition, Pearson Education Pte. Ltd., Delhi, 2003.
- Board of editors, Group and Health Insurance vol. I -III, the ICFAI University Press, Hyderabad, 2004.

References

- U. Jawaharlal (editor), Insurance Industry, the current scenario, the ICFAI University Press, Hyderabad, 2005.
- Journals: Insurance Chronicle, ICFAI Publications, Hyderabad.
- National Insurance - Monographs on Insurance Management.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| IV | MBA442A | Retail Management | 4 | 3 |

Unit - I: Trends in Indian Retailing (12 Hours)

Retail trends in India – Socio economic and technological Influences on retail management – Government of India policy implications on retails - Drivers and challenges for Retailing- Challenges in Retailing in India - Global Retailing – Challenges and opportunities.

Unit - II: Retail Shopper Behaviour(12 Hours)

Understanding of Retail shopper behavior – Shopper Profile Analysis – Shopping Decision Process - Factors influencing retail shopper behavior – Complaints Management - Retail sales force Management.

Unit - III: Retail Formats(12 Hours)

Organized and unorganized formats – Different organized retail formats – Characteristics of each format – Emerging trends in retail formats – MNC's role in organized retail formats - Categories of Retail formats- Food – Groceries – Clothing and Durables.

Unit - IV: Retailing Decisions(12 Hours)

Choice of retail locations - internal and external atmospherics – Positioning of retail shops – Building retail store Image - Retail service quality management – Retail Supply Chain Management – Retail Pricing Decisions.

Unit - V: Retail Shop Management(12 Hours)

Visual Merchandise Management – Space Management – Retail Inventory Management – Retail accounting and audits - Retail store brands – Retail advertising and promotions – Retail Management Information Systems - Online retail – Emerging trends.

Text Books

Chetan Bajaj, Rajnish Tow and Nidhi V. Srivatsava, Retail Management, Oxford University Press, 2007.

Michael Havy, Baston, Aweitz and Ajay Pandit, Retail Management, Tata Mcgraw Hill, 6th Edition, 2007.

References

Dunne, Retailing, Cengage Learning, 2nd Edition, 2008.

Patrick M. Dunne and Robert F Lusch, Retailing, Thomson Learning, 4th Edition 2008.

Sivakumar, Retail Marketing, Excel Books, 1st Edition, 2007.

Berman, Evans and Mathur, Retail Management, Pearson publication, 11th Edition, 2011.

SwapnaPuadham, Retail Management -Text and Cases, Tata McGraw Hill, 2nd Edition, 2008.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--|-------|---------|
| IV | MBA442B | Security Analysis and Portfolio Management | 4 | 3 |

Unit - I: Investment Setting(12 Hours)

Financial and economic meaning of Investment – Characteristics and objectives of Investment – Types of Investment – Investment alternatives – Investment Vs Speculation - Choice and Evaluation – Risk and return concepts.

Unit - II: Security and Derivative Markets (12 Hours)

Financial Market - Participants in financial Market – Primary Market – Methods of floating new issues - Book building – Regulation of primary market - Stock exchanges in India – BSE - OTCEI - NSE - ISE - Regulations of stock exchanges – Trading system in stock exchanges –SEBI Regulations – Derivative market in India – Regulations - financial instruments.

Unit - III: Fundamental Analysis(12 Hours)

Economic Analysis – Economic forecasting and stock Investment Decisions – Forecasting techniques. Industry Analysis : Industry classification - Industry life cycle – Company Analysis Measuring Earnings – Forecasting Earnings – Applied Valuation Techniques – Graham and Dodds investor ratios.

Unit - IV: Technical Analysis (12 Hours)

Fundamental Analysis Vs Technical Analysis – Charting methods – Market Indicators. Trend, Trend reversals – Patterns - Moving Average – Exponential moving Average – Oscillators –Efficient Market theory – Dows Theory – Random Walk.

Unit - V: Portfolio Management(12 Hours)

Portfolio analysis –Portfolio Selection –Capital Asset Pricing model – Portfolio Revision - Markowitz risk return - Sharpe portfolio and Jensen’s model– Portfolio Evaluation – Mutual Funds.

Text Books

- Donald E.Fischer& Ronald J.Jordan, Security Analysis & Portfolio Management, PHI Learning,, New Delhi, 6th edition, 2008.
- Prasanna Chandra, Investment analysis and Portfolio Management, Tata McGraw Hill, 4th Edition, 2012.

References

- Reilly & Brown, Investment Analysis and Portfolio Management, Cengage Learning, 8th edition, 2008.
- S. Kevin, Securities Analysis and Portfolio Management, PHI Learning, 2nd Edition, 2008.
- Bodi, Kane, Markus, Mohanty, Investments, Tata McGraw Hill, 6th edition, 2007.
- V.K.Bhalla, Investment Management, S.Chand& Company Ltd., 2008.
- V.A.Avadhani, Securities Analysis and Portfolio Management, Himalaya Publishing House, 2008.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| IV | MBA442C | Project Management | 4 | 3 |

Unit - I: Basic of Project Management (12 Hours)

Project: Meaning – Classification – Importance of project management – An Integrated Approach – Project Portfolio Management System – Need – Choosing the appropriate Project Management structure: Organizational considerations and project considerations – Steps in defining the project – Project Rollup – WBS (Work Breakdown Structure) - Process breakdown structure – Responsibility Matrices – External causes of delay and internal constraints.

Unit - II: Project Feasibility Studies (12 Hours)

Project feasibility studies: Opportunity studies - General opportunity studies - Specific opportunity studies - Pre-feasibility studies - Functional studies or support studies - Feasibility study – Components of project feasibility studies – Managing project resources flow – Project planning to project

completion: Pre-investment phase - Investment phase and operational phase – Project life cycle – Project constraints.

Unit - III: Project Evaluation under Certainty(12 Hours)

Project Evaluation under certainty: Net present value (Problems – Case Study) - Benefit cost ratio - Internal rate of return – Urgency - Payback period - ARR – Project evaluation under uncertainty – Methodology for project evaluation – Commercial vs. National profitability – Social cost benefit analysis - Commercial or National profitability - Social or National profitability.

Unit - IV: Developing a Project Plan(12 Hours)

Developing a project plan: Developing the project network – Constructing a project network (Problems) – PERT – CPM – Crashing of project network (Problems - Case Study) – Resource leveling and resource allocation – How to avoid cost and time over runs – Steps in Project Appraisal Process – Project Control Process – Control issues – Project audits – Project audit process – Project closure – Team member and project managers evaluation.

Unit - V: Managing a Project(12 Hours)

Managing versus leading a project - Managing project stakeholders – Social network building (Including management by wandering around) – Qualities of an effective project manager – Managing project teams – Five Stage Team Development Model – Situational factors affecting team development – Project team pitfalls.

Text Books

- Clifford F. Gray and Erik W. Larson, Project management – The Managerial Process, Tata Mcgraw Hill, 4th Edition, 2011.
- Gopala Krishnan P and Rama Moorthy, V.E., Project Management, Trinity Press, 2014.

References

- B.B. Goel, Project Management – Principles and Techniques, Deep and Deep publications, 2002.
- Prasanna Chandra, Projects: Planning, Analysis, Selection, Financing, Implementation and Review Tata Mcgraw Hill, 2009.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---|-------|---------|
| IV | MBA442D | Knowledge Management and Occupational Testing | 4 | 3 |

Unit - I: Understanding Knowledge (12 Hours)

Significance of Knowledge Management - the close relationship of knowledge management with other concepts - Understanding the three major inputs viz. strategy, people and IT for a successful Knowledge management system-Understanding the difference between data - information and knowledge - Understanding the various types of knowledge viz. tacit and explicit - The consequences of knowledge types on managing knowledge.

Unit - II: Organization Design and Culture(12 Hours)

Emphasis on people vs emphasis on technology in managing knowledge and its impact on organization design - Understanding how organization structure can affect knowledge management – How culture affects knowledge? – How individual “share” knowledge and how organizational culture can help mitigate individual’s fears?

Unit - III: Knowledge Management in India and Global Level (12 Hours)

Knowledge management in India - Discussion of the case of Indian organizations that are experimenting with Knowledge management -The problems Indian organization face with respect to Knowledge management - Global knowledge management system - Pitfalls of a global knowledge management system and problems of cross - border issues in Knowledge management.

Unit - IV: Psychological Testing - Fundamentals(12 Hours)

Introduction to psychological testing – importance – scope - Issues in Psychological Testing – types of psychological test- achievement test, attitude test-advantages of each - Intelligence Testing - Personality Assessment - assessment centers - theoretical background.

Unit - V: Psychological Testing - Types(12 Hours)

Aptitude Testing - The D.A.T (Differential Aptitude Test) - Self-Report Inventories- The M.M.P.I (Multi-factor Personality Tests) - The 16 P.F (Typological Tests) - The M.B.T.I (Projective Techniques) - The T.A.T (Thematic Apperception Test).

Text Books

- Amrit Tiwana, The Essential Guide to Knowledge Management, Pearson Education, 1st Edition, 2001.
- Gordon B. Davis, Margrethe H. Olson, Management Information System: Conceptual Foundation, Structure and Development, Tata McGraw Hill International Book Company, 2nd Edition, 2000.

References

- Ratnaja Gogula, Knowledge Management: A new Dawn, ICFAI, 2002.
- E. Wairight Martin, Carol V.Brown, DanialW. Jeffery A. Hoffer, Willain C. Perkins, Managing Information Technology Prentice Hall International Edition, 3rd Edition, 1999.
- Harold Koontz, Heinz Weihrich, Essentials of Management, Tata McGraw Hill, 5th Edition, 1998.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--------------------------------|-------|---------|
| IV | MBA442E | Hospital Architecture Planning | 4 | 3 |

Unit - I: Introduction to Hospital Planning (12 Hours)

Introduction to hospital planning - Idea formation - Hospital Planning Team, Market Survey, Feasibility Study, Selection of Location - Financial planning of hospitals - Macro level planning.

Unit - II: Construction Planning (12 Hours)

Conception to commissioning - Site Development, Architects Brief Working Drawings And Specifications, Engineering Drawing, Equipment Planning, Bed Distribution, Space Allocation, Interior Designing and Construction of Building - Commissioning, Shake Down Period.

Unit - III: Patient Services (12 Hours)

Planning for the outpatient services - Accident and Emergency Services and Day Care Services - Planning for Patient Care Units – In Patient Services and Intensive Care Units - Planning for Surgical Suites, Labour and Delivery Suites, Ldrp Suites (Labor Delivery Recovery Postpartum).

Unit - IV: Diagnostics (12 Hours)

Planning for laboratory service and blood banking - Planning for image logical services - x-rays, ultrasonography, MRI (magnetic resonance imaging), CT- scan (computed tomography) PET scans (positron emission tomography) and other advances in image logical services.

Unit - V: Advanced Facilities (12 Hours)

Planning for advanced facilities: Cardiac catheterization laboratory, Various Endoscopy Units, Extra Corporeal Shock Wave Lithotripsy, Radiotherapy Unit, IVF unit (In vitro fertilization), Dialysis unit - Planning for supportive services - medical gases, HVAC (heating, ventilating, and air conditioning), housekeeping, CSSD (central sterile services department), Food and beverages.

Text Books

- Shakti gupta sunil Kant, Chandra sekhar and sidharthsatpathy, Modern trends in planning and design of hospitals, Jaypee brothers New Delhi, 2nd Edition, 2007.
- Kunders G.D, Gopinath S., and Katakama a, Hospital Planning, Design and Management, Tata McGraw Hill, New Delhi, 1999.

References

- Arun Kumar, Encyclopedia of Hospital Administration and Development, Anmol Publications, New Delhi, 2nd Edition, 2002.
- Srinivasan A. V., Managing a modern hospital, Chapter 2, Response Books New Delhi, 2nd Edition, 2009.
- Padmanand V. and P.C. Jain, Doing Business in India, Response Books, New Delhi, 2nd Edition, 2000.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------------------|-------|---------|
| IV | MBA443A | Advertising and Sales Promotion | 4 | 3 |

Unit – I: Fundamentals of Advertisement (12 Hours)

Concept and definition of advertisement – Social - Economic and Legal Implications of advertisements – setting advertisement objectives – Ad Agencies – Selection and remuneration – Advertisement campaigns.

Unit – II: Advertisement Media (12 Hours)

Media plan – Type and choice criteria – Reach and frequency of advertisements – Cost of advertisements – Media strategy and scheduling – Process of Communication – Wilbur Schramm’s Model, - Two step flow of Communication.

Unit – III: Design and Execution of Advertisements (12 Hours)

Message development – Different types of advertisements – Layout – Design appeal – Copy structure – Advertisement production – Print – Radio. T.V and Web advertisements – Media Research – Testing validity and Reliability of ads – Measuring impact of advertisements.

Unit – IV: Introduction to Sales Promotion (12 Hours)

Definition - Nature, Type and role of sale promotion – Objectives of sales promotion - Deal prone consumers – Economic Theories of Promotion - Sales promotion techniques – Trade oriented and consumer oriented - Integrating above the Line and Below the Line – Choice and Purchase Timing Model.

Unit – V: Sales Promotion Campaign (12 Hours)

Sales promotion – Requirement identification – Designing of sales promotion campaign – Involvement of salesmen and dealers – Out sourcing sales promotion national and international promotion strategies – Integrated promotion – Coordination within the various promotion Agencies – Online sales promotions - Sales promotion impact on sales.

Text Books

S. H. H. Kazmi and Satish K Batra, Advertising & Sales Promotion, Excel Books, New Delhi, 3rd Edition, 2008.

Wells, Moriarty & Burnett, Advertising, Principles & Practice, Pearson Education 7th Edition, 2007.

References

E. Betch and Michael, Advertising and Promotion, McGraw Hill, 2003.

George E Belch and Michel A Belch, Advertising & Promotion, McGraw Hill, Singapore, 1998.

JaishriJefhwaney, Advertising Management, Oxford, 2008.

Julian Cummings, Sales Promotion, Kogan Page, London 1998.

Kenneth Clow. Donald Baack, Integrated Advertisements, Promotion and Marketing Communication, Prentice Hall of India, New Delhi, 2003.

| Semester | Course Code | Title of the Course | Hours | Credits |
|-----------------|--------------------|--|--------------|----------------|
| IV | MBA443B | Strategic Cost Management and Control | 4 | 3 |

Unit - I: Foundation of Cost Management (12 Hours)

Nature of management control system; Basic concepts – Boundaries of management control – Role of management control system – frame work for strategy formulation and implementation – Strategy formulation Vs Management control and task control- Management control process – Benefits of management control system.

Unit - II: Activity Based Costing and Activity Based Management (12 Hours)

Nature of activity based costing – Limitations and benefits of ABC – Activity based costing system – Designing ABC system – Implementing activity based costing – Comparing alternative costing systems – Measuring and managing e-retailing with activity based costing – Cost hierarchies – Cost drivers.

Unit- III: Pricing Decisions & Cost Management Applications (12 Hours)

Concept – Major influences on pricing decisions – Target costing for target pricing– Cost-plus pricing – Transfer pricing- Methods – Cost based transfer prices – Multinational transfer pricing and tax consideration.

Unit - IV: Budget Planning and Evaluation (12 Hours)

Definition of budget – Purpose – Strategy and purpose – Activity based budgeting – kaizen approach – Performance budgeting – Nature and role of budgetary evaluation – Risk and uncertainty in capital budgeting – Methods – Sensitivity technique method – Probability technical method.

Unit - V: Performance Measurement (12 Hours)

Financial and non-financial performance measures – Alternatives for performance measures – Performance measurement in multinational companies – Performance measurement at the various levels – Balanced score card – Prospective and limitations – Environmental and ethical responsibilities.

Text Books

Drury, Colin, Management Accounting and Control, Thomson Learning, 5th Edition, 2007.
Horngrén, Datar Foster, Cost Accounting, Pearson Education, 7th Edition, 2008.

References

Shashi K. Gupta, R.K. Sharma, Management Accounting, Kalyani Publication, 10th Edition, 2008.
Kaplan, Atkinson & Young, Management Accounting, Pearson Education, 6th Edition, 2012
Chandra Prasanna, Financial Management, Tata McGraw Hill, New Delhi, 8th Edition, 2011.
Anthony, Robert N., and Govindraján, Vijay, Management Control System, McGraw Hill, 12th Edition, 2007.
Hansen and Mowen, Cost Management, Thomson Learning, 6th Edition, 2007.
Shank Govindarajan, Strategic Cost Management, Simon & Schuster Publication, 2008.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|----------------------|-------|---------|
| IV | MBA443C | Inventory Management | 4 | 3 |

Unit - I: Inventory (12 Hours)

Introduction - Functions of inventories - Types of inventories - Classification of inventories - Factors affecting inventory control - Advantages and disadvantages of inventory.

Unit - II: Inventory Management and Control (12 Hours)

Inventory control concept - Objectives - Costs concept. Inventory control techniques: ABC analysis - HML analysis – FSN - VED analysis - Material Requirement Planning (MRP) - MRP objectives & methods - MRP system components - Limitations and advantages of MRP.

Unit - III: Requirement of Material (12 Hours)

Safety or buffer stock - Standard order quantity - Factors affecting stock levels - Maximum and minimum level - Re-order level - Perpetual inventory system - Lead time - Economic Order Quantity (EOQ) with & without shortage - BASIC EOQ Model - EOQ under fluctuating demand - Feedback Inventory Information System - Economic Production Quality - FOQ and FOC System.

Unit - IV: Inventory Control Models(12 Hours)

Static and dynamic control models – Lead time Analysis - Material Management & Warehouse Management, Equipment choice - Inventory checking and accounting – ERP. Store management: Objectives - Receiving procedures and control - Identification of materials - Storing of materials - Stock valuation & verification.

Unit - V: Finished Goods(12 Hours)

Factors influencing Finished Goods inventory - Requirement of inventory control Systems - Multi echelon Inventory Model - Use of Information Technology in Inventory Management.

Text Books

Elwood S. Buffa, Modern Production/Operations Management, Wiley Series, 8th Edition.
KanishkaBedi, Production and Operations Management, Oxford University Press, 9th Impression, 2006.

References

Donald. J. Bowersox & Donald. J. Claoss, Logistical Management - The integrated Supply Chain Process – TATA Mc-Graw Hill, 1996.

K. ShridharaBhat, Inventory Management, Himalaya Publishing House, 2010.

Lee J. Krajewski, Operations Management: Processes and Value Chains, Prentice-Hall of India, New Delhi, 8th Edition, 2007.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| IV | MBA443D | Talent Management | 4 | 3 |

Unit - I: Fundamentals of Talent Management(12 Hours)

Talent Management – definition – building blocks of a Talent Management – role and importance of Job Core Competencies– Elements of Talent Planning –Talent Management Process.

Unit - II: Talent Acquisition(12 Hours)

Talent acquisition – concepts and approaches- framework for talent acquisition- methods used for talent acquisition – E - Recruitment systems - evaluation and screening of electronic resumes and applications - out sourcing- legal issues in the hiring process.

Unit - II: Performance Management(12 Hours)

Performance Management Systems in organizations-overview- relationship between rewards and performance- Managing employee engagement- Developing a Career Track Planning process – Evaluating Internal and External Recruitment Strategies and selection techniques.

Unit - IV: Talent Management Practice(12 Hours)

Relationship between Compensation and Talent -importance of coaching - training in talent development - using talent management process to drive a culture of excellence- talent management practice in India.

Unit - V: Talent Management System(12 Hours)

Human Resource Information Systems and Talent Management System - outsourcing – Contingent - Contract/temporary work force – Data Security and Reporting Essentials in a Talent Management System.

Text Books

AlianSchweyer, Talent Management Systems: Best Practices in Technology Solutions for Recruitment, Retention and Workforce Planning, Wiley, 1stEdition, 2004.

Lance A.B & Berger D.R, the Talent Management Handbook: Creating Organizational Excellence by Identifying, Developing and Positioning Your Best People, McGraw-Hill, 2nd Edition, 2011.

References

Cynthia and Fisher, Human Resource Management, Biztantra Publication, 6th Edition, 2005.

Dubrin, Leadership, Research Findings, Practices & Skills, South-Western Publication, 7th Edition, 2012.

Jackson Mathis, Human Resource Management, New York: Thomson Southwestern, 2005.

Richard Regis, Strategic Human Resource Management, Excel Books, 2008.

| Semester | Course Code | Title of the Course | Hours | Credits |
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| IV | MBA443E | Logistics for Health Care Services | 4 | 3 |
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Unit – I: Procurement in Healthcare (12 Hours)

Overview: The Modern Concept, Scope And Objective, Special Features of Materials Management Applied to Hospitals. Purchasing function – objectives, scope, responsibilities, and activities.

Unit - II: Hospital Inventory Management in Healthcare (12 Hours)

Definition of inventory - Need of Control - Objectives of Inventory Control - Scope and Importance - Impact on Profitability of the Organization - Different Types of Hospital Inventories - Categories of Materials in Hospital as Un-Expendable and Expandable - Classification of Un-Expandable Items - Hospital Maintenance Items - Spare Parts Stocking Policies for Capital Item.

Unit - III: Cost Associated with Inventories (12 Hours)

Ordering Cost, Carrying Cost, Over Stocking Cost, Under Stocking Cost, other costs associated with service level. Selective Inventory Controls- Concept Of Selective Inventory Control, basis and use of different types of selective controls – ABC (Always Better Control), VED (Vital, Essential, Desirable), HML(High, Medium, Low),FSN (Fast, Slow moving and Non-moving),SDE (Scarce, Difficult, Easy), GOLF(Government controlled supplies, Open market supplies, Local supplies, Foreign market supplies),SOS(Seasonal items & off seasonal items), XYZ, MBASIC (Multiple basic approaches to selective inventory control) approach to drugs.

Unit – IV: Supply Chain Management (12 Hours)

Concept of SCM – Components - Supply Chain Management in Global Competitive Scenario. Hospital Stores Organization - Relevance and Importance of Store Keeping, functions and responsibilities of stores - duties and responsibilities of store keeper - Elements of Good Stores Organization - Stores Organization in Hospitals: Centralized And Decentralized Stores.

Unit – V: Stores Management in Healthcare (12 Hours)

Stores layout: Principles, Factors Influencing Stores Layout, Storage Facility, Bin Location, Stock Accounting and Stock Recording - Methods of Stock Verification, Investigation of Discrepancies, Reconciliation, Stock Adjustment, Write off and Stock Valuation, Standardization and Codification, Documents Used in the Material Function.

Text Books

- Shakti Gupta, Sunilkanth – Hospital Stores Management, Jaypee Brothers, 1stEdition, 2009.
Gopalakrishna, P., Purchasing and Materials Management, Tata MC.Graw Hill, New Delhi, 1995.

References

- Srinivasan A.V, Managing a modem hospital, Chapters 6, 7, 8, 9, Response Books, New Delhi, 2000.
Gopalakrishna, P, Materials Management, Prentice Hall, New Delhi, 1997.
Sharma, Madhuri, Essentials for Hospital Supportive Services, Jaypee Brothers, New Delhi, 1stEdition, 2003.

| Semester | Course Code | Title of the Course | Hours | Credits |
|-----------------|--------------------|----------------------------|--------------|----------------|
| IV | MBA444A | Rural Marketing | 4 | 3 |

Unit - I: Overview of Rural Marketing (12 Hours)

Introduction of Rural marketing – Evolution of Rural Marketing in Indian and Global Context- Definition- Nature – Scope - Characteristics and potential of Rural Marketing - A comparative Analysis of Rural Vs Urban Marketing- Size & Structure of Rural Marketing – Emerging challenges & Opportunities in Rural Marketing.

Unit - II: Rural Marketing Strategies(12 Hours)

Profile of Rural Marketing Dimensions & Consumer Profile- Rural Market Equilibrium -Classification of Rural Marketing – Regulated - Non Regulated- Marketing Mix – Segmentation - Targeting - Position - Rural Marketing Strategies - Role of Government and other Institutions in Rural Marketing Integrated Marketing Communication in Rural Marketing.

Unit - III: Product & Distribution(12 Hours)

Product / Service Classification in Rural Marketing - New Product Development in Rural Marketing- Brand Management in Rural Marketing - Channel management in rural Marketing- Managing Physical distribution - Emerging Distribution Models - Sales force Management in Rural Marketing – Marketing of Agricultural Produce: Objectives and Challenges.

Unit - IV: Rural Consumer Behaviour and Marketing Research (12 Hours)

Consumer Buyer Behaviour Model in Rural Marketing - Rural Marketing Research - Retail & IT models in Rural Marketing - CSR and Marketing Ethics in Rural Marketing - Source of Financing and credit agencies - Consumer Education & Consumer Methods in Promotion of Rural Marketing- Advertisement & Media Role in Rural Marketing.

Unit - V: Trends in Rural Marketing (12 Hours)

e- Rural Marketing- CRM & e - CRM in Rural Marketing - Advanced Practices in Rural Marketing- Social Marketing - Network Marketing - Green Marketing in Indian and Global Context - Co-operative Marketing - Micro Credit Marketing - Public Private Partnership Model in Rural Marketing - Advancement of Technology in Rural Marketing- Structure of Competition in Rural India.

Text Books

- C. G. Krishnamacharyulu and Lalitha Ramakrishnan, Rural Marketing — Pearson Education, 2nd Edition, 2010
 Awadhesh Kumar Singhand Satyaprakash pandey, Rural Marketing: Indian Perspective, New age publishers, 1st Edition, 2007

References

- Pradeep Kashyap& Siddhartha Raut, Rural Marketing, Biztantra,2009.
 T.P. Gopalaswamy, Rural Marketing Environment, Problems & Strategies, Vikas Publications, 3rd edition. 2009.
 Sanal Kumar Velayudhan Rural Marketing: Targeting the Non-urban Consumer, Sage Response, 2nd Edition, 2010.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|------------------------|-------|---------|
| IV | MBA444B | Derivatives Management | 4 | 3 |

Unit I Introduction

Derivatives – Definition – Types – Forward Contracts – Futures Contracts – Options – Swaps – Differences between Cash and Future Markets – Types of Traders – OTC and Exchange Traded Securities – Types of Settlement – Uses and Advantages of Derivatives – Risks in Derivatives.

Unit II Futures Contract

Specifications of Futures Contract - Margin Requirements – Marking to Market – Hedging uses Futures Types of Futures Contracts – Securities, Stock Index Futures, Currencies and Commodities – Delivery Options – Relationship between Future Prices, Forward Prices and Spot Prices.

Unit III Options

Definition – Exchange Traded Options, OTC Options – Specifications of Options – Call and Put Options – American and European Options – Intrinsic Value and Time Value of Options – Option payoff, options on Securities, Stock Indices, Currencies and Futures – Options pricing models – Differences between future and Option contracts.

Unit IV Swaps

Definition of SWAP – Interest Rate SWAP – Currency SWAP – Role of Financial Intermediary – Warehousing – Valuation of Interest rate SWAPs and Currency SWAPs Bonds and FRNs – Credit Risk.

Unit V Derivatives in India

Evolution of Derivatives Market in India – Regulations - Framework – Exchange Trading in Derivatives – Commodity Futures – Contract Terminology and Specifications for Stock Options and Index Options in NSE – Contract Terminology and specifications for stock futures and Index futures in NSE – Contract Terminology and Specifications for Interest Rate Derivatives.

References:

David Dubofsky – ‘Option and Financial Futures – Valuation and Uses, McGraw Hill International Edition.

Don M. Chance, Robert Brooks, An Introduction to Derivatives and Risk Management, 9th edition, Cengage, 2015.

John. C. Hull, Options, Futures and Other Derivative Securities’, PHI Learning, 9th Edition, 2012

Keith Redhead, ‘Financial Derivatives – An Introduction to Futures, Forwards, Options and SWAPs’, – PHI Learning, 2011.

| Semester | Course Code | Title of the Course | Hours | Credits |
|-----------------|--------------------|--|--------------|----------------|
| IV | MBA444C | Information Technology in Supply Chain Management | 4 | 3 |

Unit - I: Role of IT

The role of IT in Supply Chain - Uses of IT in inventories - Transportation & facilities within a Supply Chain - The Supply Chain IT frame work-macro processes.

Unit - II: IT in Supply Chain(12 Hours)

The future of IT in the Supply Chain - Internal Supply Chain management - Supply Relationship management - The transaction management foundation - Data mining – methods - Application area in Supply Chain.

UNIT - III: Supply Chain(12 Hours)

Goals of Supply Chain Information Technology – Standardization - Information Technology infrastructure - Presentation devices - Communication devices - Data base - System architecture.

Unit - IV: Supply Chain Planning(12 Hours)

The Supply Chain IT in practice - Integrating Supply Chain Information Technology - Stage of development - Implementation of ERP & DSS - Structure of DSS - Selection of Supply Chain DSS - Supply Chain master planning.

Unit - V: Design (12 Hours)

Supply Chain Information System design – Planning – Capacity - Performance requirement - Manufacturing requirement – Operation – Transportation - Inventory development - E-Business –Role in Supply Chain – Framework - Impact on Cost.

Text Books

- David Simchi-Levi et al, Designing and Managing the Supply Chain – Concepts, Strategies, and Case Studies, McGraw Hill Education, 3rd Edition, 2007.
- N. Chandrasekaran, Supply Chain Management, Oxford University Press, New Delhi 2010.

References

- Donald J Bowersox et al, Supply Chain Logistics Management, McGrawehIII Education (India) Pvt. Ltd. New Delhi, 3rd Edition, 2007.
- Sunil Chopra and Peter Meindl, Supply Chain Management, PHI, 5th Edition, 2012.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|-------------------------|-------|---------|
| IV | MBA444D | Compensation Management | 4 | 3 |

Unit - I: Job Evaluation (12 Hours)

Job description and Job specification - Job Evaluation - Methods of Job Evaluation: Non analytical methods - the ranking method, Job Classification, Internal Bench marking, Analytical methods - Point system and factor comparison – description - advantages and disadvantages of each.

Unit - II: Wage& Salary Administration(12 Hours)

Wage & salary administration - Nature and Scope of Compensation - wage determination process - Factors Influencing wage and Salary Administration - Theories of Wages - Types of wages: Time rate, piece rate, debt method. Wage differentials - Wage boards in India. Components and calculation of total compensation package. Dearness allowance - description and methods for computing dearness allowance - highlights and recommendations of the recent pay commission (7th pay commission).

Unit - III: Incentives and Fringe Benefits (12 Hours)

Incentives and fringe benefits: Incentives – Definition - Types - Individual incentives: Measured day Work, Piecework, standard hour, Gain sharing, its advantages and disadvantages. Organization Wide incentives: Scanlon Plan, Kaiser Plan, Profit sharing - Non-financial incentives - Fringe Benefits.

Unit - IV: Executive Compensation and Retirement Plans(12 Hours)

Executive Compensation Plan - principles and factors affecting executive compensation - models for executive compensation payments - legal environment of executive compensation in India. Retirement Plan - types and description.

Unit - V: Compensation and Bonus(12 Hours)

Individual - group variable compensation: Pay for Performance, Pay by Seniority, Production sharing plan, Employee stock options - essentials of effective stock based compensation and limitations of stock based compensation. Bonus - concept and method of determining bonus -payment of bonus (Amendment) act, 2015.

Text Books

- B.D Singh, Compensation & Rewards management, Excel Books, 2nd Edition, 2010.
Tapomy Deb, Compensation Management: Text and Cases, Excel Books, New Delhi, 1st Edition, 2009.

References

- Garry Dessler.V, Human Resource Management, PHI, 13th Edition, 2014.
R.K Sahu, Performance management systems: A holistic approach, Excel Books, 5th Edition, 2006.
Dilip Kumar Bhattacharya, Compensation Management, Oxford University Press, 3rd Edition, 2009.

| Semester | Course Code | Title of the Course | Hours | Credits |
|-----------------|--------------------|--|--------------|----------------|
| IV | MBA444E | Management of Hospital Services | 4 | 3 |

Unit- I: Overview of Patient Services (12 Hours)

Hospital operations management: role and decisions - Difference of hospital operations from other service and manufacturing organizations. Out Patient Services: day care, accident and emergency services, physical medicine and rehabilitation, occupational therapy unit, physiotherapy department. In Patient Services: Ward design (general & specialized), critical care services: ICU (Intensive Care Unit), CCU (Critical Care Unit) , NICU (neuroscience intensive care unit) - medical services - surgical services – operation theater, nuclear medicine, burn unit, nursing services and administration.

Unit – II: Specialty Services (12 Hours)

Specialty Services - Pediatrics, OBG & GYN (obstetrics&gynecology), ENT (ear, nose, and throat), Ophthalmology, Orthopedic, Psychiatry, Anesthesia, Dental.
Super-specialty Services - Cardiology, Thoracic Surgery, Neurology, Neurosurgery, Nephrology-Dialysis Unit, Transplantation Services.

Unit – III: Supportive Services (12 Hours)

Diagnostic - Radiology & Imaging Services - Hospital Laboratory - Blood Bank - Transfusion Services - Ambulance Services – Pharmacy - CSSD (central sterile services department) - Oxygen Manifold/Concentrator - Dietary Service - Hospital Laundry and Linen - Medical Social Worker - Marketing and Public Relations - Finance - Administrative Departments and Outsourcing.

Unit – IV: Utility Services(12 Hours)

Housekeeping - Hospital Engineering and Maintenance - Biomedical Department - Central Stores and Purchase Department - Medical Records - confidentiality of records – reception – enquiry - registration and admission - central billing and accounts - Cafeteria - Mortuary.

Unit – V: Hospital Acquired Infection(12 Hours)

Source and Control - Modern trends in Hospital Administration - Disaster Management, Information Systems - Telemedicine.

Text Books

Sakharkar.B M -Principles of Hospital Administration & Planning - Jaypee Publishers New Delhi, 2nd Edition, 2009.

Kunders, G.D., Designing for Total Quality in Healthcare, Prism Books Pvt. Ltd., Bangalore, 2004.

References

Goel, S L, Healthcare Systems and Management, Deep and Deep Publications, Vol. 1-4 New Delhi, 2001.

Kunders, G.D, Facilities Planning and Arrangement in Healthcare, Prism Books Pvt. Ltd. Bangalore, 2004.

Sharma, Madhuri, Essentials for Hospital Supportive Services and physical infrastructure, Jaypee Brothers, New Delhi, 1st Edition, 2003.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| IV | MBA445A | Services Marketing | 4 | 3 |

Unit – I: Foundations of Services (12 Hours)

Definition – Service Economy – Nature and Scope of Services – Unique Characteristics of services - Classification of Services; Consumer versus Industrial Services - 7 Ps of Services Marketing Mix - Challenges and issues in Services Marketing.

Unit – II: Service Marketing Opportunities(12 Hours)

Assessing service market potential - Classification of services - Difference between Goods and services – Environment and trends – Service market segmentation - targeting and positioning – Customer perception and services.

Unit – III: Service Design and Development (12 Hours)

Service Life Cycle – New service development – Service Blue Printing – Parsuraman – Zeithamal - Bitner (PZB) - GAP’s model of service quality – Measuring service quality – SERVQUAL – Gronroos model - SERVPERF – Service Quality function development.

Unit – IV: Service Delivery and Promotion (12 Hours)

Positioning of services - Designing service delivery System, Service Channel-Pricing of services, methods- Service marketing triangle - Integrated Service marketing communication.

Unit – VService Strategies (12 Hours)

Service Marketing Strategies for health – Hospitality – Tourism – Financial – Logistics - Educational – Entertainment & public utility - Information technique Services – Demand and supply in services case studies - Global and Indian Scenario in services sector.

Text Books

Christopher H. Lovelock and Jochen Wirtz, Services Marketing, Pearson Education, New Delhi, 1st Edition, 2004.
 Hoffman, Marketing of Services, Cengage Learning, 1st Edition, 2008.

References

Christian Gronroos, Services Management and Marketing a CRM Approach, John Wiley, 2002
 Halen Woodroffe, Services Marketing, McMillan, 2003.
 K. Douglas Hoffman et al, Essentials of Service Marketing: Concepts, Strategies and Cases, Thomson Learning, 4th Edition, 2008.
 Kenneth E Clow, et al, Services Marketing Operation Management and Strategy, Biztantra, New Delhi, 2nd Edition, 2004.
 Valarie Zeithaml et al, Services Marketing, Mcgraw Hill, 6th Edition, 2007.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--------------------------|-------|---------|
| IV | MBA445B | Mergers and Acquisitions | 4 | 3 |

Unit - I: Overview of Mergers and Acquisitions (12 Hours)

Meaning – Types – Causes - Distinction between Mergers and Acquisitions- Merger procedure - Scheme for Merger - theories of Merger - cross border Mergers and Acquisitions. Corporate Restructuring: meaning – objectives - types and forms - motives for restructuring.

Unit - II: Regulatory Framework (12 Hours)

Regulations of M&A in India - Compliance with Indian Companies Act - Competition Act 2002 - Income Tax Act 1961 - Securities and Exchange Board of India (Substantial Acquisition of Shares and Takeovers) Regulations, 2011 & 2015 - Other latest regulations.

Unit - III: Process, Financing & Accounting Framework (12 Hours)

Due diligence- concepts, challenges, checklist and screening. Valuation for Merger and Acquisition - Methods of Enterprise and Equity valuation – Brand, cost of capital, equity, firm valuation, relative, enterprise- Issues in Valuation Synergy and Value creation – Negotiation-Deal structuring & methods of payment in merger and acquisition- Accounting for mergers (problems).

Unit - IV: Post-Merger Integration (12 Hours)

Critical success factors for post-merger integration - Ingredients of integration - Timing and Speed of integration - Approaches to integration - Challenges in integration - Steps for successful integration - Cultural integration - Redesigning post-merger cultural process.

Unit - V: Corporate Control Mechanism and Takeover Defences (12 Hours)

Internal and external control mechanism- Takeover tactics - Takeover defences - Regulatory aspects in India with respect to Takeover defences - Exchange control (Foreign direct Investment, Indirect Foreign Investment, Investment in Holding Company, Overseas direct investment).

Text Books

- Rajesh Kumar B., Mergers and Acquisitions Text and Cases, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 1st Edition, 2012.
Jay M. Desai and Nisarg A. Joshi, Mergers and Acquisitions, Biztantra, New Delhi, 2012.

References

- Ray K.G. Mergers and Acquisitions: Strategy, Valuation and Intergration, PHI Learning Private Limited, New Delhi, 2010.
Enrique R. Arzac, Valuation for Mergers, Buyouts and Restructuring, Wiley India, 2nd Edition, 2010.
Patrick A. Gaughan, Mergers, Acquisitions and Corporate Restructurings, Wiley India, 5th Edition, 2011.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------------------|-------|---------|
| IV | MBA445C | Materials and Stores Management | 4 | 3 |

Unit - I: Introduction(12 Hours)

Operating environment-aggregate planning - role, need, strategies, costs techniques, approaches-manufacturing planning and control system – Sales and operations planning - manufacturing resource planning-enterprise resource planning - making the production plan.

Unit - II: Materials Planning(12 Hours)

Materials requirements planning - bill of materials - resource requirement planning process - .capacity management – capacity planning – capacity Requirements planning – capacity available – capacity Load - scheduling orders.

Unit - III: Inventory Management(12 Hours)

Inventory and the flow of material – Types and functions of inventories – inventory costs – ABC Analysis – order quantities - EOQ and EPQ models – Just-in-Time – Kanban – Lean production.

Unit - IV: Purchasing Management(12 Hours)

Purchasing cycle – Duties and responsibilities – methods of purchasing – centralized and decentralized purchasing – BUYGRID analytic framework – purchasing decision process – price determination – price negotiation. Forecasting - demand management – Forecasting techniques – seasonality – tracking forecast – P/D Ratio.

Unit - V: Stores Management(12 Hours)

Stores organization – Location – Layout – Receipt section – Types of stores – Preservation of stores – stock taking, Storage Equipment – Types and Selection of Equipment – Classification of Material Handling, Surplus – Scrap – Salvage, Warehouse Management – Role – activities and Layout.

Text Books

- J.R.Tony Arnold, Stephen N. Chapman, Lloyd M. Clive, Materials Management, Pearson, 2012.
A.K.Chitale and R.C.Gupta, Materials Management, Text and Cases, PHI Learning, 2nd Edition, 2006.

References

- P. Gopalakrishnan, Purchasing and Materials Management, Tata McGraw Hill, 2012
Ajay K Garg, Production and Operations Mangement, Tata McGraw Hill, 2012.
Ronald H. Ballou and Samir K. Srivastava, Business Logistics and Supply Chain Management, Pearson education, Fifth Edition, 2013.
S. N. Chary, Production and Operations Management, Tata McGraw Hill, 2012.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--|-------|---------|
| IV | MBA445D | Organization Development and Change Management | 4 | 3 |

Unit – I: Concept of Organization(12 Hours)

Meaning of Organization – Need for existence - Organizational Effectiveness – Measuring Organizational Effectiveness – External Resources Approach, Internal Systems Approach and Technical approach - Organization development (OD) - history of OD- Values - assumptions and beliefs in OD - foundation of OD - models and theories.

Unit – II: Management of OD Process(12 Hours)

Managing the OD process – action research: process and approach – history and varieties of action research - Operational Components of OD: Diagnostic, Action and Process – Maintenance Components.

Unit – III: Implementation and Assessment of OD(12 Hours)

Implementation of conditions for success in OD efforts - Assessment of OD and change in organizational performance - The impact of OD Structure interventions and applicability of OD – training experiences – T-groups – behavioral modeling – life and career planning –instrumental training.

Unit- IV: OD Intervention and Group Dynamics(12 Hours)

OD – interventions – classifications - teams interventions – inter group and third party peacemaking interventions – comprehensive OD interventions. Group Dynamics - Inter group Dynamics and Organizations as Systems.

Unit – V: Organization Change(12 Hours)

Theory and Practice on change and changing - The Nature of Planned Change– Forces for Change - Resistance to Change – Types and forms of change – Evolutionary and Revolutionary change – Change process– HR functions and Strategic Change Management - Implications for practicing Managers

Text Books

Gareth R.Jones, Organizational Theory, Design & Change, Pearson Education, 7th Edition, 2004.

L.M.Prasad, Organizational Behaviour, Sultan Chand & Sons, New Delhi, 8th Edition, 2005.

Richard L. Daft, Understanding the theory & Design of Organizations, Cengage Learning Western, 7th Edition, 2007.

References

Adrian Thorn Hill, Phil Lewis, Mike Millmore and Mark Saunders, Managing Change -A Human Resource Strategy Approach, Wiley India, 5th Edition, 2008.

BhupenSrivastava, Organizational Design and Development: Concepts application, Biztantra Publication, 2007.

Robert A Paton, James McCalman, Change Management, A guide to effective implementation, Sage Response Books, 3rd Edition, 2008.

Stephen P. Robbins, Organization Theory: Structure, Design & Applications, Prentice Hall of India, 11th Edition, 2008.

Thomas G. Cummings and Christopher G. Worley, Organizational development and Change, South Western College Publication, 10th Edition, 2014.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|------------------------------|-------|---------|
| IV | MBA445E | RISK AND DISASTER MANAGEMENT | 4 | 3 |

Unit - I: Security Organization and Management (12 Hours)

Security Sensitive Areas –Functions of Hospital Security Department – Security Organization and Physical Security Measures - Need for Security Technology –Contract Security Agency –Effective Security Management in Hospitals – Security Committee – Periodic Security Audit.

Unit - II: Hospital Acquired Infection (HAI) (12 Hours)

Objectives – Control and Prevention – Housekeeping –Central Sterile Supply Department (CSSD) – Nursing Care – Waste Disposal – Antibiotic Policy – Hospital Infection Control committee – Composition – Role and Functions – Surveillance –High Risk Procedures – Training and Education – Universal Precautions for Health Care Workers.

Unit - III: Fire Hazards (12 Hours)

Elements of Fire – Fire Hazard Triangle – Causes of Hospital Fires – Fire Protection – Structure Planning and Design Considerations. Buildings: Electric Installations – Water Supply – Fire Points and Escape Routes – Fuel Store – Manual Call Points – Means of Escape and Evacuation – Risk Evaluation.

Unit - IV: Radiation (12 Hours)

Introduction – Biological Effects of Radiation – Radiation Protection and Safety – Principles in the Layout of a Diagnostic X- ray Room – Contrast Media – Magnetic Resonance Imaging – Planning - Constraints – Preventive Measures Against Magnetic Field Hazards – Nuclear Medicine Department – Radiation Protection Aspects – Radioactive Waste Collection and Disposal.

Unit - V: Disaster Management (12 Hours)

Basic Concepts – Disaster Classification – Disaster Process – Special Characteristics – Principles of Disaster Planning – Disaster and Health Problems – Organization for Medical Relief – Principles of Mass Casualty Management – Objectives of and Need for Hospital Disaster Plan – Disaster Committee – Organization – Role and Responsibilities – Organizing Disaster Facilities – Disaster Response – Alert and Recall – Deployment – Disaster Administration – Disaster Manual – Disaster Drill - TRIAGE.

Text Books

- Shailendra K. Singh, Safety & Risk Management, Mittal Publishers, 2nd Edition, 2010.
J.H. Diwan, Safety, Security & Risk Management, APH, 2009.

References

- AH Suryakantha, Community Medicine – Recent Advance, Brothers Medical Publishers (P) Ltd., New Delhi, 3rd Edition, 2008.
D.C. Joshi & Mamta Joshi, Hospital Administration, Published by Jaypee, New Delhi, 1st Edition, 2009.
Stephen Ayers & Garmvik, Text Book of Critical Care, Holbook and Shoemaker, 4th Edition, 2006.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| IV | MBA446A | Consumer Behavior | 4 | 3 |

Unit – I: Basics of Consumer Behaviour(12 Hours)

Scope and Relevance of Consumer Behaviour Studies, Concepts – Significance – Dimensions of Consumer Behavior – Application of knowledge of Consumer Behaviour in marketing decisions.

Unit – II: Consumer Behaviour Models(12 Hours)

Industrial and individual consumer behavior models - Howard- Sheth - Engel – Kollat, Webster and Wind Consumer Behaviour Models – Implications of the models on marketing decisions.

Unit – III: Internal and External Influences (12 Hours)

Psychological Influences on consumer behavior – motivation – perception – personality Learning and Attitude- Self Image and Life styles – Consumer expectation and satisfaction. Socio-Cultural - Cross Culture - Family group – Reference group – Communication -Influences on Consumer behavior.

Unit - IV: Consumer Attitude and Communication (12 Hours)

Concept of attitude - Attitude formation - Cognitive Dissonance Theory and Attribution Theory. Strategies for Attitude Change. Celebrity influence - Word of Mouth - Opinion Leaders - Use of Unconventional Communication methods - Influence of Social Media on Consumer purchase Behaviour.

Unit – V: Purchase Decision Process (12 Hours)

High and low involvement - Pre-purchase and post-purchase behavior – Online purchase decision process – Diffusion of Innovation – Managing Dissonance - Emerging Issues – case studies.

Text Books

Jay D. Lindquist and Joseph Sirgy, Shopper, Buyer and Consumer Behavior, Biztranza 2008.

L.Venugopal Reddy, C.N.KrishnaNaik, ‘Consumer Behaviour’, Discovery Publishing House, 1999.

References

Assel, Consumer Behavior - A Strategic Approach, Biztranza, 2008.

David L. Loudon and Albert J Della Bitta, Consumer Behavior, McGraw Hill, New Delhi 2002.

Frank R. Kardes, Consumer Behaviour and Managerial Decision Making, 2nd Edition, 2006.

Leon G.Schiffman and Leslie LasarKanuk, Consumer Behavior, Pearson Education, India, 2002.

Paul Peter et al., Consumer Behavior and Marketing Strategy, Tata McGraw Hill, Indian Edition, 7th Edition 2005.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------------------------|-------|---------|
| IV | MBA446B | Banking Financial Services Management | 4 | 3 |

Unit I Overview of Indian Banking System

Overview of Indian Banking System, Functions of banks, key Acts governing the functioning of Indian banking system – RBI Act 1934, Negotiable Instruments Act 1881, Banking Regulations Act 1948 – Rights and obligations of a banker, Overview of Financial statement of banks – Balance sheet and Income Statement.

Unit II Sources and Application of Bank Funds

Capital adequacy, Deposits and non-deposit sources, Designing of deposit schemes and pricing of deposit services, application of bank funds – Investments and Lending functions, Types of lending – Fund based, non-fund based, asset based – Different types of loans and their features, Major components of a typical loan policy document, Steps involved in Credit analysis, Credit delivery and administration, Pricing of loans, Customer profitability analysis.

Unit II Credit Monitoring and Risk Management

Need for credit monitoring, Signals of borrowers’ financial sickness, Financial distress prediction models – Rehabilitation process, Risk management – Interest rate, liquidity, forex, credit, market, operational and solvency risks – risk measurement process and mitigation, Basic understanding of NPAs and ALM.

Unit IV Mergers, Diversification and Performance Evaluation

Mergers and Diversification of banks into securities market, underwriting, Mutual funds and Insurance business, Risks associated therewith. Performance analysis of banks – background factors, ratio analysis and CAMELS.

UNIT V High Tech E-Banking

Payment system in India – Paper based, e-payments – Electronic banking – advantages – Plastic money, E-money – Forecasting of cash demand at ATMs – Security threats in e-banking and RBI’s initiatives.

REFERENCES :

1. Padmalatha Suresh and Justin Paul, “Management of Banking and Financial Services, Pearson, Delhi, 2012.
2. Meera Sharma, “Management of Financial Institutions – with emphasis on Bank and Risk Management”, PHI Learning Pvt. Ltd., New Delhi 2010.
3. Peter S. Rose and Sylvia C. and Hudgins, “Bank Management and Financial Services”, Tata McGraw Hill, New Delhi, 2012.
4. Madura, Financial Institutions & Markets, 10th edition, Cengage, 2016.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|-------------------------------|-------|---------|
| IV | MBA446C | Total Productivity Management | 4 | 3 |

Unit - I: TPM Overview(12 Hours)

Meaning and objectives of TPM - Methodology of TPM - gains of TPM - relevance and scope for productivity and effectiveness - Productivity conceptualization - Productivity mission – Objectives - Policies And Strategies.

Unit - II: Productivity Environment

(12 Hours)

Productivity environment - Corporate culture - Management styles - Employee's participation - Trade unions and role of governmental agencies - Productivity measurement - Monitoring and management both at micro and macro levels - Corporate and annual productivity plans.

Unit - III: Productivity Models(12 Hours)

Productivity Models: Productivity Measurement at International - National and organization level - Total productivity models - Productivity management in manufacturing and service sector. Productivity evaluation models – Productivity improvement model.

Unit - IV: Benchmarking(12 Hours)

Management issues – Modeling - tools and techniques - Indicators for evaluation of manufacturing - Business or services organizational performance and its measurement.

Unit - V: Productivity Improvement Techniques(12 Hours)

Productivity Improvement Techniques: Modifying organizational characteristics and work characteristics. Work study - Method study - Value Engineering - Waste management - Human resource development strategies to increase productivity - Managing technological change. Interfaces of Productivity with Quality - Reliability and Safety. Management commitment and involvement for higher productivity - Case Study.

Text Books

John G., Jr. Belcher, Productivity Plus: How Today's Best Run Companies are gaining the Competitive Edge, Gulf professional Publishing, 1987.

Sumanth, D.J., Productivity Engineering and Management, Tata McGraw - Hill, New Delhi, 3rd Edition, 1990.

References

Christopher W. Head and Carl G. Thor, Handbook for Productivity Measurement and Improvement, Productivity Press, 1993.

H. James Harrington, Business Process Improvement: The Breakthrough Strategy for Total Quality, Productivity and Competitiveness, McGraw – Hill, 1991.

| Semester | Course Code | Title of the Course | Hours | Credits |
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| IV | MBA446D | Training for Effective Performance | 4 | 3 |

Unit - I: Training for Development (12 Hours)

Training and development: Definition - Concept of Training And Development - Need For Training – Importance of Training - Principles of Training - Areas of Training-Assessment of Training Needs - Approaches To Training Needs - Levels of Training Needs- The Role of Stakeholders In Training.

Unit - II: Learning

(12 Hours)

learning: learning curve - Linkage of Learning With Training - Essentials for Developing a Learning Organization -Learning Process - Features - Need for Integrated Approach - Methods - Factors Influencing Learning Process - Training Needs Assessment - Approaches to Training Needs - Factors Affecting Performance - Levels of Training Needs.

Unit - III: Training Programme Development

(12 Hours)

Identification of the training needs: Competency Gap And Skill Gap -Training Content Development - Budgeting for The Training Programme - Development of Training Process - Factors Involved In Designing a Training Programme - Checklist for Designing Training Programme - Framework for Training Programme Delivery - Making The Training Programme Functional- Designing The Means for Concluding The Training Programme – Empowering the Group- Qualities Of Professional Trainer.

Unit - IV: Training Methods (12 Hours)

Overview of the methods of training- Traditional Methods, e-Learning - Importance - Advantages and Disadvantages - Factors Influencing the Choice of Training Method - Developing Audio Visual Materials – Characteristics of Effective Course Materials-Printed Materials- Developing Training Support Materials.

Unit - V: Training and Learning Evaluation (12 Hours)

Managing effective performance - Measuring Impact of Training- Need For Result Based Training- Trend Towards Measurement of Training- Developing Result Based Approach- Levels of Training: Krikpatrick Four Level Approach-Kaufman’s Five Levels of Evaluation Of Training Impact- The Ciro Approach To Evaluate Training Method-Philip’s Five Level Roi Frame Work to Evaluate Training Impact.

Text Books

- Dr.R.K.Sahu, Training for Development, Excel Books, New Delhi, 7th Edition, 2005.
- Rolf P Lynton and UdiaPareek, Training for Development, Vistaar Publications, New Delhi, 3rd Edition, 2008.

References

- Blanchard and Thacker, Effective Training Systems, Strategies and Practices, New Delhi: Pearson Education Pvt. Ltd, 2005.
- Dubin, Leadership, Research Findings, Practices & Skills, Houghton Mifflin, 2006.
- NilanjanSengupta, Managing Change in Organizations, New Delhi: PHI, 2006.
- Stephen P Robbins and Philip L Hunsaker, Training in Interpersonal Skills, PHI, New Delhi, 2011.

| Semester | Course Code | Title of the Course | Hours | Credits |
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| IV | MBA446E | Hospital Waste Management | 4 | 3 |

Unit - I: Hospital Hazards (12 Hours)

Meaning – Need – Principles – Purpose – Types – Physical – Biological - Mechanical – Psychological – Its Impact on Employees – Preventive measures.

Unit - II: Hospital Acquired Infection (12 Hours)

Types of Infection – Common Nosocomial Infection and their Causative Agents – Prevention of Hospital Acquired Infection – Role of Central Sterile Supply Department – Infection Control Committee – Monitoring and Control or Cross-Infection – Staff Health.

Unit - III: Biomedical Waste Management (12 Hours)

Meaning – Categories of Biomedical wastes – Disposal of biomedical waste products – Incineration and its importance – Standards for Waste Autoclaving, Micro Waving and Deep Burial – Segregation – Packaging – Transportation – Storage.

Unit - IV: Human Waste Disposal & Sewage Wastes (12 Hours)

Diseases carried from excreta – Sanitation barrier – Methods of Excreta disposal. Sewage wastes: Meaning – Composition – Aims of Sewage disposal – Decomposition of Organic Matter – Modern Sewage Treatment – Drawbacks of improper disposal of wastes – Solid and liquid.

Unit - V: Radioactive Waste (12 Hours)

Definition – Sources - Low level and high level radioactive wastes and their management - Radiation standard by ICRP (International Commission on Radiological Protection) and AERB (Atomic Energy Regulatory Board) - Procedure for Obtaining Clearance of – Metals – Chemicals - Drug waste.

Text Books

- Basarkar Shishir, Hospital Waste Management, Jaypee Brothers Publications, 1st Edition, 2009.
- Sanskriti Sharma, Hospital Waste Management and its monitoring, Jaypee Brothers Publications, 1st Edition, 2007.

References

- Singh Anantpreet and KaurSukhjrit, Biomedical Waste Disposal, Jaypee Brothers Publications, 1st Edition, 2012.
- Sharma – Holistic approach to Hospital Waste Management published by Dept. of Hospital Administration – AIIMS, New Delhi, 2006.
- Mohd. Faisal Khan, Hospital Waste Management, principles and guidelines, Kanishka Publishers, 1st Edition, 2004.

| Semester | Course Code | Title of the Course | Hours | Credits |
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| IV | MBA447J | Research Project | | 9 |

Research Project

Each student shall be required to prepare on the basis of investigations carried out by him in a business or industrial organization, project on possible solutions for a typical problem of current interest in the area of management. The report should demonstrate the capability of the student, for some creative potential and original approach to solve the practical problems in to-days business or industry. The report should include field studies, surveys, interpretation, planning and design of improved integrated management systems. It should be presented in a comprehensive manner with recommendations for solutions based on scientifically worked out data. Viva will be conducted on the basis of the report.

Evaluation Pattern

- Each student should carry out his investigation separately.
 - The mode of evaluating the student will consists of two parts. One on the basis of report writing and the other will be through Viva Voce.
 - The valuation of the report writing and oral examination will be done by both internal and external examiner.
 - 80 Marks will be awarded for report writing and 20 Marks for oral examination.
- The following are the components for Marks

Report Writing – 80 Marks

Content -50 Marks
Layout- 5 Marks
Methodology-10 Marks
Grammar- 5 Marks
Mid-Month Review-10 Marks

Viva Voce - 20 Marks

Research project will be for a period of two months, which will be in the month of February and March of every academic year.

Each student should find a reputed industry to carry out his investigation with the approval of the department.

After completing his/her project, the student should get an attendance certificate from the company.

Guidelines for Research Project

In IV Semester, all students shall undergo research project in any organization for a minimum period of eight weeks and submit a Project report thereon along with a research project certificate obtained from the organization. All students must undergo practical training in reputed Corporate with all specialties and facilities. The project report carries a maximum of 100 marks. The Project Report shall be guided and certified by a recognized guide approved by Department. The completed project report should be submitted to Department, at least 15 days before the scheduled time for Comprehensive Viva-voce examination. It is compulsory to submit two hard copies and soft copy of the project Report.

Project Work

Students of MBA Programme will have to take up project work in the IV Semester.

1. The purpose of the project work is primarily to demonstrate the application of knowledge and skills acquired during the Programme, by studying and analyzing the selected area in the work situation in a systematic manner and suggesting solutions to the management.
2. The research problem for project may be taken from any one of the following sources:
 - i) Comprehensive problem study, covering single organization with multifunctional area problem formulation, analysis and recommendations.
 - ii) Inter organizational comparison of performances in different functional areas including management practices.
 - iii) Field study / Empirical study.

Project Proposal

1. The proposal of project (synopsis) should be prepared in consultation with the guide and should be submitted to the guide. The proposal should clearly state the Problem, significance, objectives, methodology, tentative statistical techniques to be used, limitations if any and future directions for further research, etc.

Preparation of Project Report:

(i) The report should consist of (a) significance of the study, (b) objectives, (c) sampling and methodology, (d) statistical techniques used, (e) limitations, if any, and (f) guidelines for future research.

(ii) The length of the report shall be 60 to 80 double spacing, Times New Roman font, typed A4 size (excluding appendix and exhibits). The report is to be submitted in a bound volume.

(iii) The project report should also contain:

(a) The Certificate issued by the Organization where the student undergone his project work.

(b) Certificate from the supervisor as to strengthen the originality of work.

(d) A statement from the candidate mentioning that the work is an original one and has not been submitted earlier, either to this university or to any other institution for fulfillment of the requirement of a course of study. The candidate has to submit two hard copies and a soft copy of the project report.

Your compliance with the following format may enrich the quality of the Report.

Chapter I: Introduction to the study

This Chapter may contain a brief background of the Study and profile of the Company/ Industry/organization relating to the topic of the Project

Chapter II: Review of Literature

This chapter should contain a brief review of literature

Chapter III: Research Methodology

This chapter should contain a problem and contemporary developments thereof. Objectives of the study, Need of the study, Scope of the study, Hypothesis, Methodology and Sample selection, Research Design, Period of the study, sources of data, tools of data collection, Statistical analysis, broad hypotheses, limitations, etc.

Chapter IV: Empirical Results / Data analysis

Discussion relating to Objectives Logical presentation of the results of the study presented in tables, graphs and figures, if any, along with necessary interpretation forms part of this chapter. It can be given in two chapters also.

Chapter V: Findings, Suggestions and Conclusion

The focus of this chapter is on broad observations made by the student against each objective specified in Chapter III, along with major Findings, Suggestions and conclusions drawn by the study. Appropriate suggestions for the policy makers / managers on future course of action are appreciated.

Bibliography

Every Project work should contain a list of books consulted for the topic studied. Research Reports, list of published research articles/ papers and popular books in the field of study may be documented in standard pattern. Whenever information /data are drawn from internet sources, please give the websites referred.

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Employability skills

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Course Objective

Identify the knowledge and skills required for obtaining and keeping employment.

Course work will emphasize individual skill assessments, interpersonal communication skills, workplace responsibilities, teamwork skills, safety issues, and personal management skills for the workplace.

Course Outcome

To help students explore their values and career choices through individual skill assessments

To make realistic employment choices and to identify the steps necessary to achieve a goal

Unit - I: Job Hunting Skills

The job search process – Self assessment-Job hunting methods- The bases for job hunting- Life history- Identifying skills

Unit - II: Personal Grooming & Business Etiquette

Introduction- Personal grooming: Hair, Face, Dressing, Hands, Accessories, Jewellery - General hygiene-Business Etiquette- Social networking.

Unit - 3 Telephone & E-Mail Etiquette

Objective-Introduction-Telephone Etiquette: Tips, Placing a call, answering a call, Transferring calls, Hold procedures-Email Etiquette: 32 most important email etiquette tips.

Unit - 4 Interview Process

Introduction- 10 tips for interviews- Resume preparation- Group discussion- Self introduction.

Unit - 5 List of Mathematical formulas

Averages-Mean-Percentage Change- Interest-Population formula- Depreciation formula- Growth- Profit and Loss- False Weight- Discount- Ratios.

Text Books

Kapil Dev, Vishnu P. Singh) C. Subhas, Employability Skills, Computech Publications Ltd, 2017
Employability Skills for Getting the Job You Want, Student Aid Publications, 2017.

References

Rosalie Marsh, Skills for Employability: Part 1: Pre-Employment (Lifelong Learning: Personal Effectiveness Guides), Christal Publishing, 2016

K. Rameshwar, Pallavi TS, Employability Skills, Arihant publications; new 2017 edition (2017).

ஆ பூக்காடு பூக்காடு (பூக்காடு 33 பூ, பூக்காடு: 72,73,74,76,77,78)

இ பூக்காடு (பூக்காடு பூக்காடு பூக்காடு பூக்காடு, பூக்காடு பூக்காடு :130-160)

3. பூக்காடு

அ பூக்காடு (பூக்காடு - 11)

ஆ பூக்காடு (பூக்காடு பூக்காடு, பூக்காடு:478,489,491,492,499,500)

இ பூக்காடு - பூக்காடு... (பூக்காடு)

4. பூக்காடு

அ பூக்காடு (1, 3)

ஆ பூக்காடு - பூக்காடு (பூக்காடு-130)

இ பூக்காடு - பூக்காடு, பூக்காடு (பூக்காடு: 100-101)

(3) பூக்காடு பூக்காடு பூக்காடு :

1. பூக்காடு பூக்காடு பூக்காடு பூக்காடு பூக்காடு : பூக்காடு பூக்காடு பூக்காடு - பூக்காடு பூக்காடு - பூக்காடு பூக்காடு - பூக்காடு பூக்காடு - பூக்காடு பூக்காடு

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(1) பெரிய செய்தி - பெரிய செய்தி

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(2) பெரிய செய்தி - பெரிய செய்தி

1. பெரிய செய்தி

அ பெரிய செய்தி (11)

ஆ பெரிய செய்தி - பெரிய செய்தி (286, 290)

இ பெரிய செய்தி - பெரிய செய்தி

2. பெரிய செய்தி

அ பெரிய செய்தி (401, 402, 403, 405, 406)

ஆ பெரிய செய்தி - பெரிய செய்தி (பெரிய செய்தி: 75-90)

இலக்கணம் - பத்திரிகை பத்திரிகை (பக்கங்கள் : 32, 34, 35, 38, 39, 40)

3. பொதுவானவை

அ பொதுவானவை (145 -157, 454 - 464)

ஆ பொதுவானவை - பொதுவானவை (பக்கங்கள் - 2052 -2058)

இ பொதுவானவை - பொதுவானவை (பக்கங்கள் -)
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4. பொதுவானவை

அ பொதுவானவை - பொதுவானவை (1-8)

ஆ பொதுவானவை - பொதுவானவை (பக்கங்கள் 7)

இ பொதுவானவை - பொதுவானவை (பக்கங்கள்)
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(பக்கங்கள் - 89-93)

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- 2. சி.ஐ.ஐ.யின் தலைநகரம் - ஆம்.பி.ஐ.யின் தலைநகரம் திருச்சூர், இந்தியாவின் தென்மேற்கு பகுதியில் உள்ளது.
- 3. சி.ஐ.ஐ.யின் தலைநகரம் - ஆம்.பி.ஐ.யின் தலைநகரம் திருச்சூர், இந்தியாவின் தென்மேற்கு பகுதியில் உள்ளது, 1992.
- 4. சி.ஐ.ஐ.யின் தலைநகரம் - ஆம்.பி.ஐ.யின் தலைநகரம் திருச்சூர், இந்தியாவின் தென்மேற்கு பகுதியில் உள்ளது, 2008.

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பகுதி 2

சி.ஐ.ஐ.யின் தலைநகரம் திருச்சூர், இந்தியாவின் தென்மேற்கு பகுதியில் உள்ளது, 1992. சி.ஐ.ஐ.யின் தலைநகரம் திருச்சூர், இந்தியாவின் தென்மேற்கு பகுதியில் உள்ளது, 2008.

பகுதி 2

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பகுதி 1 : சி.ஐ.ஐ.யின் தலைநகரம் திருச்சூர்

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பெரிய 2 : பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம் (6 மாதங்களுக்கு)

பெரிய 3 : பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம் (8 மாதங்களுக்கு)

பெரிய 4 : பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம் (16 மாதங்களுக்கு)

பெரிய 5 : பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம் (5 மாதங்களுக்கு) - பன்னாட்டு அமைதிப் படைகள்

பெரிய 6 :

பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம், (உலக அமைதிப் படைகள், உட்கட்டிடம்).

பெரிய 7 : பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம் :

1. பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம், பன்னாட்டு அமைதிப் படைகள், த.ப.க.

2. பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம், பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம், பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம்.

3. பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம், பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம், பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம், 1969.

பெரிய 12

பெரிய 4

TA412 - பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம் - 2

பெரிய 8 :

பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம், பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம், பன்னாட்டு அமைதிப் படைகள் உடனடி உட்கட்டிடம் - பன்னாட்டு அமைதிப் படைகள்

(ଅକ୍ଷୟ କୁମାରଙ୍କ ଅଭିନୀତ) - ଶ୍ରୀମତୀ ଶର୍ମିଷ୍ଠା ପାଣିଗ୍ରାହୀଙ୍କ
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M.A TAMIL

பெரிய செய்தி / பெரிய செய்தி

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TA718 - பெரிய செய்தி - பெரிய செய்தி

பெரிய செய்தி : பெரிய செய்தி பெரிய செய்தி
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பெரிய செய்தி 3 பெரிய செய்தி, பெரிய செய்தி

பெரிய செய்தி 4 பெரிய செய்தி, பெரிய செய்தி

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பெரிய செய்தி, பெரிய செய்தி - 600 108.

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1. சிவகாமசுந்தரி கவிதைகள் தொகுதி, கழகம் -1
2. சிவகாமசுந்தரி கவிதைகள் தொகுதி, கழகம் - 17.
3. சிவகாமசுந்தரி கவிதைகள் தொகுதி, கழகம் -1
4. சிவகாமசுந்தரி கவிதைகள் தொகுதி, கழகம்.
5. சிவகாமசுந்தரி கவிதைகள் தொகுதி - சிவகாமசுந்தரி கவிதைகள் தொகுதி, கழகம் - 641 037
6. சிவகாமசுந்தரி கவிதைகள் தொகுதி, கழகம்.
7. சிவகாமசுந்தரி கவிதைகள் தொகுதி, கழகம் -2

சிவகாமசுந்தரி கவிதைகள் தொகுதி :

1. சிவகாமசுந்தரி கவிதைகள் தொகுதி, கழகம்.
2. வசுதேவியார் கவிதைகள் தொகுதி, கழகம்.
3. சிவகாமசுந்தரி கவிதைகள் தொகுதி, கழகம்.
4. சிவகாமசுந்தரி கவிதைகள் தொகுதி, கழகம்.

5. ஐ. இயற்கைவழி, இயற்கைவழி இயற்கைவழி இயற்கைவழி, கழகம்.
6. இயற்கைவழி ச.இ. இயற்கைவழி, இயற்கைவழி இயற்கைவழி, இயற்கைவழி இயற்கைவழி, இயற்கைவழி
7. இயற்கைவழி இ. இயற்கைவழி இயற்கைவழி, இயற்கைவழி இயற்கைவழி, கழகம்.
8. இயற்கைவழி இ. இயற்கைவழி இயற்கைவழி, இயற்கைவழி இயற்கைவழி, கழகம்.
9. இ. இயற்கைவழி, இயற்கைவழி இயற்கைவழி இயற்கைவழி, இயற்கைவழி இயற்கைவழி, இயற்கைவழி.

பகுதி 8

இயற்கைவழி இயற்கைவழி

TA821 - இயற்கைவழி & இயற்கைவழி

பகுதி 1

இ.இ.இயற்கைவழி - இயற்கைவழி
 இயற்கைவழி - இயற்கைவழி

பகுதி 2

இயற்கைவழி - இயற்கைவழி
 இயற்கைவழி - இயற்கைவழி

பகுதி 3

இ. இயற்கைவழி - இயற்கைவழி இயற்கைவழி
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பக்கம் 14

TA922J - பாரதிபுத்தூர் பஞ்சாயத்து ஒன்றியம் & பாரதிபுத்தூர் (Research methodology)

பாரதிபுத்தூர் :

பாரதிபுத்தூர் பஞ்சாயத்து ஒன்றியம் திண்டுக்கூர் பாரதிபுத்தூர் ஒன்றியம். பாரதிபுத்தூர் பஞ்சாயத்து ஒன்றியம் பாரதிபுத்தூர் ஒன்றியம்.

பாரதிபுத்தூர் :

பாரதிபுத்தூர் பஞ்சாயத்து ஒன்றியம் திண்டுக்கூர் பாரதிபுத்தூர் ஒன்றியம். பாரதிபுத்தூர் பஞ்சாயத்து ஒன்றியம் பாரதிபுத்தூர் ஒன்றியம். பாரதிபுத்தூர் பஞ்சாயத்து ஒன்றியம் பாரதிபுத்தூர் ஒன்றியம். பாரதிபுத்தூர் பஞ்சாயத்து ஒன்றியம் பாரதிபுத்தூர் ஒன்றியம். பாரதிபுத்தூர் பஞ்சாயத்து ஒன்றியம் பாரதிபுத்தூர் ஒன்றியம்.

பாரதிபுத்தூர் 1

பாரதிபுத்தூர் பஞ்சாயத்து ஒன்றியம் (Research) - பாரதிபுத்தூர் பஞ்சாயத்து ஒன்றியம் (Research and Thesis) - பாரதிபுத்தூர் பஞ்சாயத்து ஒன்றியம் (The Research Problem) - பாரதிபுத்தூர் பஞ்சாயத்து ஒன்றியம்

(Planning The Research) - □□□□□□ □□□□□□,
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Source Material and Data)

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Reporting)

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(Methods of Data Collection) - □□□□□□□□□□
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Thesis) - □□□□□□□□□□□□ □□□□□□□□ (Viva Voce
Examination) - □□□□□□□□□□ □□□□□□□□□□ (Methods of
Research)

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6. சி.கே.சிவசுப்ரமணியன் (பி.ஆ) - அறிவுறுத்தல்கள் அறிவுறுத்தல்கள், அறிவுறுத்தல்கள் அறிவுறுத்தல்கள், அறிவுறுத்தல்கள், அறிவுறுத்தல்கள் 600 113.
7. டி.கே.சிவசுப்ரமணியன் (எ.ஆ), - அறிவுறுத்தல்கள் அறிவுறுத்தல்கள், அறிவுறுத்தல்கள் அறிவுறுத்தல்கள், அறிவுறுத்தல்கள் - 608 002, 1986.
8. கி.பி. அறிவுறுத்தல்கள் - அறிவுறுத்தல்கள் அறிவுறுத்தல்கள் அறிவுறுத்தல்கள், அறிவுறுத்தல்கள், அறிவுறுத்தல்கள், அறிவுறுத்தல்கள் - 600 030, 1971.
9. ஆ. அறிவுறுத்தல்கள் - அறிவுறுத்தல்கள் அறிவுறுத்தல்கள், அறிவுறுத்தல்கள் அறிவுறுத்தல்கள் அறிவுறுத்தல்கள், அறிவுறுத்தல்கள், அறிவுறுத்தல்கள் 600 113, 1982.
10. வி.கே. அறிவுறுத்தல்கள் அறிவுறுத்தல்கள் அறிவுறுத்தல்கள், அறிவுறுத்தல்கள் அறிவுறுத்தல்கள், 31, அறிவுறுத்தல்கள் அறிவுறுத்தல்கள், அறிவுறுத்தல்கள், அறிவுறுத்தல்கள் - 600 108.

17

அறிவுறுத்தல்கள் அறிவுறுத்தல்கள்

4. ஶ்ரீராமன் ஶ்ரீமதாய - ஶ்ரீமதாய ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன்.
5. அச. ஶ்ரீராமன் ஶ்ரீராமன் - ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன்.
6. ப. ஶ்ரீராமன் ஶ்ரீராமன் - ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன்.
7. ஶ்ரீராமன். ந. ஶ்ரீராமன் ஶ்ரீராமன் - ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன் - 5.
8. ஶ்ரீராமன்-ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன் - 17.
9. ஶ்ரீராமன்-ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன் - 4.
10. ஶ்ரீராமன் ஶ்ரீராமன். ர. ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன் - ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன், கழக ஶ்ரீராமன், ஶ்ரீராமன் -1
11. வ. ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன் - ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன், கழக ஶ்ரீராமன்.
12. ஶ்ரீராமன் - ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன் (1, 2 ஶ்ரீராமன்), ஶ்ரீராமன் ஶ்ரீராமன், ஶ்ரீராமன்.
13. ஶ்ரீராமன். ஶ்ரீராமன் - ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன் ஶ்ரீராமன்.

சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம்
சென்னை - 600 005
தமிழ்நாடு அரசு தகவல் தொழில்நுட்ப அமைச்சு - சென்னை
சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம் - சென்னை
சென்னை - 600 005
சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம்

பகுதி 5

சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம் 13 சென்னை 18 சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம் - சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம்
சென்னை - 600 005 - சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம்
சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம் - சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம் -
சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம் - சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம் -
சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம் - சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம்.

பகுதி 5 :

1. செ.நா. சென்னை - சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம்
சென்னை; சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம்,
சென்னை, சென்னை - 600 113.
2. செ.நா.சென்னை - சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம்,
சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம், சென்னை சென்னை, சென்னை
சென்னை சென்னை - 600108
3. சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம் 2020.
<https://tnarch.gov.in/Library>

பகுதி 5 பகுதி 5 :

1. சென்னை அ சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம் - சென்னை
சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம், சென்னை சென்னை,
ஏ.நா.1108., சென்னை மாநகராட்சி நிர்வாக இயக்குநர் அலுவலகம்
சென்னை, சென்னை சென்னை, சென்னை - 600 040

B. Sc BIOCHEMISTRY

Semester-I

Sub. Code: BC106

CELL BIOLOGY

3 Hours/3 Credits

Course Objectives:

To understand the structure of prokaryotic and eukaryotic cellular organization and to know the fluid mosaic model and membrane transport mechanism.

To learn about the chemical composition and functions of endoplasmic reticulum, golgi apparatus and lysosomes.

To have in-depth understanding of the Structure, Chemical composition and functions of Mitochondria and Ribosomes.

To learn the functions of peroxisomes and glyoxysomes and composition of cytoskeleton and extracellular matrix.

To acquire knowledge on nucleus—structure, composition and functions of chromosomes cell cycle, cell division and cell death mechanisms.

UNIT-I: Cell and its Theory, Structure of Plant and Animal cell. Cells-Prokaryotes and Eukaryotes, Difference between Prokaryotes and Eukaryotes.

UNIT-II: Membrane structure-Fluid Mosaic model, chemical composition and physical properties. Membrane Transport-Diffusion, Active and Passive.

UNIT-III: Structure, Chemical composition and functions of Endoplasmic Reticulum, Golgi apparatus and Lysosomes.

UNIT-IV: Structure, Chemical composition and functions of Mitochondria and Ribosomes. Functions of Peroxisomes and Glyoxysomes. Cytoskeletons.

UNIT-V: Nucleus-Structure, composition and functions of Chromosomes. Cell cycle and Cell divisions-Mitosis and Meiosis.

Text Books:

P.S Verma and V.K.Agarval (2016) Cytology (Cell Biology, Biomolecules and Molecular Biology), S.Chand Publishing, New Delhi.

Geoffrey M. Cooper and Robert E. Hausma (2015)The Cell: A Molecular Approach, Seventh Edition, Sinauer Associates, Inc.

References:

J.M. Bery, J.L. Tymoezko and L. Stryer (2008) Biochemistry, 6th Ed., W.H. Freeman and Company, New York.

D.L.Nelson, and M.M. Cox (2008) Lehninger Principles of Biochemistry, 5th Ed., W.H. Freeman and Company, New York.

T.D.Pollard and W.C. Earnshaw (2002), Cell Biology, Saunders Publishing and Co, New York.

C.B. Powar (1994), Cell Biology, Second edition, Himalayan publishing house, Mumbai.

Semester-I

Sub. Code: BC107

BIOMOLECULES

4 Hours/4 Credits

Course Objectives:

To study the structure and functions of large biological macromolecules.

To understand the organic chemical principles in life processes.

To introduce the knowledge of lipid and their importance.

To provide in-depth understanding of Nucleic acids and its structure.

To categorize the source, applications of vitamins and minerals.

UNIT-I: Classification of Carbohydrates. Isomers, Anomers, epimers, enantiomers and mutarotation. Ring and linear structure (Haworth projection formula). Structure, Properties and Functions of Monosaccharides, Structure and Functions of Oligo (Di-Maltose, Lactose and Sucrose) and Polysaccharide (Homo-Starch, Glycogen & Cellulose; Hetero-Proteoglycan).

UNIT-II: Classification and structure of Amino acids. Essential and Non-essential amino acids. Properties of amino acids—Physical and Chemical, Zwitter ion. Classifications of Proteins based on solubility, shape, composition and biological function. Structure of Proteins. Denaturation and Renaturation of Proteins.

UNIT-III: Classification of Lipids, Essential fatty acids, Structure, Types and Functions of Phospholipids. Structure and functions of Glycolipids and Cholesterol.

UNIT-IV: Structure of purine and pyrimidine nucleotides. Structure and Properties of DNA—Tm, Denaturation and Renaturation, Hypo & Hyperchromicity and Types of RNA.

UNIT-V: Vitamins—Fat and Water Soluble Vitamins, Chemical name, Sources, Daily requirements, Functions and Deficiency disorders. Minerals—Micro (Fe, Zn, Cu, I, F, Mn, Mo) and Macro elements (Na, Mg, Cl, Ca, P, K, S)—source, biological importance and Deficiency disorders.

Text Books:

A.C. Deb (2001), Fundamentals of Biochemistry, New Central Book Agency Pvt., Ltd., Calcutta.

Murray, R. K., D. K. Granner, P. A. Mayes and D. W. Rodwell. 2006. Harper's Biochemistry, 25th edition, Prentice Hall, New Jersey.

J.L Jain., (2005). Fundamentals of Biochemistry. S.Chand Publishing, New Delhi.

D.L.Nelson, and M.M. Cox (2008) Lehninger Principles of Biochemistry, 5th Ed, W.H. Freeman and Company, New York.

References:

R.K. Murray, D.K. Granner, P.A. Mayes, D.W. Rodwell (2006), Harper's Biochemistry, twentyfifth edition, Prentice Hall, New Jersey.

D. Voet, and G.Voet (2006), Biochemistry, John Wiley and Sons, New York.

G.L Zubay (1999) Biochemistry, 4th Ed, WCB, McGraw-Hill, New York.

Ambika Shanmugam (1998). Fundamentals of Biochemistry for Medical Students.

U. Satyanarayana., (2006) A textbook of Biochemistry, Books & Allied, Kolkata.

Semester-I

| | | |
|-------------------|-------------------------------|--------------------------|
| Sub. Code: | PBC102MAIN PRACTICAL-I | 3 Hours/3 Credits |
|-------------------|-------------------------------|--------------------------|

I. Qualitative analysis of carbohydrate

Arabinose, Glucose, Fructose, Maltose, Lactose, Sucrose and Starch.

II. Qualitative analysis of Amino acid

Arginine, Cysteine, Tyrosine, Tryptophan, Histidine and Methionine.

Semester-I

| | | |
|--------------------------|------------------------------|--------------------------|
| Sub. Code: ABC102 | ALLIED BIOCHEMISTRY-I | 4 Hours/3 Credits |
|--------------------------|------------------------------|--------------------------|

Course Objectives:

To develop skill and acquire knowledge in fundamentals of Chemistry, Biology and will develop disciplinary theory and practical knowledge in the diversified areas of Biochemistry.

To enable the students to understand the various perspectives of applied sciences that benefits mankind.

To give fundamental knowledge about the course and encouraged to become unique by allowing them to perform experiments their areas of interest.

To enable the students to equip themselves with the basic practical training in different areas of Biochemistry ranging from Metabolism, Nutrition, Plant Biochemistry, Enzymology, Clinical Biochemistry, Molecular Biology to Genetic Engineering, Biotechnology, etc.

To help the students to take up further specialized Master level courses in these areas or to take up suitable assignments/jobs in Biotech/Biochemical industries.

UNIT-I: Carbohydrates-Definition and Classification of carbohydrates, linear and ring forms (Haworth formula)–Glucose and Fructose. Physical properties–Mutarotation. Chemical properties-Oxidation, Reduction, Osazone formation. Disaccharide-Sucrose and Lactose, Polysaccharides-Starch and Cellulose–Sources and Functions.

UNIT-II: Amino acids-Definition and classification of amino acids, Physical Properties-Amphoteric nature, Isoelectric point, Isoelectric pH and Zwitter ion. Proteins–Classification, shape and size, solubility and functions. Structure of protein– Primary, Secondary, Tertiary and Quaternary.

UNIT-III: Lipids-Definition, classification and functions. Occurrence and biological functions- simple lipids, compound lipids (e.g. phospholipids) and derived lipids: steroids (e.g. Cholesterol). Fatty acids–Saturated and Unsaturated.

UNIT-IV: Nucleic acids-Nucleoside, Nucleotides, Types of Nucleic acids, DNA- Double helical model of DNA and its biological functions. RNA–Structure, Occurrence, chemistry and its biological functions of tRNA, mRNA and rRNA.

UNIT-V: Enzymes-Definition, classification of enzymes with one example. Mechanism of enzyme action. Lock and key mechanism, Induced fit theory. Biological functions of enzymes. Factors affecting enzyme activity–pH, temperature and substrate concentration. Michaelis-Menton equation.

Text Books:

- A.C. Deb (2001), Fundamentals of Biochemistry, New Central Book Agency Pvt., Ltd., Calcutta.
- Ambika Shanmugam. 1998. Fundamentals of Biochemistry for Medical Students.
- Satyanarayana, U. 2006. A textbook of Biochemistry, Books & Allied, Kolkata.

References:

- Chatterjee, N and Rana Shinde. 2012. Textbook of Medical Biochemistry, 8th edition, Jaypee publication, New Delhi.
- Jain, J. L. 2005. Fundamentals of Biochemistry. S. Chand Publishing, New Delhi.
- Murray, R.K., D.K. Granner, P.A. Mayes and D.W. Rodwell. 2006. Harper's Biochemistry, 25th edition, Prentice Hall, New Jersey.
- Voet, D and G. Voet. 2006. Biochemistry, John Wiley and Sons, New York.

Semester-I

Sub. Code:PABC201 ALLIED BIOCHEMISTRY PRACTICAL-I 2 Hours/1 Credit

I. Qualitative analysis of Carbohydrates

Glucose, Fructose, Sucrose, Maltose and Starch.

II. Qualitative analysis of Amino acids

Tyrosine, Tryptophan, Cysteine, Methionine and Arginine.

III. Volumetric estimation (Demonstration)

Estimation of Ascorbic acid and Oxalic acid.

Semester-II

Sub. Code: BC206

PLANT BIOCHEMISTRY

3 Hours/3 Credits

Course Objectives:

To provide the basic knowledge of plant cell and water absorption mechanism.

To get familiar with photosynthetic mechanism and starch production cycle.

To acquire knowledge about NPK cycle and its biological significance.

To give detail idea about seed germination, primary and secondary metabolites.

To explore the information about plant hormones and their physiological effects.

UNIT-I: Plant cell-Structure and Functions, Plant cell wall, Transpiration-Types, Mechanism and Factors affecting transpiration, Mechanism of Water Absorption–Passive and Active.

UNIT-II: Photosynthesis–photosynthetic pigments and chloroplast. Light reaction– Photosystems, Cyclic and non-cyclic photophosphorylation, Calvin cycle, Hatch-Slack cycle.

UNIT-III: Cycles of Elements-N₂ cycle, Biochemistry of symbiotic and non-symbiotic N₂ fixation, Sulphur cycle and Phosphorous cycle.

UNIT-IV: Biochemistry of seed dormancy, seed germination, fruit ripening and Senescence, Primary and Secondary metabolites in Plants–Definition and Function.

UNIT-V: Plant growth regulators-Physiological effects of Auxins, Gibberellins, Cytokinins, ABA and Ethylene.

Text Books:

H.S. Srivastava (2006), Plant Physiology, Biochemistry and Biotechnology, Rastogi Publications, Merut.

V. Verma, Plant Physiology, (2001) 7th revised edition. Emkay publications.

V.K. Jain, (2000) Fundamentals of Plant Physiology, S.Chand Publishing, New Delhi.

References:

N.C. Gautam (2006), Plant Biotechnology, Shree Publishers.

Heldt HW (2005), 3rd Edition, Plant Biochemistry, Elsevier Academic Press Publication, USA.

A.J. Lack (2001). Plant Biology. Viva Books, New Delhi.

P.J. Lea and R.C. Leegood (1999), 2nd Edition, Plant Biochemistry and Molecular Biology, Wiley and Sons, New York.

Andrew Lack (2001) Plant Biology, Taylor & Francis, New York.

Semester-II

Sub. Code: BC207HUMAN PHYSIOLOGY4 Hours/4 Credits

Course Objectives:

To understand the anatomy and physiology, various levels of organizations basic homeostatic mechanism.

To elucidate and describe the composition, function of various body fluids like blood and lymph, their significance and related disorders

To explain the morphology, physiology of circulatory, respiratory and digestive system and classify the structure of lungs, transport of gases between lungs and tissues. Explain the morphology, functions of kidney and nephron and their role in urine formation.

To categorize the Structure and functions of nerve cells, conduction of nerve impulses, the role of neurotransmitters and reflex action.

To speculate the physiology of muscle contraction in co-ordination with the joints, their articulation and skin.

UNIT-I: Components of Blood, Morphology and functions of blood cells. Blood groups and Rh factor. Lymphatic system and Composition of lymph. Circulatory system - Heart anatomy, Pace maker, Cardiac cycle and ECG.

UNIT-II: Structure of Lungs, Transport of gases between lungs and tissues. Structure and functions of Kidney and Nephron. Mechanism of urine formation.

UNIT-III: Structure and functions of digestive system. Digestion and Assimilation of Carbohydrate, lipids, proteins and nucleic acid. Mechanism of HCl secretion in stomach. Role of hormones involved in digestion.

UNIT-IV: Structure and functions of nerve cells, Conduction of nerve impulse in myelinated and non-myelinated sheath. Neurotransmitters, Reflex action, Sleep and awake.

UNIT-V: Muscles- Types, structure and functions. Ultra structure of skeletal muscle- light band, dark band, Sarcomere, Filaments–Thick (myosin) and Thin (actin, tropomyosin and troponin). Contraction and relaxation of skeletal muscle via Ca^{2+} pump.

Text Books:

N. Arumugam (2001) Animal Physiology, Saras publication.

Sembulingam K and Sembulingam P (2010). Essentials of medical physiology. 5th ed. Jaypee Brothers Medical Limited. pp. 85-89.

R.A. Agarwal, Anil. K, Srivastava, KaushalKumar (1986), Animal physiology and Biochemistry-3rd edition. S.Chand Publishing, New Delhi.

References:

J. Brachet and A. E. Mirsky (1963), The Cell-Biochemistry, physiology and morphology, Academic Press.

William. F. Ganong. (2005), Review of Medical Physiology McGraw-Hill Medical; 22 edition.

Guyton (1996) Human Physiology and Mechanisms of Disease. Saunders Publications; 6th edition.

A.C. Guyton and J.E. Hall (2000), Text Book of Medical Physiology. Harcourt Asia.

Anne Waugh and Allison Grant (2018). Ross & Wilson anatomy and physiology in health and illness. Edinburgh: Elsevier, 2018.

Semester-II

Sub. Code: PBC205

MAIN PRACTICAL-II

3 Hours/3 Credits

I. Titrimetric methods

Estimation of Ascorbic Acid

Estimation of Glucose by Benedict's Method

Estimation of Glycine by Sorensen's Formal Titration method

Estimation of Calcium from Milk

II. Preparations

Preparation of Starch from potato

Preparation of Casein from Milk

Preparation of Albumin from Egg

Mitosis and Meiosis of Onion root tip.

Semester-II

Sub. Code: ABC202

ALLIED BIOCHEMISTRY-II

4 Hours/3 Credits

Course Objectives:

To develop the skill to understand and acquire knowledge in the functioning of principal organs in human body.

To emphasis on the major organs and the process they govern like circulation, heart function, muscle function, respiratory, Nervous, digestive and excretory system.

To develop an ability to relate various interrelated physiological and metabolic events in systems physiology, building knowledge on basic physiological principles established in the Physiology of Organisms.

To expand the practical biological skills in the Physiology of Organisms.

To create the ability to think laterally and in an integrating manner and develop interdisciplinary approach. Overall knowledge of the avenues for research and higher academic achievements in the field of biochemistry and allied subjects.

UNIT-I: Circulatory system: Components of Blood, Morphology and functions of blood cells. Lymphatic system and Composition of lymph. Circulatory system-Heart anatomy, Cardiac cycle and ECG.

UNIT-II: Nervous system: Structure and functions of Brain, Structure and functions of nerve cells, Conduction of nerve impulse in myelinated and non-myelinated sheath. Neurotransmitters, Reflex action.

UNIT-III: Respiratory system: Structure and functions of Lungs, Mechanism of breathing, Ventilation, Artificial ventilation, Regulation of respiration, Transport of gases, Anoxia, Hypoxia, Non-respiratory functions of the lungs.

UNIT-IV: Digestive system: Structure and functions. Digestion and absorption of Carbohydrate, lipids, proteins and nucleic acid. Mechanism of HCl secretion in stomach. Role of hormones involved in digestion.

UNIT-V: Excretory system: Structure and functions of Kidney and Nephron, Mechanism of urine formation–Filtration, Reabsorption and Secretion, Composition of urine, Dialysis.

Text Books:

N. Arumugam (2001) Animal Physiology, Saras publication.

A.C. Guyton and J.E. Hall (2000), Text Book of Medical Physiology. Harcourt Asia.

Anne Waugh and Allison Grant (2018). Ross & Wilson anatomy and physiology in health and illness. Edinburgh: Elsevier, 2018.

Sembulingam K and Sembulingam P (2010). Essentials of medical physiology. 5th ed. Jaypee Brothers Medical Limited. pp. 85-89.

References:

J. Brachet and A. E. Mirsky (1963), The Cell - Biochemistry, physiology and morphology, Academic Press.

William. F. Ganong. (2005), Review of Medical Physiology McGraw-Hill Medical; 22 edition.

Guyton (1996) Human Physiology and Mechanisms of Disease. Saunders Publications; 6th edition.

R.A. Agarwal, Anil. K, Srivastava, Kaushal Kumar (1986), Animal physiology and Biochemistry-3rd edition. S.Chand Publishing, New Delhi.

Semester-II

Sub. Code: PABC202 ALLIED BIOCHEMISTRY PRACTICAL-II 2 Hours/1 Credit

I. Urine Analysis

Qualitative analysis of Normal and pathological (abnormal) urine.

II. Haematology

Estimation of Haemoglobin content by Sahli's method.

Determination of ESR.

Semester-III

Sub. Code: BC306 MICROBIOLOGY 3 Hours/3 Credits

Course Objectives:

To learn and impart the basic knowledge on Microbiology.

To understand the various types of microscopes and its applications.

To understand the overview of bacteria, fungi, Algae and protozoa.

To create awareness on viruses and bacteriophages.

To know the various methods in microbial techniques.

UNIT-I: Microbiology–History, Branches and Scope. Spontaneous generation–Abiogenesis and Biogenesis; Contributions of Leeuwenhoek, Louis Pasteur, Robert Koch, and Alexander Fleming.

UNIT-II: Microscopy–Principles and applications of Bright field; Dark field; Phase contrast microscope and Fluorescence microscope; Principles and Applications of Electron Microscopy–SEM and TEM.

UNIT-III: Bacteria–Ultra structure; Classification (Gram positive and Gram negative); Shape and arrangement; Cell wall polysaccharides; Growth curve and Factors affecting microbial growth. Fungi (Mold and Yeast), Algae and Protozoa - Ultra structure, Characteristics and Economic importance.

UNIT–IV: Virus - General properties, Structure and Classification; Plant (TMV & CMV) and Animal viruses (Dengue & Corona); Viroids and Prions; Bacteriophage–Structure, Lytic and Lysogenic cycle.

UNIT–V: Sterilization–Dry heat, Moist heat, Filtration and Radiation; Disinfection and Disinfectants; Culture medium, Staining techniques–Gram staining and Acid fast staining; Antibiotic sensitivity test.

Text Books:

M.J. Pelczar Jr, E.C.S. Chan and N.R. Kreig (2006). “Microbiology”- 5th Edition Mc Graw Hill Inc. New York.

Park William Halock (2001) Pathogenic Microorganisms, Leafebiger, Philadelphia.

References:

R. Ananthanarayan and C.K. Jayaram Paniker (2000). Text book of Microbiology. 6th Edition, Orient Longman Limited, Chennai.

P. Chakraborty (2003). A Text book of Microbiology. 2nd Edition, Published by New Central Book Agency (P) Ltd., Kolkata.

R.C. Dubey and D.K. Maheswari, (2010). A Text book of Microbiology. 3rd Edition, S. Chand Publishing, New Delhi.

H.Frobisher, R.D.Hinsdil, K.T.Crabtree and D.R.Goodhert (2005). Fundamentals of Microbiology, Saunder and Compa

C.B. Powar and H.F. Dagainawala, (2008). General Microbiology. Volume: II. Himalaya Publishing House.

Semester-III

Sub. Code: BC307

BIOPHYSICAL CHEMISTRY

4 Hours/4 Credits

Course Objectives:

To understand about the measurement of solutes in solution and learn the basic concepts in biophysical chemistry.

To learn the regulation of pH the various buffer systems.

To acquire in-depth understanding on the principles of electrochemical techniques, instrumentation and applications of reference electrodes.

To learn the laws of thermodynamics, reversible and irreversible process and their applications.

To acquire knowledge on viscosity coefficient, surface tension and their applications.

UNIT-I: Units of measurement of solutes in solution, normality, molality, molarity, and milliosmol, Percentage solution examples for this concept. Ionic strength, Isotonic, hypertonic and hypotonic solution. Diffusion, Osmosis and its applications.

UNIT-II: Acid and bases, Arrhenius, Lowry & Bronsted concept, Lewis concept–conjugated pairs. pH, pOH, buffer, buffering capacity, common ion effect. Henderson–Hasselbalch equation. Buffer systems–Bicarbonate, Phosphate, Protein & Haemoglobin buffers.

UNIT-III: Principles of electrochemical techniques, Reference electrodes – Silver and Calomel electrode. Determination of pH using pH indicator, Universal indicators, pH paper & pH meter–Instrumentation and applications, Hydrogen electrode and glass electrodes.

UNIT-IV: First law of thermodynamics, Work, heat, free energy, enthalpy and entropy, exothermic and endothermic reactions, Reversible & irreversible process, isothermal and adiabatic process, Hess’s law and its applications, Kirchoff’s equation, relations between Cp & Cv.

UNIT-V: Definition and determination of viscosity coefficient. Poiseuille’s equation, Stoke’s law and terminal velocity. Surface tension: Definition, determination of surface tension, temperature effect. Equilibrium constant, Le-Chatelier’s principle and applications.

Text Books:

B.R. Puri, L.R. Sharma, M.S. Pathania (2016), Principles of Physical Chemistry. 47th Ed., Vishal Publishing Co.

K.Wilson and J. Walker (2006), Practical Biochemistry – Principles and techniques of Biochemistry and Molecular Biology, sixth Edition, Cambridge University Press, New York, USA.

References:

Upadhyay, K. Upadhyay and N. Nath (2007), Biophysical chemistry, Third revised edition, Himalaya publishing House, Mumbai.

Vasanth Pattabhi and Gautham, (2002), Biophysics, second reprint 2005. Narosa Publishing House PVT Ltd, New Delhi.

R. Gurdeep, Chatwal and Sham K. Aanand. (2006). Instrumental Methods of Chemical Analysis, Himalaya publishing House, New Delhi.

David Freifelder (1976)., Physical biochemistry, applications to biochemistry and molecular biology, second edition. W.H.Freeman & Co Ltd.

M.L Srivastava (2008)., Bioanalytical Techniques., Narosa, Chennai.

Semester-III

Sub. Code: PBC302

MAIN PRACTICAL-III

3 Hours/3 Credits

I. Preparation

a).Preparation of Buffer

Phosphate buffer

Tris buffer

Citrate buffer.

b).Solution preparation

Normality and Molarity solution

Saturated solution, Percentage solution, Sucrose gradient solution and dilute solution.

II. Techniques

a).Colorimetry

Estimation of Amino acids by Ninhydrin method.

Estimation of Protein by Biuret method.

Estimation of Protein by Lowry's method.

Estimation of Phosphorus by Fiske and Subbarow method.

Semester-IV

Sub. Code: BC407

MICROBIAL BIOCHEMISTRY

3 Hours/3 Credits

Course Objectives:

To learn the principle involved in food preservation and its application.

To study the various diseases caused by pathogenic microorganisms.

To know the processes of microbial fermentation and fermenters.

To understand the role of microbes in solid and liquid waste management.

To learn the use of microorganisms in biofertilizers and vermicomposting.

UNIT-I: Food preservation-Principles and Preservatives; Dairy products–Cheese and Yoghurt; Baker's yeast (Bread making) and Alcoholic beverages (Beer & Wine production). SCP-Cultivation and Applications.

UNIT-II: Bacterial diseases – Typhoid, Anthrax, Tuberculosis and Leprosy; Fungal diseases-Candidiasis, Aspergillosis and Dermatophytes; Viral diseases-AIDS, Covid-19, Dengue, Rabies and Hepatitis.

UNIT-III: Microbial fermentation and Fermentor; Industrial fermentation–Penicillin, Streptomycin, Ethanol, Vitamin B₁₂, Glutamic acid, Protease, Amylase and Lipase.

UNIT-IV: Solid and Liquid Wastes, Solid waste management–Saccharification, Gasification and Composting; Liquid waste management–Aerobic and Anaerobic methods; Bioremediation and *Biodeterioration* of wastes.

UNIT-V: Biofertilizers-Characteristic features of bacterial biofertilizers, types and uses. Biopesticides–Scope, Classification and Importance. Composting and Vermicomposting and Organic farming.

Text Books:

M.J. Pelczar Jr, E.C.S. Chan and N.R. Kreig (2006). “Microbiology”- 5th Edition Mc Graw Hill Inc. New York.

M.J. Waites (2007). Industrial Microbiology. Blackwell Publishing Company. UK.

References:

R. Ananthanarayan and C.K. Jayaram Paniker (2000). Text book of Microbiology. 6th Edition, Orient Longman Limited, Chennai.

R.M. Atlas and R. Bartha (1992). Microbial ecology. Fundamentals and applications. 3rd Edition. Red Wood City. C.A. Benjamin

W.C. Frazies and D.C. Westhoff (1988). Food microbiology. 4th Edition. McGraw Hill NY.

U. Satyanarayana (2005). Biotechnology. 1st Edition, Books and Allied (P) Ltd., Kolkata.

N.S. SubbaRao (1995) Soil microorganisms and plant growth Oxford and IBH publishing co. Pvt. Ltd. NewDelhi.

Semester-IV

| | | |
|-------------------------|--------------------------------|--------------------------|
| Sub. Code: BC408 | ANALYTICAL BIOCHEMISTRY | 4 Hours/4 Credits |
|-------------------------|--------------------------------|--------------------------|

Course Objectives:

To learn the basic knowledge of centrifugation and its applications.

To study the working principle of chromatography.

To understand the principle and instrumentation of electromagnetic radiation.

To learn the principle, instrumentation and applications of colorimeter.

To understand the basic mechanism and applications of radioisotopes.

UNIT-I: Basic principles-Sedimentation rate, Svedberg unit, different types of rotors. Types of centrifuges, Different types of centrifugation –Analytical and preparative, Differential, density gradient, isopycnic and equilibrium centrifugation and its applications.

UNIT-II: General principles (partition and adsorption), instrumentation and Applications of chromatography–Paper Chromatography, Thin layer chromatography, Affinity Chromatography, Ion Exchange Chromatography, Gel filtration chromatography, Gas Liquid chromatography and HPLC.

UNIT-III: General principles, factors affecting the migration rate-sample, electric field, buffer and supporting medium. Paper electrophoresis, Tiselius moving boundary electrophoresis, Agarose gel electrophoresis, SDS-PAGE and Immunoelectrophoresis.

UNIT-IV: Basic principles of electromagnetic radiation. Energy, wavelength, wave number and frequency. Absorption and emission spectra. Beer–Lambert’s law, light absorption and its transmittance. Principles, instrumentation and applications–Colorimeter, UV-visible, Flame Emission and Atomic Absorption Spectrophotometer.

UNIT-V: Atomic structure, radiation, types of radioactive decay, half-life, and units of radioactivity (Roentgen, Rad, Rem, Let). Detection and measurement of radioactivity–methods based upon ionization (GM counter), methods based upon excitation (Liquid and solid scintillation counter), Autoradiography, Applications of radioisotopes, Radiation hazards and safety measures.

Text Books:

P. Asokan (2001), Analytical Biochemistry. Chinnaa Publications.

M K. Wilson and J. Walker (2006), Practical Biochemistry–Principles and techniques of Biochemistry and Molecular Biology, sixth Edition, Cambridge University Press, New York, USA.

References:

A. Upadhyay, K. Upadhyay and N. Nath (2007), Biophysical chemistry, Third revised edition, Himalaya publishing House, Mumbai.

Vasantha Pattabhi and Gautham, (2002), Biophysics, second reprint 2005. Narosa Publishing House PVT Ltd, New Delhi.

R. Gurdeep, Chatwal and Sham K. Aanand. (2006). Instrumental Methods of Chemical Analysis, Himalaya publishing House, New Delhi.

David Freifelder., (1976), Physical biochemistry, applications to biochemistry and molecular biology, second edition. W.H.Freeman & Co Ltd.

Semester-IV

Sub. Code: PBC405

MAIN PRACTICAL-IV

3 Hours/3 Credits

I. Electrophoresis

Separation of serum protein by SDS-PAGE

Separation of DNA by Agarose gel electrophoresis.

II. Chromatography

Paper chromatographic separation and detection of amino acids

Separation of carbohydrates and amino acids by TLC

III. Microbiology

Preparation of liquid and solid media.

Isolation of bacteria from Air, soil and water.

Isolation and maintenance of organisms by plating and streaking methods.

Slants and swab culture.

Gram's staining method.

Antibiotic sensitivity test

M.Sc BIOCHEMISTRY

SEMESTER I

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|----------|--------------|---------------------|--------------|---------|
| I | BC709 | Cell Dynamics | 4 | 4 |

Course Objectives

To learn the prokaryotic and eukaryotic cellular organization and acquire knowledge on cell cycle and cell division.

To understand the communication and transport across the cell membrane.

To know the histopathology techniques and staining methods.

To understand the membrane proteins and their interactions with other cellular components.

To explain the molecular basis of apoptosis and necrosis.

UNIT-I

Cell types–Organization of Prokaryotic and Eukaryotic cells, Cell division –Mitosis and Meiosis, Cell cycle–Phases of cell cycle, Cell motility–Molecular motors, Microtubules, Structure and composition, Microtubular associated proteins–Role in intracellular motility.

UNIT-II

Cellular organelles–Nucleus-internal organization, Traffic between the Nucleus the Nucleolus, and Cytoplasm, Endoplasmic reticulum–Protein sorting and transport, Golgi apparatus and Lysosomes, Morphology and Functions of mitochondria, Chloroplasts, Peroxisomes and Glyoxysomes.

UNIT-III

Histopathological Studies–Methods for disrupting tissues and cells, Organ and tissue slice techniques, Cell fixation–fluid fixatives, freezing and section drying, Staining techniques–acid and basic, fluorescent and radioactive dyes, staining of lipids, steroids, nucleic acids, proteins and enzymatic reaction products.

UNIT-IV

Differentiation of Cell membrane–microvilli, tight junctions, epithelia, Bell and sqot desmosomes–Mechanical function, cell-cell interaction, cell adhesion proteins and tight junctions. Overview of membrane protein– Peripheral and Integral, molecular model of cell membrane–Fluid mosaic model and membrane fluidity, Solute transport across membrane–Passive and Active transport by ATP powered pumps.

UNIT-V

Cell Aging and Death–Necrosis and Apoptosis. Cell Signaling–Signaling molecules and their receptors, Functions of cell surface receptors, Pathways of intracellular signal transduction, ras, MAP kinase pathways.

References

The Cell-Biochemistry, physiology and morphology by J. Brachet and A.

E. Mirsky, Academic Press (1963).

Cell and Molecular Biology by concepts and experiments by Gerald Karp (2005) John Wiley sons & Inc.

The World of the cell by Becker, Kleinsmith and Harden Academic Internet Publishers; 5th edition (2006).

The Cell: A Molecular Approach, Fourth Edition by Geoffrey M. Cooper and Robert E. Hausman (2006).

Molecular cell Biology by Harvey Lodish. W. H. Freeman; Sol edition (2007).

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|----------|--------------|---------------------|--------------|---------|
| I | BC710 | Biomolecules | 4 | 4 |

Course Objectives

- To understand the nature of various biomolecules present in living cells.
- To get exposed to key contributions of scientists such as G.N. Ramachandran and Watson - Crick etc. in order to create scientific interest amongst students in life processes.
- To learn the properties of carbohydrates, proteins, lipids, cholesterol, DNA, RNA, glycoproteins and glycolipids and their importance in biological systems.
- To understand the organic chemical principles in life processes.
- To develop skills to determine amino acid and nucleotide sequences of proteins and DNA respectively.

UNIT-I

Polysaccharides–Occurrence, Structure and Functions of homoglycans–Starch, Glycogen, Cellulose, Dextrin, Inulin and Chitins. Occurrence, structure and functions of heteroglycans–bacterial cell wall polysaccharides, glycosaminoglycans, agar, alginic acid, pectins, amino sugars and deoxy sugars, blood group substances and sialic acids. Glycoproteins and Lectins–Structure and functions.

UNIT-II

Classification of Proteins on the basis of solubility and shape, structure and biological functions. Isolation, fractionation and purification of Proteins. Primary structure– determination of amino acid sequences and Ramachandran plot. Secondary structure–weak interactions involved– alpha helix and beta pleated sheets and beta turns. Collagen triple helix, super secondary structures–helix-loop-helix. Tertiary structure–alpha and beta domains. Quaternary structure–Structure of Haemoglobin. Denaturation and renaturation of Proteins.

UNIT-III

Watson -Crick Model of DNA structure. A, B and Z–DNA, Cruciform - structure in DNA, formation and stability, Miscellaneous alternative conformation of DNA–slipped mispaired DNA, parallel stranded, isomorphous DNA, palindrome, isolation and purification of DNA, Molecular hybridization, Cot value curve and hypochromic effect, secondary and tertiary structure of RNA, hnRNA, methods for nucleic acid sequence.

UNIT-IV

Lipids–Classification, saturated and unsaturated fatty acids, phospholipids–classification, structure and functions. Eicosanoids- Structure and functions of prostaglandins, thromboxanes and leukotrienes. Types and functions of plasma lipoproteins. Amphipathic lipids–membranes, micelles, emulsions and liposomes. Steroids–Structure and biological role of cholesterol, bile acids and bile salts.

UNIT-V

Vitamins–Water soluble-Thiamine, Riboflavin, Niacin, Pyridoxine, Biotin, Cyanocobalamin, Folic acid, Ascorbic acid–Sources, structure, biochemical functions, deficiency diseases and daily requirements. Fat soluble–Vitamin A, vitamin D, vitamin E and vitamin K–Sources, structure, biochemical functions, deficiency diseases and daily requirements.

References

Biochemistry by Zubey, GL WCB Publishers (1998).

Biochemistry by L. Stryer, W.H. Freeman and Co. 5th Edition (2002).
 Fundamentals of Biochemistry by Voet and Voet, John Wiley and sons NY (2002).
 Lehninger's Principle of Biochemistry by David L. Nelson and Michael M. Cox. W. H. Freeman;
 4th edition (2004)
 Text Book of Biochemistry with clinical correlation by Thomas .M. Devlin, John Wiley-Liss,
 Hoboken NJ publishers (2006).

| Semester | Course Code | Title of the Course | Hours /Week | Credits |
|----------|-------------|--------------------------------|-------------|---------|
| I | BC 711 | Human Physiology and Nutrition | 4 | 4 |

Course Objectives

- To understand the composition and functions of Blood and Plasma.
- To know the process of gaseous exchange in tissues and lungs, respiratory adaption to high altitude.
- To understand the nerve physiology and muscle physiology.
- To gain insight into digestive system and renal physiology.
- To gain awareness on nutritional requirements and energy measurements.

UNIT-I

Composition and functions of Blood and Plasma, Blood volume regulation, Blood groups. Blood coagulation mechanism, anticoagulants and its mode of action. Formation and mechanism of Hemoglobin. Cardiophysiology- functional anatomy of heart- genesis and spread of cardiac impulses- cardiac cycle- heart sound- cardiac output- cardiovascular regulatory mechanisms- ECG. Lymph- Composition and function of lymph.

UNIT-II

Respiratory physiology- functional anatomy of air-passages and lung- respiratory muscles- mechanism of respiration- lung volumes and capacities- gas exchange in the lungs- regulation of respiration. Mechanism of transport of blood gases-O₂ and CO₂. Acid-base balance-Role of buffers, erythrocytes, respiratory system and kidneys.

UNIT-III

Nerve physiology-Structure of neuron and synapse- excitability- action potential conduction of nerve impulse-synaptic transmission- neurotransmitter systems- Types & role of cranial and spinal nerves – Mechanism of reflex action. Muscle physiology- skeletal, cardiac and smooth muscles- electrical properties and ionic properties- types and mechanism of muscle contraction-role of muscle proteins in contraction and relaxation – Neuromuscular transmission.

UNIT-IV

Digestive system – digestive processes at various regions, internal environment and homeostasis-coordinated body functions, mode of absorption of various food, gastric secretions- regulation and motility, intestinal secretion and motility-role of gastrointestinal hormones. Renal physiology- structure of nephron, mechanism of urine formation. Regulation of water and mineral excretion.

UNIT-V

Basal metabolism, Basal Metabolic Rate, factors affecting BMR, determination of BMR-direct and indirect method, respiratory quotient and SDA. Role of fiber in diet, role of essential amino acids-relation with Marasmus, Kwashiorkar disease, role of essential fatty acids, disorders of fatty acid metabolism, Refsum's disease. Trace elements-macro and micro, daily requirements, functions and deficiency manifestations.

References

Human physiology by C.C. Chatterjee, 11th Edition (1985)
 Human Nutrition and Dietetics by Davidson and Passmore. Churchill Livingstone; 8th Edition (1986)
 Principles of Nutrition and Dietetics by M.S. Swaminathan, Bappco Publishers (1995)
 Human Physiology and Mechanisms of Disease by Guyton. Saunders Publications; 6th Edition (1996)
 Review of Medical Physiology by William. F. Ganong, McGraw-Hill Medical; 22nd Edition (2005)
 Barrett KE, Brooks HL, Boitano S and Barman SM, Ganong's Review of Medical Physiology, 23rd Ed., McGraw-Hill Medical, 2009.
 Pal, G.K. Textbook of Medical Physiology, Ahuja Publishing House, Delhi, 2007
 Hall. J.E. Guyton and Hall Textbook of Medical Physiology. 12th ed. Saunders, Elsevier Inc., 2011.

| Semester | Course Code | Title of the course | Hrs | Credits |
|----------|-------------|-------------------------------|-----|---------|
| I | BC812A | Elective – I – Bioinformatics | 4 | 4 |

Course Objectives

- To give focus on online resources in life sciences and applications of Bioinformatics in scientific research.
- To determine the function of genes and proteins, to establish evolutionary relationships, and to calculate the three-dimensional shape of proteins by using computer programs.
- To learn algorithms and statistics for assessing the relationships among large sets of biological data.
- To know the tools for the analysis and interpretation of the various biological data.
- To understand various databases and learn the useful biological information.

UNIT-I

Introduction to Computers-Computer Peripherals and Hardware description. Computer system design, Respective Usage I/O and Storage Devices. Internet Service requirements and applications-E-Mail, World Wide Web, URL, HTML and TCP/IP.

UNIT-II

Operating systems. Evolution, types-system and applications of operating systems, layered structure of operating system, CUI and GUI's DOS internet and external commands, anatomy of windows, features and multitasking. Office applications□MS-Office, MS-Word, MS-Excel and MS PowerPoint.

UNIT-III

Bioinformatics-definition, application, challenges and opportunities. Internet, Database- types, classification, sequence formats, DBMS, RDBMS and SQL, Nucleic Acid Database-NCBI, EMBL, DDBJ and Phylogenetic tree. Protein Sequence Database- BLAST, FASTA, PIR and SWISS-PROT, Structure database-PDB, CDS, ORFand EST motifs.

UNIT-IV

Secondary structure prediction of RNA and protein. RNA Structure Prediction–mFold, Vienna RNA Package and Circles. Protein structure prediction□kPROT, Jnet and SSA. Structural classification of proteins (SCOP), Classification of protein (CATH), Structural and functional genomics and proteomics, DNA microarrays□Principle, applications and future prospects.

UNIT-V

Molecular Visualization Tools,Rasmol, Chime, Weblab Viewer, Deep View, ISIS Draw, Chemdraw and Molmol and Drug Designing- drug target, computer aided drug design, types and applications. Emulation of common DOS commands using PERL and BIOPERL.

References

- Bioinformatics Computing by Bergeron, B.P. 1st Edition, Printice Hall (2000).
- Introduction to Bioinformatics by Lesk, A.M. 1st Edition, Oxford University Press,(2002).
- Discovering Genomics, Proteomics and Bioinformatics by Campbell and Heyer

Cold Spring Harbour Laboratory Press & Benjamin Cummings, (2002).
 Fundamental concepts of bioinformatics by Dan E. Krane and Michael L. Raymer, Benjamin Cummings, (2003).

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|----------|--------------|-------------------------|--------------|---------|
| I | BC 712B | Industrial Microbiology | 4 | 4 |

Course Objectives:

- To learn about the basic concepts of industrial microbiology and industrially important microbes.
- To understand the microbial fermentation process, fermenters types and fermentation techniques.
- To gain the knowledge about inoculum development, raw materials used in fermentation process.
- To become familiar with the food preservation techniques and fermented dairy, brewers products.
- To understand the food preservation techniques and uses of microbes in waste management.

UNIT – I:

General concepts of Industrial Microbiology, Industrially important microorganisms, Primary and Secondary metabolites from microorganisms, Microbial fermentation and its types, Fermentor–Design and types, Factors affecting fermentor design, Sterilization of Fermentor, media and air.

UNIT – II:

Inoculum development for fermentation process, Raw material for media preparation, Strain improvement strategies, Foam formation during fermentation and Antifoam agents, Scale up of fermentation process– Upstream and Downstream process.

UNIT – III:

Microbial products of industrial value–Penicillin, Streptomycin, Ethanol, Amylase, Vitamin – B12, Acetic acid, Citric acid and Glutamic acid. Probiotics-types.

UNIT – IV:

Principles of food preservation; Single cell proteins – *Spirulina*; Lactic acid bacteria and Propionic acid bacteria, Fermented dairy products–Cheese and Yoghurt; Baker’s yeast–Bread making, Beer and Wine production. Food Spoilage –Mycotoxins.

UNIT – V:

Wastes - Types of wastes; Solid waste treatment – Saccharification, Gasification and Composting; Liquid waste treatment – Aerobic and Anaerobic methods; Bioremediation and *Biodeterioration* of Industrial wastes. Composting and Vermicomposting of industrial wastes. Biogas Production.

References:

- A.H. Patel (2007). Industrial Microbiology, Pan MacMillan Publication, UK.
- R. Ananthanarayan and C.K. Jayaram Paniker (2000). Text book of Microbiology. 6th Edition, Orient Longman Limited, Chennai.
- R.M. Atlas and R. Bartha (1992). Microbial ecology. Fundamentals and applications. 3rd Edition. Red Wood City. C.A. Benjamin
- W.C. Frazier and D.C. Westhoff (1988). Food microbiology. 4th Edition. McGraw Hill NY.
- M.J. Waites (2007). Industrial Microbiology. Blackwell Publishing Company. UK.
- U. Satyanarayana (2005). Biotechnology. 1st Edition, Books and Allied (P) Ltd., Kolkata.
- Martin Adams and Maurice Moss (2008). Food Microbiology, 3rd Edition, RSC Publications, UK.

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|----------|--------------|----------------------|--------------|---------|
| I | BC712C | Stem Cell Technology | 4 | 4 |

Course Objectives

- To learn about the basics of stem cells.
- To understand the embryonic and adult stem cell therapy.
- To examine the increasing potential of stem cell in medicine and understanding of the molecular determinants.
- To develop the ability to understand the role of stem cells in research.
- To learn about Stem cell based therapies in animal models.

UNIT- I

Stem cells-Definition, Sources, Classification and Types–Human Embryonic and Adult Stem Cells. Blastocyst Culture–Stages of embryonic development. Properties of Stem cells-Self Renewal, Clonality and Plasticity.Cryopreservation of Stem cells-Conventional, Slow freezing and Vitrification Methods.Pluripotent nature of stem cells-Extrinsic and Intrinsic factors.

UNIT- II

Characteristics of Stem cells and their developmental potentials; Ips- Induced pluripotent stem cells, Blastocyst and inner cell mass, Organogenesis, Mammalian Nuclear Transfer Technology, Stem cell differentiation–*in vitro* and *in vivo*. Applications of Stem cells.

UNIT-III

Therapeutic Cloning Strategies, Derivation and propagation of human embryonic stem cells, Reproductive cloning by Somatic Cell Nuclear Transfer (SCNT) and its uses, Limitations of Cloning, Human stem cell research–Ethical consideration, Stem cell religion consideration. Stem cell based therapies–Preclinical regulatory consideration and Patient advocacy.

UNIT- IV

Overview of Embryonic and Adult stem cells Therapy. Neurodegenerative diseases–Parkinson, Alzheimer, Spinal cord injuries and other brain syndromes.Tissue system failures–Cardiomyopathy, Kidney and Liver failure, Cancer and Hemophilia.

UNIT-V

Skeletal Muscle Stem cells–Development and Functions. Tumor stem cells–Basic differences and similarities of cancer stem cells.Cancer stem cell signaling–NOTCH pathway; Canonical Wntsignaling pathways in hematopoietic stem cells. Stem cell therapies in animal models.

References

- Stem Cell Biology and Gene Therapy by Peter J. Quesenberry, 1st Edition, Willy-Less Publishers (1998).
- Human Embryonic Stem Cells: An Introduction to the Science and Therapeutic Potential by Ann A. Kiessling, Jones and Bartett Publishers (2003).
- Stem Cells by Potten, C.S., Elsevier (2006).
- Essential of Stem Cell Biology by Robert Lanja, 2nd Edition, Academic Press (2006).
- Stem cell Transplantation Biology Processes Therapy by Ho, A.D. and Hoffiman, R., Willy-VCH (2006).

SEMESTER II

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|----------|--------------|------------------------------|--------------|---------|
| II | BC 809 | Instrumentation Biochemistry | 4 | 4 |

Course Objectives:

- To study the principle, procedure and applications of electrophoresis.
- To understand the principle, procedure and applications of microscopes.

To study the principle, procedure and applications of chromatography.
 To learn the principle, procedure and applications of centrifugation techniques.
 To know the principle, procedure and applications of spectrophotometry.

UNIT-I

Electrophoresis–General Principles, Factors affecting electrophoretic mobility, Support media. Paper and Gel electrophoresis. SDS-PAGE, 2D PAGE, Native gel Electrophoresis. Detection, estimation and recovery of proteins in gels. Agarose gel, Capillary Electrophoresis and pulsed field gel electrophoresis. Isoelectric focusing, Immunoelectrophoresis and ELISA. Types of Blotting–Southern, Northern, Western, Dot-blot and Slot-blot.

UNIT-II

Microscopy–Bright field, Dark field, Phase contrast, Confocal microscopy and Fluorescence microscope. Visualization of cells and subcellular components by light microscopy, resolving powers of different microscopes, microscopy of living cells, scanning and transmission microscopes, fixation and staining techniques for EM.

UNIT-III

General principle of Chromatography, Types– Paper, TLC, Ion exchange, Molecular gel exclusion, Affinity, Gas Liquid, HPLC and HPTLC. Basic principle of Centrifugation, Types–Preparative ultracentrifuge, Differential, Density gradient, Rate zonal, isopycnic isodensity and equilibrium isodensity centrifugation. Determination of molecular weight by sedimentation in an ultracentrifuge.

UNIT-IV

UV-Visible spectral analysis of colouring pigments (Beta cyanin, Anthocyanin, Xanthine, Lycopene and Curcumin), Atomic force microscopy, Circular Dichorism spectroscopy, OpticalRotatory Dispersion spectroscopy and X-ray diffraction –Principle, instrumentation and application.

UNIT-V

Principle and applications of Atomic flame and flameless spectrophotometry. Electron spin Resonance, Nuclear Magnetic Resonance, Infrared, Raman spectroscopy and Mass spectroscopy.

References

Introduction to Medical Laboratory Techniques by Mukherjee, Volume I, II and III, Oxford University Press (1976).
 Physical Biochemistry by David Friefielder, W.H. Freeman 2nd Edition (1982).
 Introductory Practical Biochemistry by K. Shawney and Randhir Singh (2000).
 Practical Biochemistry by K. Wilson and J. Walker. 5th Edition Cambridge Univ. (2005).
 Introduction to instrumental analysis by Robert D. Brown, Pharma Book Syndicate (2006).
 Introduction to Experimental Biophysics (set): Textbook and Lab manual by CRC press. Jay Nadeau (2015).

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|----------|--------------|---------------------|--------------|---------|
| II | BC 810 | Advanced Enzymology | 4 | 4 |

Course Objectives

- To acquire fundamental knowledge on enzymes and their importance in biological reactions.
- To understand the ability to difference between a chemical catalyst and biocatalyst.
- To know the mechanism of enzyme and its importance in biological reactions.
- To learn the kinetics of enzyme catalyzed reactions and enzyme inhibitory and regulatory process.
- To understand the role of enzymes in clinical diagnosis and industries.

UNIT-I

Introduction to Enzymes, Nomenclature and IUBMB classification of enzymes. Enzyme activity, factors contributing to the catalytic efficiency of enzyme. Enzyme Units—Specific activity, Turn over number, Katal and IU. Enzyme Active site—determination of active site amino acids—Chemical probe, Affinity label and Site-directed mutagenesis. Investigation of 3D structure of active site. Coenzymes—Prosthetic group, Classification— Vitamin and non-vitamin Coenzymes and Cofactors.

UNIT-II

Theories of enzyme substrate complex- Lock and key, induced fit theory, Kinetics of Single Substrate-enzyme catalysed reactions—Michaelis-Menten equation, importance of V_{max} , K_m and MM equation. Modification of MM equation—Lineweaver-Burk plot, Eadie-Hofstee plot, Hanes-Woolf plot and Eisenthal and Cornish-Bowden plot. Kinetics of multi substrate-enzyme catalysed reactions: Non Sequential-Ping-pong, bi-bi, Sequential- random order and compulsory order mechanism.

UNIT-III

Mechanism of Enzymic Action—general acid-base catalysis, covalent catalysis, role of metal ion in enzyme catalysis, mechanism of Serine proteases-chymotrypsin and lysozyme. Inhibitors-Definition, Types and kinetics of Reversible inhibition—Competitive, uncompetitive, non-competitive. Irreversible inhibition and Allosteric regulation.

UNIT-IV

Isolation and Purification of enzymes, Preparation of purification chart, Purification techniques, Enzyme Immobilization- methods and their applications, RNA catalysis- Ribozymes, Catalytic antibodies – abzymes and synzymes. Multi enzyme complex- Pyruvate dehydrogenase, Isoenzymes- LDH and CPK.

UNIT-V

Industrial Uses of Enzymes—Sources, thermophilic enzymes, amylases, glucose isomerases, cellulases, lipases, proteases in meat and leather industry, detergents and cheese production. Enzymes as thrombolytic agents, anti-inflammatory agents and digestive aids.

References

- Enzymes by Dixon and Webb, Academic Press (1964).
- Enzymes by Boyer. Academic Press, 3rd edition (November 1983).
- Understanding enzymes by Palmer, Prentice Hall; 4th Edn. (1995).
- Biochemistry by Metzler, Academic Press (2000).
- Biochemistry by Stryer. W. H. Freeman; 6th Edition (2006).

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|-----------------|---------------------|--------------------------------|---------------------|----------------|
| II | BC 811 | Intermediary Metabolism | 4 | 4 |

Course Objectives

- To determine the biochemical reactions, central metabolic pathways and kinetics of energy and homeostasis of metabolism.
- To learn the importance of lipids as storage molecules and as structural component of biomembranes.
- To understand the importance of high energy compounds, electron transport chain, and synthesis of ATP under aerobic and anaerobic conditions.
- To acquire knowledge related to the role of TCA cycle in central carbon metabolism, importance of anaplerotic reactions and redox balance.
- To gain insights into metabolic engineering for the production of useful biomolecules.

UNIT-I

Introduction to Metabolism of Cells, Aerobic Glycolysis and Fermentation–Energetics, Citric Acid Cycle – PDH complex, energetics and regulation, Pentose Phosphate Pathway, Gluconeogenesis, Glycogenesis, Glycogenolysis and their regulation. Glyoxylate Pathway and Uronic acid pathway. Metabolism of Fructose and Galactose, Futile cycle.

UNIT-II

Energy Transformation, Free Energy changes and Redox Potential, Biological Oxidation–Enzymes involved in Redox Reactions. Phosphoryl group transfers and ATP. Components of Electron Transport Chain and the sequence of electron transport. Oxidative Phosphorylation–Chemiosmotic Theory. Structure and Mechanism of ATP synthesis (F_1F_0 complex). Inhibitors of respiratory chain and oxidative phosphorylation - Uncouplers. Regulation of oxidative phosphorylation. Mitochondrial Transport Systems-ATP/ADP exchange, malate aspartate shuttle, glycerol phosphate shuttle and creatine-phosphate shuttle.

UNIT-III

Metabolism of Triglycerides, phospholipids and Sphingolipids. Fatty acid biosynthesis, Fatty acid oxidation (α , β and ω) and lipid peroxidation. Ketone bodies-Formation, utilization, excretion and clinical significance. Cholesterol-Biosynthesis, regulation, transport and excretion. Prostaglandins and thromboxane metabolism.

UNIT-IV

Biosynthesis of aromatic aminoacids. Catabolism of amino acid nitrogen– Transamination, deamination, ammonia formation and the urea cycle. Disorders of the urea cycle. Catabolism of carbon skeletons of amino acids. Conversion of amino acids to specialized products. Biosynthesis and degradation of Porphyrin and Heme. Metabolism of purines–De novo and salvage pathways for biosynthesis. Purine catabolism. Biosynthesis and Catabolism of pyrimidines.

UNIT-V

Interrelationship of carbohydrates, Proteins and Fat metabolism- Integration of different metabolic pathways and role of acetyl CoA and TCA cycle. Metabolic profile of the principle organs (liver, adipose tissue and brain) and their relationships. Altered metabolism in starvation. Metabolism under different stress conditions.

References

- Biochemistry by Zubay, G.L, 4th edition, WMC Brown publishers (1988).
- Principles of Biochemistry by Garrette and Grisham, Saunders College publishing (1994).
- Biochemistry by Donald Voet, J.G. Voet and John Wiley, (1995).
- Biochemistry by Kuchel and Ralston, 2nd ed. Schaum’s Outlines McGraw Hill (1998).
- Biochemistry by Davidson and Sittman., NMS. 4th ed. Lippincott. Willams and Wilkins, (1999).
- Biochemistry by Campbell and Farrell, 4th ed. Brooks/Cole Pub Co. (2002).
- Lehninger’s Principles of Biochemistry by Nelson Cox, 4th ed. McMillan Worth (2004).
- Biochemistry by Stryer. W. H. Freeman; 6 editions (2006).

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|----------|--------------|--------------------------------------|--------------|---------|
| II | BC812A | Elective II - Advanced Endocrinology | 4 | 4 |

Course Objectives

- To learn the basic aspects of hormones and endocrine glands.
- To provide in depth knowledge about chemical structures of hormones.
- To understand the classification of hormones.

To identify about the functions of hormones.

To compile information about new diseases associated with hormones.

UNIT-I

Hormones–Introduction and Chemical nature.Neuroendocrine integration in homeostasis.Classes of chemical messengers.Hormone secretion, Transport and clearance. Feed-back Regulation of hormonal secretion. Mechanism of Group I and Group II hormone action, Receptors and its types, Second messengers. Signal Transduction.

UNIT-II

Endocrine hypothalamus–Structure, hypophysiotropic hormones, regulation of hypothalamic hormone secretion. Pituitary hormones– Anatomy of pituitary gland, hormones of the anterior pituitary–Synthesis, chemistry, physiological roles, mechanism of action, regulation of secretions and pathophysiology. Neurohypophysis–Synthesis, chemistry, physiological roles, Regulation of secretions and pathophysiology of neurohypophyseal hormone secretion

UNIT-III

Thyroid gland–Synthesis, chemistry, physiological roles, mechanism of action. Regulation of thyroid hormone secretion and Pathophysiology.Parathyroid gland–Synthesis, chemistry, physiological roles, mechanism of action, regulation of parathyroid hormone secretion and pathophysiology.Pineal gland–Melatonin hypothesis, secretion and circulation, proposed role of pineal. Melanotropic hormones–Chemistry, role of MSH, mechanism of action and pathophysiology.

UNIT-IV

Pancreas–Synthesis, chemistry, physiological roles, mechanism of action, regulation of secretion and pathophysiology of Insulin, Glucagon and Somatostatin.Neurohormones–chemistry, physiological roles, mechanism of action, regulation of secretion and pathophysiology of Catecholamines and endorphins.

UNIT-V

Reproductive Endocrinology–Male reproductive system-Synthesis, chemistry, physiological roles, mechanism of action, and pathophysiology of Androgens. Female reproductive system–Synthesis, chemistry, physiological roles, mechanism of action, regulation of secretion and pathophysiology of Ovarian hormones. Endocrinology of pregnancy, parturition and lactation, puberty and hormone regulation.Human infertility–Reasons, therapy and treatment.

References

William’s Textbook of endocrinology by Wilson, Foster, 8th Edition (2002).

Principles of Biochemistry by Smith et al., 7th Edition, McGraw Hill (2003).

Harper’s Biochemistry by R.K. Murray et al. McGraw-Hill Medical; 27th Edition (2006).

Medical Endocrinology by Goodman HM, Basic. Academic Press. 4th Edition (2008).

Endocrine and Metabolic Disorders: Clinical Lab Testing Manual by Robert F. Dons., 4th Edition, CRC Press (2009).

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|-----------------|---------------------|--|---------------------|----------------|
| II | BC812B | Elective – II – Pharmaceutical Biochemistry | 4 | 4 |

Course Objectives

To gain the knowledge on basic concepts of pharmacology to understand the mechanisms of drug action and toxicity.

To understand the chemistry of drugs with respect to their pharmacological activity.

To learn the drug metabolic pathways, adverse effect and therapeutic value of drugs.

To know the mechanism of action of drug therapy.
 To study about the natural drug development.

UNIT-I

Drug: Structural feature and pharmacology activity, Prodrug concept. Absorption–first Pass effect. Distribution and Metabolism–Phase I, II reactions, action of cytochrome p450 and elimination of drug. Receptor: localization, types, models and their drug– Receptor interaction, agonist and antagonist.

UNIT-II

Adverse response to drugs, Drug tolerance and intolerance, Idiosyncrasy, drug allergy. Tachyphylaxis, Drug abuse, Vaccination against infection, Factor that modifies the effect of drug. Assay of drug potency-Bioassay and Immunoassay.

UNIT-III

Biotechnology and pharmacy: Genetically engineered protein -Insulin, drug delivery systems, Non-conventional routes of administration. Anti-AIDS drugs, Anti-cancer drugs, Covid-19 drugs and Multi-drug resistance.

UNIT-IV

Mechanism of action of drugs used in therapy of Respiratory system–Cough, Bronchial, Asthma and Pulmonary tuberculosis. GIT–Digestants and Appetite suppressants. Hypo lipidemia agents, Antimicrobial drugs, Aminoglycosides. Insulin and oral diabetic drugs, antifertility and ovulation inducing drugs.

UNIT-V

Role of natural products in drug development, Drug dependence and abuse, Chemotherapy- Immuno suppressive drugs, Anti-hypertensive, Anti-platelet, Anti-inflammatory and Anti-cholinergic drugs.

References

Oxford text book of Clinical pharmacology and drug therapy by A. Burger, D. J. Abraham. Burger’s medicinal Chemistry & Drug Discovery, (2003).
 Essentials of Medical Pharmacology by K. D. Tripathi 5th Edition, Jaypee, New Delhi, (2004).
 Pharmacology (Lippincott Illustrated Reviews Series) by Richard A. Harvey, Pamela C.Champe, Richard Finkel, Luigi Cubeddu, Michelle A.Clarke 4th Edition,Wolterskluwer, (2008).
 Principles of medicinal chemistry by William, O. and Foge, B.I., Waverks Pvt.Ltd.,New Delhi,(2008).
 Pharmacology and Pharmacotherapeutics by Bhandarkar, 10th Edition, Elseveir (2010).
 The pharmacological basis of therapeutics by Laurence Brunton, Bruce A.Chabne and Bjorn Knollman Goodman and Gillman, Vol. I and II,Mc Graw Hill (2011).
 Pharmacology and Pharmacotherapeutics by Satoskar, 24th Edition, Elseveir (2015).
 Pharmacology and Pharmacotherapeutics by R.S. Satoskar, S.D.Bhandhakar and S.S. Anilapure, Elsevier (2015).

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|----------|--------------|--|--------------|---------|
| II | BC812C | Elective II - Environmental Toxicology | 4 | 4 |

Course Objectives

- To gain knowledge on toxic substances and biochemical basis of toxicity.
- To understand the sources and routes of the various toxic substances in the environment.
- To learn about environmental impacts of pesticides and xenobiotics.

To study about the toxicity testing and their interpretations.
To understand the causes of organ toxicity.

UNIT-I

Ecotoxicology–Introduction, Principles and Scope. Types of toxic substances–Degradable and Non-degradable. Factors influencing toxicity. Biochemical basis of toxicity–Mechanism of toxicity and Receptor mediated events, Acute and Chronic toxicity.

UNIT-II

Toxic substances in the environment, their sources and entry routes. Transport of toxicants by air and water–Transport through food chain–bioaccumulation and biomagnifications of toxic materials in food chain. Xenobiotics, Combined effect of xenobiotics on physiology and Biochemistry of organisms.

UNIT-III

Toxicology of major pesticides–Environmental impacts of pesticides, biotransformation, biomonitoring, concept of bioindicator groups and examples. Combined effect of xenobiotics on physiology and biochemistry of aquatic organisms.

UNIT-IV

Toxicity testing–Laboratory animals, estimation of LC₅₀ and LD₅₀, Interpretation of laboratory data–distinction between adverse and non-adverse effects. Human data–ethical consideration, need for human investigation and clinical toxicology.

Unit-V:

Hepatotoxicity–Common examples of hepatotoxicants, injuries caused to liver, Nephrotoxicity–Common examples of nephrotoxicants, injuries caused to kidney, Pulmonary toxicity–Common examples of pulmonary toxicants, injuries caused to lungs, Neurotoxicity–Common examples of neurotoxicants, injuries caused to nervous tissues.

References

- Text Book of Preventive and Social Medicine by Park, J.E. and Park, K., Banosidas Bharat Publishers, Jabalpur (1985).
- Environmental Pollution and Toxicology by Meera Asthana and Astana D.K., Alka Printers, Chandigarh (1990).
- Environmental Biology and Toxicology by Sharma, P.D, Rastogi and Lamporary, Rajpal and Sons Publishing, New Delhi (1994).
- Environmental Epidemiology by Anisa Basheer, Rawat Publications, New Delhi (1995).
- Toxicology by Sood, A, Sarup and Sons, New Delhi (1999).

CORE PRACTICALS

SEMESTER I & II 5 Hrs/Week (4 Credits)

CORE PRACTICAL-I

Lab Course–I: Isolation, Quantitative Analysis and Techniques

I. Isolation, Quantitative Analysis

- Isolation and estimation of Glycogen from Liver.
- Isolation and estimation of DNA from Liver/Spleen.
- Isolation and estimation of RNA from Yeast.
- Isolation of Lecithin from Egg yolk.
- Estimation of Ascorbic Acid isolated from Lemon.
- Estimation of Inorganic Phosphorus by Fiske and Subbarow method.
- Estimation of Pyruvate.
- Estimation of Tryptophan.
- Estimation of Protein by Lowry's method.

Estimation of Sodium by Flame photometry.
Estimation of potassium by Flame photometry

II. Techniques

Preparation of buffers and measurement of pH using indicators and pH meter.
Separation of Amino acids/Sugar by Thin Layer Chromatography.
Separation of Amino acids/sugar by Paper Chromatography
Separation of Plant pigments by Column Chromatography.
Separation of Serum Proteins by SDS-PAGE.

CORE PRACTICAL-II

SEMESTER I & II

5 Hrs/Week (4 Credits)

Lab Course–II: Industrial and Clinical Enzymology

I. Assay of Industrial enzymes

1. Acid Phosphatase

Assay of Acid Phosphatase activity from Potato.
Determination of optimum pH on Acid phosphatase activity.
Determination of Optimum Temperature on Acid phosphatase activity.
Effect of Substrate concentration on Acid phosphatase activity.

2. Alkaline Phosphatase

Assay of Alkaline Phosphatase activity from Green gram.
Determination of optimum pH on Alkaline phosphatase activity.
Determination of Optimum Temperature on Alkaline phosphatase activity.
Effect of Substrate concentration on Alkaline phosphatase activity.

3. Urease

1. Assay of Urease activity from horse gram.
2. Determination of optimum pH on Urease activity.
3. Determination of Optimum Temperature on Urease activity.
4. Effect of Substrate concentration on Urease activity and calculate K_m and V_{max} using MM Curve and LB Plot.

4. Salivary Amylase

Assay of Salivary amylase activity from Saliva.
Determination of optimum pH on Salivary amylase activity.
Determination of Optimum Temperature on Salivary amylase activity.
Effect of Substrate concentration on salivary amylase activity and calculate K_m and V_{max} using MM Curve and LB Plot.

II. Assay of clinically important enzymes

Assay Serum Alanine aminotransferase activity.
Assay of serum Aspartate aminotransferase activity.

III. Techniques

Immobilization of enzymes by sodium alginate method.
Subcellular fractionation of organelles from liver cells and identification by marker enzyme –LDH.
Enzymes purification by Ammonium sulphate fractionation.

CORE PRACTICAL-III

SEMESTER I & II

4 Hrs/Week (4 Credits)

Lab Course–III: Microbial Biochemistry

Cleaning of Glasswares and Sterilization techniques.
 Preparation of Culture medium used for the cultivation of bacteria and fungi–Broth and Agar.
 Staining techniques–Simple staining, Gram staining, Capsule staining, Endospore staining and Acid fast staining.
 Hanging drop method.
 Antibiotic sensitivity test.
 Slide culture technique for fungal identification and Lactophenol cotton blue (LPCB) Staining method.
 Pure culture techniques–Serial dilution (Pour plate and Spread plate) and Streak plate.
 Growth curve of bacteria.
 Effect of pH, Temperature and Salinity on the growth of bacteria.
 Isolation of *Rhizobium* from rhizosphere soil.
 Isolation of yeast (*Saccharomyces cerevisiae*) from grapes.
 Isolation and enumeration of microorganisms in milk and water by Standard Plate Count (SPC Method).
 Analysis of water quality by Most Probable Number (MPN) Technique.

Semester III

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|----------|--------------|---------------------|--------------|---------|
| III | BC911 | MOLECULAR BIOLOGY | 6 | 5 |

Course Objectives

To learn the basic information about Mendelian genetics and the basic aspects of molecular theories.
 To understand the process of DNA replication involving the roles of various DNA polymerases and other proteins with special reference to the events in prokaryotes and eukaryotes.
 To Gain the insights on the various kinds of DNA repair and major diseases resulting from defective DNA repair
 To acquire the knowledge on various kinds of DNA recombination and a detailed understanding of the process of Holliday recombination
 To acquire the knowledge related to major features of chloroplast and mitochondrial DNA.

UNIT-I

Genetics–History, Definition and Scope. Premendelian genetic concepts –Preformation, Epigenesis, Inheritance of acquired characters and germplasm theory. Hereditary and Environment, Genotype and Phenotype; Heredity and Variation. Clones, Pure lines, Inbred lines and Phenocopies. Biography of Mendel and his experiments with Pea plant. Law of Segregation–Monohybrid cross, back and test cross, Dominance and Recessive, Co-dominance and Incomplete dominance. Law of Independent Assortment–Dihybrid crosses in Pea plant.

UNIT-II

Types of Replication, Evidence for Semiconservative replication–Meselson and Stahl experiment. Replication in Prokaryotes, Replication bubble, bidirectional replication, replicon, action of SSB, primase, DNA gyrase, topoisomerases, Telomerases, DNA polymerase I, II, and III, lagging and leading strand synthesis and Inhibitors of replication. Replications in circular chromosomes–Cairns and Rolling circle model. Replication in RNA virus, Plasmid Replication, temporal control of replication. Eukaryotic replication.

UNIT-III

Transcription–Definition, Coding strand, Template strand, Sense strand and Antisense strand. Prokaryotic transcription: Initiation- Promoter region, role of Pribnow box, DNA– dependent RNA polymerase, Foot-printing experiment, Elongation and Termination- Rho–Dependent and independent termination, Post - transcriptional processing in prokaryotes, split genes, over lapping genes, housekeeping genes, biosynthesis of rRNA and tRNA. Eukaryotic transcription, RNA editing. Post-transcriptional modifications in eukaryotic RNAs, RNA splicing–Introns and splicing reactions, Types of introns. Exons, spacer sequences and enhancers. Inhibitors of Transcription.

UNIT-IV

Genetic code–Definition, deciphering of the genetic code, codon dictionary and its salient features. Wobble mechanism and its significance, Structure of tRNA and composition of prokaryotic and eukaryotic ribosomes. Steps - Activation of amino acids, Initiation-Shine-Dalgarno sequence, reading frame-shift, Elongation and Termination. Eukaryotic Protein synthesis–initiation, elongation and termination. Polysomes, Post-translational modifications in Prokaryotes and Eukaryotes. Inhibitors of protein synthesis.

UNIT-V

Gene expression and regulations, Molecular mechanism of regulation, Prokaryotes–Operon model, lac, trp, ara operons, repression and attenuation. Eukaryotes–C value paradox, repetitive DNA, gene dosage and gene amplifications. Mutagenesis and replication fidelity, frame-shift mutagenesis, DNA damage–different types, DNA repair–Direct reversal repair, direct repair of nicks, excision repair, nucleotide excision repair, mismatch repair, long and short patch mismatch repair, recombination error, SOS response and mutagenic repair.

References

- Biochemistry by D. Voet and J. Voet. John Wiley and Sons Ltd. (1990)
 Advanced molecular biology by R. M. Twyman (1998).
 Genes VII by B. Lewin, Oxford University Press, Cell Press, London (2000).
 Cell and molecular biology by G. Karp, John Wiley & Sons Inc. (2002).
 Molecular biology by Robert F. Weaver, McGraw-Hill, 4th Edition (2007).

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|----------|--------------|---------------------|--------------|---------|
| III | BC912 | Immunology | 5 | 4 |

Course Objectives

- To gain acquaintance on the organs involved in the immune system, antigens and different types of antibody.
- To acquire knowledge on types of immunity, immune response and complement system.
- To gain knowledge about different vaccines and the importance of different immunological techniques.
- To acquire knowledge about the MHC complex, transplantation immunology and tumor immunology.
- To comprehend the complications of hypersensitivity, Autoimmune diseases and Immunodeficiency disorders.

UNIT-I

Lymphoid system–Central and Peripheral Lymphoid Organs and Cells involved in immune system. Antigen, haptens, adjuvants, antigenicity, immunogenicity, antigenic determinants. Immunoglobulins -

structure, classification, functions, allotypes and idiotypes. Theories of antibody formation–Side chain and clonal selection theory.

UNIT-II

Types of Immunity–Innate and Acquired immunity, antitoxin, antibacterial and antiviral immunity. Immune response–Humoral and Cell mediated immunity. Antigen recognition–T and B cell receptor complexes, antigen processing and presentation. Interaction of T and B cells, Cytokines and Immunological memory. Cytotoxicity– immunotolerance and immunosuppression. Complement system– Components, nomenclature and complement activation pathway.

UNIT-III

Vaccines–Attenuated organisms, toxoid, recombinant vaccines, subunit vaccines–DNA vaccines, synthetic peptide vaccines, antiidiotypic vaccines. Immunization practices–Immune prophylaxis and Immunotherapy. Immunological techniques–Production of polyclonal and monoclonal antibodies. Immunoprecipitation, RIA, ELISA, fluorescent Immunoassay, Avidin–Biotin mediated assay, Immunohistochemistry, Immunoelectrophoresis, immunoblotting, Complement fixation test.

UNIT-IV

MHC Complex–Gene organization. MHC complex class I, II and III molecules, Histocompatibility testing–Lympho cytotoxicity test and cross matching MHC. Transplantation–Types, genetics of transplantation, organ transplantation and graft versus host reactions. Tissue matching and Immunosuppressive agents. Tumor immunology–Types, properties of tumor cells, Immune surveillance, tumor antigens, immune response to tumors, Immunotherapy of tumors, DNA tumor virus and Retro virus.

UNIT-V

Hypersensitivity–Definition and classification–Type I, II, III, IV and V hypersensitivity, mechanism , diagnosis and treatment. Autoimmunity and Autoimmune diseases–Mechanism of development, diagnosis and treatment. Immunodeficiency disorders–B and T cell deficiencies. Secondary Immunodeficiency diseases–Pathogenesis, diagnosis and treatment of AIDS.

References

- Basic and Clinical Immunology by Daniel P. Stites, John D. Stobo, J. Vivian Wells, Appleton & Lange, 6th Edition (1987).
- Immunology by Geoffrey Zubay, W.M.C. Brown publisher, 4th Edition (1992).
- Immunology by Janis Kuby, 4th Edition, W.H. Freeman and Company (2000).
- Cellular and Molecular Immunology by Abul K. Abbas, Andrew Lichtman, Saunders, 5th Edition (2005).
- Essential Immunology by Ivon Roitt, Blackwell Publishing, 11th Edition (2006).

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|----------|--------------|----------------------|--------------|---------|
| III | BC913 | RESEARCH METHODOLOGY | 5 | 4 |

Course Objectives

To learn the Importance of Research and Ethics in Scientific research

To understand the collection and classification of research data.

To know the scope of Bioinformatics, the role of Computers in Biology and Useful search engines.

To acquire in-depth knowledge about the Laboratory animals used for Life science research.

To explain the Composition of the Institutional Ethical Committee (IEC) and General ethical issues.

UNIT-I

Importance and Need for Research, Ethics in Scientific research, Designing a Research work, Formulation of Hypothesis, Scientific writing–Research and Review article. Logical format for Dissertation–Title, Certificate, Declaration, Acknowledgement, Contents, Abstract, Introduction, Review of Literature, Materials and Methods, Results, Discussion, Summary, Conclusion, Appendix and References–Harvard and Vancouver systems. Antiplagiarism.

UNIT-II

Collection and Classification of Data–Diagrammatic and Graphic representation of data–Measurement of Central tendency–Standard Deviation-Normal distribution-test of significance based on large samples and small samples, Student ‘t’ test, Correlation and Regression, Chi-square test for independence of attributes, ANOVA and SPSS.

UNIT-III

Introduction and Scope of Bioinformatics, Role of Computers in Biology. Useful search engines–Boolean searching, Search engine algorithms. Finding scientific articles in Google scholar, Science Direct, Scopus, Web of Science and UGC-CARE.

UNIT –IV

Laboratory animals used for Life science research. Ethics in animal experimentation. CPCSEA guidelines–Animal care and technical personnel environment, animal husbandry, feed, bedding, water, sanitation and cleanliness, waste disposal, anesthesia and euthanasia. Research funding agencies in India.

UNIT-V

Composition of institutional Ethical Committee (IEC), General ethical issues. Specific principles for chemical evaluation of drugs and human genetics research, Ethics in food and drug safety. Environmental release of microorganisms and genetically engineered organisms. Ethical issues in human gene therapy and human cloning. IPR and Patenting.

References

The craft of scientific writing by Alley, Michael, Englewood Cliffs. N.N. Prentice (1987).

Molecular and cell biology of human gene therapeutics by Dickson, Series Chapman and Hall (1995).

Bioinformatics Computing by Bergeron, B.P. 1st Edition, Printice Hall (2000).

Ethical guidelines for biomedical research on human subjects. ICMR, New Delhi (2000).

Research methods for biological science by Gurumani, N , MJP Pub., (2007).

Statistical methods by S.P Gupta. 41st Edition, S. Chand and co. (2011).

| Semester | Subject code | Title of the Course | Hours/Week | Credits |
|----------|--------------|---|------------|---------|
| III | BC914A | Elective III- Ecology, Evolution And Biodiversity | 4 | 4 |

Course Objectives

- To learn the fundamental principles of evolutionary theory to explore the evolution of biodiversity.
- To make familiar with the major groups of organisms related to one another.
- To learn the basic ecological theory and proposing solutions to the major environmental problems.
- To understand the concepts of genetic variation, Mendelian genetics and recombination.
- To gain the knowledge about aquatic biotic production and biodegradation in different ecosystems.

UNIT-I

Evolutionary Thoughts–Emergency of evolutionary thoughts. Lamarck, Darwin–Concepts of variation, adaptation, struggle, fitness and natural selection. Mendelism, spontaneity of mutations and evolutionary synthesis.

UNIT-II

Evolutionary Theory–Origin of cells and unicellular evolution, Origin of basic biological molecules, Abiotic synthesis of organic monomers and polymers, Concept of Oparin and Haldane, Experiments of Miller (1953), First cell, Evolution of Prokaryotes, Origin of Eukaryotic cells, Evolution of Unicellular Eukaryotes.

UNIT-III

Origin of genetic variation; Mendelian genetics; polygenic traits, linkage and recombination; epistasis, gene-environment interaction; heritability; population genetics; Molecular evolution; molecular clocks; systems of classification: cladistics and phenetics; molecular systematics; gene expression and evolution. Types of selection (stabilizing, directional etc.); sexual selection; genetic drift; gene flow; adaptation; convergence; species concepts

UNIT-IV

Ecology -Interaction between an organism and environment Concept of habitat and ecological niches, Contributing and Limiting factors for population growth, Energy flow, Food web and Tropic levels. Ecological pyramids and recycling, Communities – population dynamics and community level interactions, N, P, C, S cycles in nature, Ecosystem dynamics and management, stability and complexity of ecosystems, Biogeography and Conservation.

UNIT-V

Ecomanagement–Physio–chemical properties of water, kinds of aquatic habitat (fresh water and marine), distribution and impact of experimental factors on the aquatic biotic productivity and biodegradation in different ecosystems, fish and fishes of India with respect to the management of estuarine, coastal water systems and manmade reservoirs, biology and ecology of reservoirs.

References

1. Ecology Environment and Pollution by A. Balasubramanian, First edition, Publisher: Indira Publishers, Mysore (1995).
2. Biodiversity of Microbial Life by Staley Reysenbach, Wiley Publishers (2001).
3. Glimpses of Biodiversity by B. Bhosetti, Daya Publishing House (2002).
4. Text Book of Ecology by Eugene P. Odum, Brooks/Cole; 5th Revised Edition (2004).
5. Environmental Biodiversity by P.R. Yadav, Discovery Publishing Pvt. Ltd. (2016).

| Semester | Subject Code | Title of the Course | Hours/week | Credits |
|----------|--------------|---------------------|------------|---------|
| III | BC914B | Elective III - | 4 | 4 |

| | | | | |
|--|--|--------------------------|--|--|
| | | Food Biochemistry | | |
|--|--|--------------------------|--|--|

Course Objectives

- To learn the structure, composition, nutritional value, processing and storage of cereals.
- To understand the importance, composition, classification, processing and toxic constituents of spices and pulses.
- To know the classification of nuts and oils, fat and oils, milk and milk products; nutritive values and significance.
- To understand the composition, classification, importance of vegetables and non-vegetable foods.
- To learn about the sugar, sugar products, baking and beverages of food.

UNIT-I:

Cereal- Structure and composition, Nutritional value, Processing-Milling, polishing. Parboiling, flaking, parching, roasting, use in variety of preparations selection, storage and care, breakfast cereals.

UNIT-II:

Role of spices in food science - Importance, composition & classification. Pulses: Composition and nutritional value, processing, soaking, germination. Cooking and fermentations: Toxic constituents of pulses, Lathyrism.

UNIT-III:

Nuts and oil seeds: Nutritive value, importance & classification. Fats and oils: Types, role of fat in cookery. Milk and milk products: Composition of milk, properties and effect of heat, nutritional importance, milk processing, milk products.

UNIT-IV:

Flesh foods - selection, storage, uses and nutritional aspects of meat, fish and poultry, spoilage of fish. Egg- composition & classification of egg & egg products, its nutritive value. Fruits and vegetables: Classifications, composition and importance in human nutrition storage, cooking of vegetables, changes during cooking, effect of heat, acid and alkali.

UNIT-V:

Sugar and Sugar products – Form of sugar and liquid sweetness, Caramelization, Hydrolysis, Crystallization, Indian confectionery. Baking- Types of bake products & its nutritive value. Beverages: Coffee, tea, and cocoa, processing composition and preparation.

References

1. Srilakshmi, B. 2005. Food Science, New Age International (P) Ltd., Publishers, New Delhi.
2. Chemists, St. Paul Mimesota, USA. 4. Charley, H.(1982).Food Science, 2nd edition, John Wiley & Sons, New York.
3. Desrosier, N.W. and James N.(2007).Technology of food preservation. AVI Publishers.
4. Meyer, L.H.1974. Food Chemistry, AVI Publishing Co. Inc,
5. Manay, S. and Shadaksha ramasamy, Food: Facts and Principles, New Age International (P) Publishers, New Delhi.
6. Srilakshmi, B. (2010), Food Science, 5th edition, New age international publishers, New Delhi.

| Semester | Subject Code | Title of The Course | Hours | Credits |
|------------|-----------------|---|----------|----------|
| III | BC914C | Elective III - Bionanotechnology | 4 | 4 |

Course Objectives

- To understand the fundamental principles of nanotechnology and its applications.
- To study about the basic knowledge about nanoparticles and its biological applications.
- To apply engineering concepts and demonstrate a comprehensive understanding of state-of-the-art nano- scale and nano-fabrication methods.
- To evaluate the processing conditions to engineer functional nanomaterials.
- To apply and transfer interdisciplinary approaches to bionanotechnology.

UNIT-I

Bionanotechnology–Concepts, Definitions, Biosystems, Biological networks, Benefits and Applications of Nanotechnology in medicine and agriculture. Nanorobots.

UNIT-II

Biomaterials- Introduction and Types. Biodegradable polymers. Biocompatibility, mechanical properties and Antibacterial Activity. DNA based nanomechanical devices, Biomaterial Nanocircuitry-DNA nanostructures for mechanics, computing and DNA based computation.

UNIT-III

Nanoparticle synthesis using Plants, Bacteria, Fungi and Virus. Metal nanoparticle synthesis and mechanism – Silver, Gold, Copper and Zinc. Magnetic Nanoparticles - Synthesis and Applications.

UNIT-IV

Techniques to construct nanostructures–Scanning probe instruments, nanoscale lithography. Characterisation of nanoparticles: UV -Visible Spectroscopy, FTIR, SEM, TEM, AFM, XRD and DLS.

UNIT V

Nanomedicines, Nanodrug administration. Drug delivery systems and its mechanism–Polymer therapeutics, conjugates, micelles and liposomes. Mechanical testing; elasticity; toughness; effect of fabrication on strength. Dendrimers as nanoparticulate drug carriers.

References

- Nanotechnology: A Gentle Introduction to the Next Big Idea by Mark Ratner and Daniel Ratner, Pearson Education Publishers (2002).
- Nanobiotechnology: Concepts, applications and perspectives by Christ M. Niemayer, Chad A. Mirkin, Wiley VCH publishers (2004).
- Encyclopedia of Nanoscience and Nanotechnology by H.S. Nalwa (Ed.), American Scientific Publishers, California (2004).
- Bionanotechnology: Lessons from Nature by David S. Goodsell, Jhonwiley (2006).
- Lehninger’s Principles of Biochemistry by David L. Nelson and Michael M. Cox, 4th Edition (2006).

Semester IV

| Semester | Subject code | Title of the Course | Hours/Week | Credits |
|----------|--------------|--------------------------------|------------|---------|
| IV | BC1009 | Advanced Clinical Biochemistry | 5 | 5 |

Course Objectives

- To learn about the specimen: composition, collection and various clinical methods.
- To gain the knowledge about metabolic disorders associated with carbohydrate and lipids.

To familiarize with the renal disorders linked with protein metabolism and non-protein nitrogenous constituents.

To understand the functions of liver and its associated disorders.

To understand the oxidative stress and damage to the macromolecules.

UNIT-I

Collection of specimens– Blood collection methods: Vein, Skin and arterial puncture. Collection and analysis of urine samples: Types of urine sample and Physical, Chemical and microscopic examinations, timed urine specimens, preservatives. CSF-Collection, Composition and Analysis. Amniotic fluid-Origin, Collection Composition and analysis.

UNIT-II

Diabetes Mellitus- Insulin receptors, renal threshold value, GTT, Hypo and Hyperglycemia, Galactosemia, Fructosuria, Glycated hemoglobin and Glycogen Storage Disease. Disorders of lipid metabolism- functions, metabolism and abnormalities of Lipoproteins, Lipid storage disease- Sudden infant death syndrome (SIDS), Zellweger’s Syndrome, Niemann Picks disease, Gaucher’s disease, TaySach’s disease, Disorders associated with lipoprotein metabolism – Hyper, Hypo and dyslipoproteinemia.

UNIT-III

Disorders of protein metabolism-Non-protein nitrogenous constituents in blood-Urea, uric acid and creatinine. Plasma protein abnormalities-deficiency, Agammaglobulinemia, Multiple myeloma, Proteinuria, Glomerulonephritis, Nephrotic syndrome. Haemoglobinopathies-Sickle cell anaemia and Thalassemia. Phenylketonuria, Tyrosinosis, Alkaptonuria, Maple syrup urine disease, Hartnup disease, Homocystinuria and Albinism. Serum enzyme activities in diseases- Acid phosphatase, Streptokinase, Asparaginase, Isocitrate dehydrogenase, Ceruloplasmin, γ -Glutamyl transpeptidase, Creatine kinase and Lactate dehydrogenase.

UNIT-IV

Liver function tests, Liver Disorders- Hepatitis types, Non-alcoholic Steatohepatitis, Cirrhosis, Alcoholic liver disease, Hepatic tumor and Biliary tract diseases. Disorders of bilirubin metabolism - Jaundice. Gastric Function Tests. Renal Function Tests and related disorders-Acute and Chronic renal failure, Urinary tract obstruction and analysis of Urinary calculi.

UNIT-V

Free radicals in health and disease-Endogenous and exogenous. Oxidative damages to carbohydrate, protein and fat metabolism. Role of enzymatic and non-enzymatic antioxidants. Cancer-Carcinogenic agents, Morphological and metabolic changes in tumors – Ovarian, breast, GIT, colon, and prostate cancers. Tumor markers- AFP, CEA and hCG.

References

- Fundamentals of clinical chemistry by N.W. Teitz, W.B. Saunders Company, 2nd Edition (1994).
Clinical biochemistry in diagnosis and treatment by Philip. D. Mayne, ELBS Publication, 6th Edition (1994).
Clinical Biochemistry–Metabolic and clinical aspects, William J. Marshall and Stephen K. Bangert, Pearson professional Ltd. (1995).
Textbook of Medical Biochemistry by N. Chatterjee, 4th edition, Rana Shinde–Jaypee publication (2000).
Biochemistry by Zubay, G.L., W.M.C. Brown publishers. New York (2002).

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|-----------------|---------------------|----------------------------|---------------------|----------------|
| | | | | |

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|-----------|---------------|----------------------|----------|----------|
| IV | BC1010 | Biotechnology | 4 | 4 |
|-----------|---------------|----------------------|----------|----------|

Course Objectives

- To impart knowledge on basic tools in genetic engineering.
- To provide knowledge on cloning vectors and DNA sequencing.
- To create awareness on gene transfer and its applications.
- To understand basics on Industrial biotechnology.
- To develop sound knowledge on Bio-safety and bio-hazards.

UNIT-I

Basic Principles–Mechanism of natural gene transfer by *Agrobacterium*, Generation of foreign DNA molecules, Restriction enzymes–Types and target sites, Cutting and joining DNA molecules, linkers, adapters, homopolymers, enzymes used in genetic engineering, cloning vehicles and their properties, natural plasmids, *in vitro* vectors, cosmids and T-DNA based hybrid vectors.

UNIT-II

Cloning strategies–Cloning with single strand DNA vectors, cDNA cloning and gene libraries, Recombinant selection and screening methods, Expression of cloned genes, Shuttle vectors, DNA sequencing strategies–Sanger’s and Maxam-Gilbert’s methods, Applications of PCR and DNA hybridization, Southern, Northern and Western blotting. Chromosome Walking and Jumping, DNA foot printing, DNA finger printing, RFLP, RAPD–Principles, Procedures and Applications.

UNIT-III

Techniques of tissue culture–Culturing explants and haploids, Protoplasts fusion, Methods of gene transfer to plants, animals and bacteria–Ca transfection, electroporation, shotgun, transgenic plants, GM foods, and biopesticides, gene knockouts and transgenic animals and xenografting.

UNIT-IV

Industrial biotechnology- Fermentation, Fermentor-common features and operation for a conventional bioreactor, classification of fermentation, factors affecting fermentation process, media–synthetic and crude media. Industrially important fermentation products.

UNIT-V

Biotechnology–Potential hazards, biological weapons, biosafety of GM foods and GMOs–Substantial equivalence and safety testing, gene drain, the tangled genes. Production of vaccines in animal cells-traditional and recombinant vaccines -subunit vaccines-Hepatitis B, Corona virus, DNA and RNA vaccines.

References

- Glick R. and J. J. Pasternak. 2002. *Molecular Biotechnology* (3rd Edition). ASM Press, Washington, USA.
- Praful. B. Godkar, 2014, *Text book of Medical laboratory technology*; III Edition, Volume I and II, Bhalani Publishing house.
- Verma P.S & V.K. Agarwal, 2003, *Cytology, Genetics, Evolution and Ecology*, S.Chand & Co Ltd., New Delhi.
- K. G. Ramawat and J. M. Merillon (Eds.), 2010, *Biotechnology - secondary metabolites*, Oxford & IBH publishing Co. Pvt. Ltd.

Basic Biotechnology - Ratledge & Kristianeen, Cambridge University press 2nd ed.
 Gene cloning - an introduction by TA Brown, Chapman and Hall.
 Molecular Biotechnology, 2nd ed - Glick & Pasternak, Panima Publications.
 Gene cloning - an introduction by TA Brown, Chapman and Hall.
 Molecular Biotechnology, 2nd ed - Glick & Pasternak, Panima Publications.

| Semester | Subject Code | Title of the Course | Hours / Week | Credits |
|----------|--------------|---|--------------|---------|
| IV | BC1011A | Elective IV - Plant: Biochemistry and Molecular biology | 4 | 4 |

Course Objectives

- To explain and understand the Biochemistry of photosynthetic system.
- To learn and understand the basics of plant cell and its physiology.
- To create awareness on Plant diseases and their metabolism.
- To impart basic knowledge on plant biotechnology.
- To develop sound knowledge on biochemical events associated with growth regulators and herbicide.

UNIT-I

Structure & synthesis of chlorophyll, phycobilins and carotenoids. Photosynthesis: photosystem I & II, Light absorption, Hill reaction, Red drop & Emerson's enhancement effect. Cyclic and non-cyclic photophosphorylation, C2, Calvin cycle, C4 & CAM. Photosynthesis factors and regulation.

UNIT-II

Nitrogen metabolism and plant hormones–Nitrogen cycle Symbiotic and Non-symbiotic nitrogen fixation. Assimilation of ammonium, carbon- nitrogen ratio, Uride metabolism, Nitrate metabolism, genetics of nitrogen fixation, genetic manipulation of nif genes, Biosynthesis, Mode of action, transport, distribution and physiological effects of Auxin, Gibberrilin, Cytokinin, ABA and Ethylene.

UNIT-III

Plant disease and Secondary metabolites. Biochemistry of plant disease, defence mechanism of plants, biosynthesis, distribution and biological functions of industrially important secondary metabolites. Principles of plant disease control.

UNIT-IV

Plant physiology. Water relations of plant, Mechanism of water absorption. Aquaporin Symplast–Apoplast concept. Ascent of sap, Transpiration and Stomatal mechanism. Source and sink relationship, Translocation of Inorganic and Organic substances. Biochemistry of seed dormancy, seed germination, fruit ripening and senescence. Phytochromes– Properties, Photochemicals, transformation, Mode of action and physiological effects.

UNIT-V

DNA polymorphism–Importance of RFLP and RAPD in plant breeding management. Aspects of plant genetic engineering. Tacking, Mapping and Cloning of plant genes and Selectable markers. Reporter genes and promoters used in Plant vectors. Ti plasmids and Crown gall tumor, Genetic engineering of plant for disease resistance, Cytoplasmic Male Sterility, Edible oil, Biodegradable plastics. Delay of fruit ripening.

Reference:

- Ajoy Paul. 2007. Textbook of Cell and Molecular Biology. Books and Allied, Kolkata
- De Robertis and De Robertis. 1990. Cell and Molecular Biology. Saunders, Philadelphia.

Gerald Karp. 2008. Cell and Molecular Biology. (Ed: 5). John Wiley and Sons, New York.
 Handbook of medicinal plants by Prajapathi, Purohit and Sharma kumar.
 Plant Biochemistry by P.M. Dey and J.B. Harborne.
 David Freifelder, 2008. Molecular Biology. (Ed: 2). Narosa Publications. New Delhi.
 Modern Plant Physiology by R.K. Sinha, Narosa Publishing House (2004).
 Plant Physiology by S.N. Pandey and B.K. Sinha, 3rd Edition, Vikas publishing House Pvt., Ltd. (2009).
 Lewin's. 2017. GENES XII. 12th edition. Jones and Bartlett Publishers, Inc; Burlington, Massachusetts, USA.
 Introduction to plant physiology, William. G.Hopkins, Norman. P.A. Hunger, 3rd Edition.
 Biochemistry and Molecular Biology of plants by Buchannan, Grvissem and Jones.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|-------------------------------|-------|---------|
| IV | BC1011B | Elective IV Herbal Technology | 4 | 4 |

Course Objectives

- To learn about the preparation of drugs.
- To know about Herbal remedies for human ailments.
- To evaluate the propagation of medicinal plants.
- To study the Nutritive and medicinal value of fruits.
- To know the applications of Herbal foods.

UNIT-I

Pharmacognosy- Definition, History and Scope. Systems of Indian Medicines–Siddha, Unani, Ayurveda and Homeopathy. Crude drugs – Definition, Classification - Pharmacological and chemical. Chemistry of drugs and its evaluation. Preparation of crude and commercial drugs.

UNIT–II

Herbal preparation–Collection of wild herbs–capsules–compresses- Hydrotherapy, Herbal bath, Herbal oils an tincture. Preparation of herbal syrups, herbal oils and herbal salves. Extraction of phytochemicals–Alkaloids, Volatile oils, Resin and Tannins. Herbal dye and perfumes.

UNIT-III

Traditional knowledge and utility of some medicinal plants–*Ocimum sanctum*, *Solanum trilobatum*, *Cassia auriculata* and *Aloe vera*. Nutritive and medicinal value of some fruits (*Psidium guajava*, *Manilkara zapota*, *Citrus sinensis*, *Citrus limon* and *Punica granatum*) and Green Vegetables–*Moringa*, *Solanum nigrum* and *Brassica oleracea*.

UNIT-IV

Drugs for urogenital disorders- roots of *Withania somnifera*, memory Stimulants – *Centella asiatica*, Kidney stones – *Musa paradisiaca*, Anticancer drugs – *Catharanthus roseus*, Anti-inflammatory drugs – *Cardiospermum* and antipsychoactive drugs - *Salvia divinorum* – basic mechanism of action.

UNIT-V

Propagation of Medicinal plants–Micro and macro propagation, Conservation of rare medicinal plants. Role of biotechnology in medicinal plant banks–Cultivation of medicinal and aromatic plants. Herbal foods– Food processing and packaging.

References

Indian Materia Medica by Nadkarni Bombay: Popular Prakashan (1976).

Glimpses of Indian Ethnobotany by Hemadri, K., Raj, P.V., Rao, S.S. and Rajeswarasarma, C.R., Oxford and IBH, New Delhi (1980).

A text book of Pharmacognosy by Shah, S.C. and Qudary, Elsevier India (1990).

An Introduction to Medical Botany and Pharmacognosy by Kumar N.C., CBS publishers and Distributors (1993).

Pharmacognosy by George Edward Trease and W.C. Evans, 12th Edition, English Language Books Society, (2009).

An introduction to medical botany and Pharmacognocoy. Kumar . N.C. (1993)

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---|-------|---------|
| IV | BC1011C | Elective IV MEDICAL DIAGNOSTIC TECHNOLOGY | 4 | 4 |

Course Objectives

To gain knowledge about good laboratory practices.

To study the collection and preservation of biological specimens.

To evaluate the knowledge of Hematological parameters.

To study about the Microscopic and Macroscopic Examination of Urine and Feces.

To learn culturing of organisms using microbiological techniques.

Unit- I: Specimens: Collection and preservation of Blood, Urine, Faeces, Sputum, Semen, Throat swab and CSF. Good laboratory practices.

Unit-II: Blood: Blood pressure (BP), Clotting time, Bleeding time, Hemoglobin Estimation, RBC count and WBC count, Differential count, Erythrocyte Sedimentation Rate (ESR), Hematocrit value (Packed cell volume) and platelet counting.

Unit-III: Urine: Composition, Preservation, Microscopic and Macroscopic Examination (Physical and Chemical examination)

Unit-IV: Faeces: Composition, Macroscopic and Microscopic Examination, Chemical examination – occult blood and steatorrhea.

Unit-V: Culturing of organism from various specimens (Pus, Urine, Blood, Sputum, Throat Swab), Antibiotic sensitivity test and Gram staining (acid fast, base & neutral). Safety procedures in microbiological techniques.

References

D.Sahu (1997), Critical approach to clinical medicine, Vikas Publishing, Noida.

- Devlin, T.M. (2002), Textbook of Biochemistry with Clinical correlations, 5th edition, John Wiley & Sons Inc, Publications.
- P.D.Mayne (1994), Clinical chemistry in diagnosis and treatment. A Hodder Arnold Publication; 6Rev Ed edition.
- W.J. Marshall and S.K. Bangeit, (1995), Clinical biochemistry - Metabolic concepts and clinical aspects, Churchill Livingstone.
- K.V. Krishna Das, Text Book of Medicine, (1996), Jaypee publication, New Delhi.
- A.C. Guyton and J.E. Hall, (2000), Text Book of Medical PhysiologyHarcourt Asia.
- Guyton (1996) Human Physiology and Mechanisms of Disease. Saunders Publications; 6th edition.
- N.Chatterjee and Rana Shinde (2012) Textbook of Medical Biochemistry - eighth edition, Jaypee publication, New Delhi.
- K. Sampath (1999), Hospital and Clinical Pharmacy, Vikas Publishing. Noida.

CORE PRACTICAL-IV

SEMESTER-III & IV

5 Hrs/Week (5 Credits)

Lab Course IV: Biochemical, Immunological and Molecular Biology Techniques

BIOCHEMICAL ANALYSIS OF BLOOD

- Estimation of Blood Glucose by O-Toluidine method.
- Estimation of Serum Proteins by Bradford's Method.
- Estimation of Plasma Fibrinogen.
- Estimation of A/G ratio in Serum.
- Estimation of Blood Urea by DAM method.
- Estimation of Serum Uric acid by Phosphotungstate method.
- Estimation of Serum Creatinine by Alkaline picrate method.
- Estimation of Serum Triglycerides.
- Estimation of Serum Cholesterol by Zlatkis, Zak and Boyle method.
- Estimation of Serum Phospholipids.
- Estimation of Serum Calcium.
- Estimation of Serum Bilirubin by Evelyn Malloy method.

IMMUNOLOGICAL AND MOLECULAR BIOLOGY TECHNIQUES

1. Grouping of Blood and Rh typing.
2. Determination of Pregnancy.
3. Widal Test.
4. Agarose gel Electrophoresis.
5. Immuno diffusion/Precipitation Methods.
6. ELISA
7. PCR technique

SEMESTER-III & IV

5 Hrs/Week (5 Credits)

CORE PRACTICAL-V

Lab Course V: HAEMATOLOGICAL METHODS

A. HAEMATOLOGICAL METHODS

Collection and Storage of Blood.
Total RBC count.
Total WBC count.
Total Platelet count.
Differential WBC count.
Absolute Eosinophil count.
Determination of Hemoglobin content.
Determination of clotting time.
Determination of ESR.
Pathological examination of Blood film.

B. URINE ANALYSIS

Qualitative analysis of Normal and Pathological constituents in urine.
Microscopic analysis of Urine.
Estimation of Titrable acidity.
Estimate of True acidity.
Estimation of Protein by Biuret method.
Estimation of Urea.
Estimation of Uric acid.
Estimation of Calcium.

BCA

Semester – I

4 Hours/4 Credits

CA107 - DIGITAL COMPUTER FUNDAMENTALS

COURSE OBJECTIVES

- To know and understand the fundamentals of a computer system
- To understand the basics of digital design and number systems
- To learn about combinational gates and k-maps to simplify the Boolean functions
- To know and understand the purpose of sequential circuits
- To learn the purpose of different registers and counters

COURSE OUTLINE

UNIT 1: INTRODUCTION TO COMPUTERS

Introduction: Characteristics of Computers – Evolution of Computers – Computer Generations. Basic Computer Organization: Input and Output Unit – Storage Unit – ALU – CU – CPU. Processor: Central Processing Unit – Memory: Main memory - Secondary Storage: Magnetic Tape, Magnetic Disks, Optical Disks, Main storage devices.

UNIT 2: BASICS OF DIGITAL DESIGN

Binary Systems: Digital Computers and Digital Systems - Binary Numbers - Number Base Conversions - Octal and Hexadecimal Numbers – Complements - Signed Binary Numbers - Binary Codes - Binary Storage and Registers - Binary Logic - Boolean Algebra and Logic Gates: Basic Theorems and Properties of Boolean Algebra - Boolean Functions - Canonical and Standard Forms - Digital Logic Gates - IC Digital Logic Families.

UNIT 3: K-MAPS AND COMBINATIONAL CIRCUITS

Simplification: K-Map Method – Two, Three Variable Maps - Table Method - Don't Care Conditions - NAND, NOR Implementation. Combinational Logic Circuits: Introduction - Design Procedure – Adders – Subtractors - Code Conversion – Analysis Procedure - Binary Parallel Adder – Decoders – Encoders - Multiplexers – Programming Logic Array (PLA).

UNIT 4: SEQUENTIAL CIRCUITS

Sequential Logic: Flip-Flops - Triggering of Flip-Flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure – Design of Counters.

UNIT 5: DIGITAL COMPONENTS

Registers and Counters: Registers, Shift Registers, Ripple Counters, Synchronous Counters – Timing Sequence – The Memory Unit – Examples of Random Access Memories.

3. TEXTBOOKS

Pradeep K. Sinha, Priti Sinha, “Computer Fundamentals”, Sixth Edition. BPB Publications.

UNIT 1: Ch.1, 2, 7 & 8

M. Morris Mano, “Digital Logic and Computer Design”, 3rd edition, Pearson Education, Delhi, 14th Impression 2012.

UNIT 2 : Ch.1 & 2

UNIT 3: Ch. 3, 4 & 5

UNIT 4: Ch. 6

UNIT 5: Ch. 7

4. REFERENCES

- Anita Goel, “Computer Fundamentals”, Pearson India, 2010
Donald P Leech, Albert Paul Malvino and Goutam Saha, “Digital Principles and Applications”, Tata Mc Graw Hill, 2007.
Bartee, “Digital Computer Fundamentals”, Tata McGraw Hill Publications.
Malvino, “Digital Computer Electronics”, Tata McGraw Hill Publications

5. WEB REFERENCES

- https://www.tutorialspoint.com/digital_circuits/index.htm
<https://www.javatpoint.com/digital-electronics>
https://www.electronics-tutorials.ws/logic/logic_1.html

6. SUPPLEMENT LEARNING

- Four, Five, Six K-Maps
RAID storage devices
Computer Languages
Data Representation
Computer Arithmetic

Semester – I

4 Hours/4 Credits

CA108 - INTERNET CONCEPTS AND WEB DESIGN

COURSE OBJECTIVES

- To know the concept of basics of Internet.
To become knowledgeable in Fundamentals of Html
To ensure that the students have a basic understanding of creating Forms and Frames.

To understand the concept of Cascading Style Sheet.

To be aware of the method of Java Script.

COURSE OUTLINE

UNIT 1: INTERNET CONCEPTS

Introduction to Internet: Internet history – Internet Access –Internet Services and Features - TCP/IP – Telnet – Changing the Password – WWW – Web Page – Net Surfing – Web Browser – Internet Addressing – Internet Protocols – Searching the Web: Web Index – Web Search Engines – Meta Search Engines – Directories – Specialized Directories – Electronic Mail – E mail messages – Managing Mails – Signature Feature - Advantages and Disadvantages of E mail.

UNIT 2: BASICS OF HTML

Core Elements and Attributes: <html> Element, <head> Element, <title> Element<body> Element – Basic Text Formatting: Creating Paragraph – Creating Line Breaks – Creating Preformatted Text-Presentational Elements – Phrase Elements – Lists –Links: Linking to other Documents – Linking to E-mail Addresses –Creating Links with the <a> Element – Images: Adding Images to your site – Using images as Links – Tables: Basic table Elements and Attributes - Rowspan – Colspan.

UNIT 3: FORMS AND FRAMES

Forms Introduction: Creating a Form with the <form> Element – Action Attribute – Method attribute – Id Attribute – Name Attribute - Onsubmit Attribute - Onreset Attribute - Form Controls: Text inputs – Buttons – Check boxes – Radio Buttons – Select Boxes – File Select Boxes. Frames: Introducing the Frameset - The <Frameset> Element: Cols Attribute - rows Attribute – The <Frame> Element: The src Attribute – The name Attribute – The Frame Border Attribute – The margin width and height attribute - Creating Links between Frames

UNIT 4: CSS

CSS Introduction- CSS Rules: The <link> and <style> Element – CSS Properties: Controlling Fonts – Text Formatting –CSS3: CSS Rounded Corner – Border Images – Multi Background –Color – Gradients –Shadow – Text - 2D and 3d Transform.

UNIT 5: JAVASCRIPT

Jscript: Introduction –Adding a script to your Pages: Comments in a Javascript – The <noscript> Element - The Document Object Model: Objects, Methods and Properties – The Forms Collection - Form Elements - Starting to Program with JavaScript: Variables – Operators – Functions – Conditional Statements – Working with Javascript: Form Validation.

3. TEXTBOOKS

Dr. Raymond Nancy Philip, “A TEXTBOOK of Internet and Web Designing”, First Edition, 2017

Unit 1: Ch 1.1-1.4, 1.8–1.10, 1.13 – 1.17, 2.1- 2.10

Jon Duckett, “Beginning Web Programming with HTML, XHTML and CSS”, 2nd Edition, 2008.

Unit 2: Ch 1,2,3,4

Unit 3: Ch 5, 6

Unit 4: Ch 7

Unit 5: Ch 11, 12

4. REFERENCES

Joel Sklar. Principles of Web Design. Singapore: Thomson Asia Pvt. Ltd, 2000 Powell, Thomas A. Web Design – The Complete Reference. Tata McGraw Hill Edition, 2000.

5. WEB REFERENCES

www.jquery.com

www.w3schools.com

www.hscripts.com

<http://www.html5andcss3.org/http://www.tutorialspoint.com/html5/>

<http://www.html-5-tutorial.com/>

https://www.tutorialspoint.com/css/css3_tutorial.htm

Online Tutorial

<https://edu.gcfglobal.org/en/internetbasics/what-is-the-internet/1/>

<https://www.w3schools.com/html/>

Online Quiz

<https://www.geeksforgeeks.org/html-course-practice-quiz-1/>

https://www.w3schools.com/css/css_quiz.asp

Online Compiler

https://www.tutorialspoint.com/online_html_editor.php

https://www.w3schools.com/js/js_editor.asp

6. SUPPLEMENT LEARNING

Network

Meta Tag

Div Tag

Lay outs

Responsive Web Design (RWD)

Semester – I

2 Hours/2 Credits

PCA104 - PRACTICAL - I: INTERNET CONCEPTS AND WEB DESIGN

Basic HTML tags

Background color and Images

HTML Link and List

HTML Tables and Frames

HTML Form Controls

CSS Inclusion and Properties

CSS 2D and 3D Transform

Jscript – Variables, constants, functions

Jscript – Methods and Functions

Jscript Validation

Semester – II

4 Hours/4 Credits

CA207 - PROGRAMMING WITH C

COURSE OBJECTIVES

To enhance their analyzing and problem-solving skills and use the same for writing programs in C.

To develop logics and that will help them to create programs, applications in C.

To identify programming task involved in a given computational problem.

To identify tasks in which the numerical techniques learned are applicable and apply them to write programs.

COURSE OUTLINE

UNIT – I: INTRODUCTION OF C PROGRAMMING

Steps Involved in Computer Programming – Problem Definition – Outlining The Solution – Flow Chart – Developing Algorithms - Structure of a C program – Basic data types– constants and variables – operators and expressions – Control Constructs (if, switch, while, do...while, for, break and continue, exit function, goto and label).

UNIT – II: ARRAYS AND FUNCTIONS

Arrays (declaration, one and two dimensional arrays) - Character Arrays and Strings. Function Fundamentals (General form, Function Definition, Function arguments, return value) – Parameter passing: call-by-value and call-by-reference – Recursion – Passing Arrays to Function – Passing Strings to Function.

UNIT – III: POINTERS

Understanding Pointers – Accessing the Address of a Variable – Declaring the Pointer Variables – Initialization of Pointer Variables – Accessing a Variable through its Pointer – Pointer Expressions – Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments – Functions returning Pointers – Pointers to Functions.

UNIT – IV: STORAGE CLASSES, STRUCTURES AND UNIONS

Scope rules (Local variables and global variables, scope rules of functions) -Type modifiers and storage class specifier. Structures – Basics of Structure – Declaring of Structure – Referencing Structure elements - Array of Structures – Nesting of Structures - Passing Structures to function – Pointers and Structures - Unions.

UNIT – V: FILE MANAGEMENT IN C

Introduction – Defining and Opening a File – Closing a File – Input / Output Operations on Files – Command Line Arguments.

TEXTBOOK

E. Balagurusamy, “Programming in ANSI C”, Seventh Edition, McGraw Hill Education Private Limited, New Delhi: 2017.

Unit – I: Ch. 1 – 6

Unit – II: Ch. 7 – 9

Unit – III: Ch. 11

Unit – IV: Ch. 10

Unit – V: Ch. 12

REFERENCES

Yashavant Kanetkar, “Let us C”, BPB Publications, Tenth Edition - New Delhi: 2010

Ashok N. Kamthane, “Programming in C”, Second Impression, Pearson: 2012.

WEB REFERENCES

<http://www.c4learn.com/?gclid=COK1y6nHk7wCFcUA4godmlgAKA/>

<http://www.cprogramming.com/tutorial/c-tutorial.html/>

<http://www.tutorialspoint.com/cprogramming/>

SUPPLEMENT LEARNING

Command Line Arguments

Recursive Algorithm

Semester – II

4 Hours/4 Credits

CA208 - OPERATING SYSTEM

1. COURSE OBJECTIVES

To study the basic concepts of operating systems and the design of operating system

To understand various CPU scheduling algorithms, Process synchronization and the deadlocks.

To learn the memory management, paging and segmentation techniques.

To be aware of the concepts of file system, allocation methods and Free space management.

To understand the concepts of disk scheduling.

2. COURSE OUTLINE

UNIT I: INTRODUCTION

Operating System Definition - Computer Organization, – Computer System Architecture – Operating System Structure – Operating System Operations – Computing Environments – Open Source Operating Systems – Operating System Services – User and Operating System – System Calls – Types of System Calls – System Programs – Operating System Design and Implementation – Operating System Structure.

UNIT II PROCESS MANAGEMENT

Process Concept - Process Scheduling - Operations on Processes – Inter Process Communication – CPU Scheduling basic Concepts - Scheduling Criteria – Scheduling Algorithms – Multiple Processor Scheduling.

UNIT III PROCESS SYNCHRONIZATION & DEADLOCK

Background - The Critical-Section Problem - Synchronization Hardware - Semaphores – The Readers Writers Problem – Dining Philosophers Problem - Critical Regions – Deadlock Concepts and Characterization - Methods for Handling Deadlocks – Deadlock Prevention and Avoidance – Detection and Recovery from Deadlock.

UNIT IV MEMORY MANAGEMENT

Background - Swapping - Contiguous Memory Allocation – Paging – Structure of the Page Table - Segmentation - Segmentation with Paging - Virtual Memory: Background - Demand Paging, Page Replacement.

UNIT V FILE SYSTEM

File Concept - Access Methods - Directory and Sisk Structure – File System Mounting - File Sharing - Protection - File-System Structure - File-System Implementation – Directory Implementation - Allocation Methods - Free-Space Management - Mass Storage: Overview of mass storage - Disk Structure - Disk Attachment - Disk Scheduling.

3. TEXTBOOK

Silberschatz and Galvin, “Operating System Concepts”, 9th Edition, John Wiley & Sons Inc., 2016

UNIT I : Chapter 1,2

UNIT II: Chapters 3, 5

UNIT – III: Chapters 6

UNIT IV: Chapters 7, 8

UNIT V: Chapter 9,10,11

4. REFERENCES

Deitel Harvey M., “Operating Systems”, 2003, Pearson Education Publications, Singapore.

Godbole Achyut S., “Operating Systems”, 2002, Tata McGraw Hill Publishing Company Limited, New Delhi.

Milan Milankovic, “Operating System-Concepts and Design”, 2005, Tata McGraw Hill Publishing Company Limited, New Delhi.

Tanenbaum Andrew S. & Woodhull Albert S., “Operating Systems – Design and Implementation”, 2002, Pearson Education Publications, Singapore.

William Stallings, “Operating Systems – Internals and Design Principles”, 2006, Pearson Education Publications, Singapore.

5. WEB REFERENCES

<http://www.cs.nthu.edu.tw/~ychung/slides/CSC3150/Abraham-Silberschatz-Operating-System-Concepts---9th2012.12.pdf>
https://repository.dinus.ac.id/docs/ajar/Operating_System.pdf

6. SUPPLEMENT LEARNING

- Distributed Operating System
- Distributed Storage Systems
- Mobile Operating Systems
- Operating System Security

Semester – II

2 Hours/2 Credits

CA207 - PROGRAMMING WITH C

- Data types
- Operators and Expressions
- Decision making statement
- Looping statement
- Arrays
- Functions
- Structures
- Unions
- Pointer
- Files

| Semester | Course Code / Name of the Course | L | P | C | CA | SEM |
|-----------------|---|----------|----------|----------|-----------|------------|
| III | CA313 - Programming with JAVA | 4 | 0 | 5 | 50 | 50 |

COURSE OVERVIEW

Java is known for reliability, maintainability and ease of development. Its unique architecture enables programmers to develop a single application that can seamlessly run across multiple platforms. The course introduces object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. To build confidence among the learners to construct robust applications that use Java’s object-oriented features.

PREREQUISITES

Fundamental knowledge on algorithms and programming.

COURSE OUTLINE

UNIT – I : BASIC CONCEPTS

Foundations of Java – Java Essentials: Elements – Java API – Variables and Literals – Data types – String Classes – Operators – Constants - Comments – Control Statements – Arrays – String Handling

UNIT – II : CLASSES AND OBJECTS

Classes and objects – General form, creation, constructors, constructor overloading, copy constructor, “this” keyword, Static members, finalize method, Inner class and anonymous classes, Inheritance – inheriting, abstract classes and final classes, Interfaces – structure, implementation, interface inheritance.

UNIT – III : PACKAGES, EXCEPTION HANDLING AND THREADING

Packages – Package Hierarchy, Import Statement, Hiding the Classes, Access Control Modifiers, Exception Handling – Default Exception – User Defined Exception Handling, Exception and Error Classes, Throw and Throws. Threading – Life Cycle, Creating and Running, Methods in Thread Class, Priority Thread, Synchronization, Dead Lock, Inter Thread Communication.

UNIT – IV : APPLETS AND AWT

Applets – Life Cycle - Applet Class – Developing Applet Program – Passing values through parameters – Graphics in Applet – Event Handling – GUI - AWT Components: Frames, panels, dialog boxes, FileDialog – Layout Managers, labels, textfields, buttons, checkbox, radio buttons, choice lists, lists, scrollbars, menu bars and menu items.

UNIT - V: SWING

SWING – Component Classes – JFrame – JPanel – JPasswordField – Jtable – JoptionPane – JtabbedPane – Jtree – JProgressBar – JfileChooser – JcolorChooser – Jslider - Developing SWING Application.

TEXTBOOK

Sagayaraj, Denis, Karthik and Gajalakshmi, “Java Programming for Core and advanced Learners”, Universities Press, 2018

Unit – I : Ch. 1, 2, 3, 5, 6

Unit - II : Ch. 4, 7, 8, 9, 10, 11

Unit - III : Ch. 16

Unit – IV : Ch. 12, 13

Unit – V : Ch. 13, 14

REFERENCES

C. Muthu, “Programming with Java”, Tata McGraw Hill, 2006.

Herbert Schildt, “The Complete Reference – Java 2”, 4th Edition, Tata McGraw Hill, 2001.

Balaguruswamy, “Programming with JAVA”, Tata McGraw Hill, 1999.

WEB REFERENCES

Online Tutorial

<http://www.tutorialspoint.com/java/>

<http://javabeginnerstutorial.com/core-java/>

Online Quiz

https://www.tutorialspoint.com/java/java_online_quiz.htm

<http://withoutbook.com/OnlineTestStart.php?quizId=2>

Online Compiler

<https://www.codechef.com/ide>

https://www.tutorialspoint.com/compile_java_online.php

SUPPLEMENT LEARNING

Keyboard Inputs

Multidimensional Arrays

Exception Catch Block search pattern

JDBC Connections

Files creation and Random Access Files

| Semester | Course Code / Name of the Course | L | P | C | CA | SEM |
|----------|--|---|---|---|----|-----|
| III | CA315 A - Discipling Specific Elective – I – Angular JS | 3 | 0 | 3 | 50 | 50 |

COURSE OVERVIEW

The objective of this course is to create web applications that depend on the Model-View-Controller Architecture, and decline the reliance on JavaScript required to functionalize web applications. AngularJS is a structural framework for creating dynamic web applications. HTML is a great declarative language for static pages. It does not contain much for creating a dynamic application. So Angular JS filling that gap. Angular's data binding and dependency injection eliminate much of the code than we would actually write. The best part is that it all happens in the browser by making it an ideal partner with any server technology.

PREREQUISITES

Working knowledge of HTML and JavaScript

COURSE OUTLINE

UNIT – I : INTRODUCTION TO ANGULAR JS

Introduction to Angular JS - JavaScript Client-Side Frameworks - Single-Page Applications - Bootstrapping the Application - Dependency Injection - Angular JS Routes - HTML5 Mode - Modern Search Engines - Angular JS Templates - Angular JS Views (MVC) - Angular JS Models (MVC) - Angular JS Controllers (MVC) - Controller Business Logic - Integrating Angular JS with Other Frameworks - Testing Angular JS Applications.

UNIT – II : IDE AND ANGULAR JS PROJECTS

The IDE - Editing the HTML Code - Editing the JavaScript Code - Creating the Templates- Running the Applications - Testing Angular JS Applications in the IDE – JsTestRunner - Karma Test Runner – Protractor.

UNIT – III : MVC AND ANGULAR JS

Angular JS Controllers – JS Test Drivers – Testing with Karma – End-to-End Testing with Protractor – Angular JS Models – Services and Business Logic – Angular JS Directives

UNIT – IV : ANGULAR JS VIEWS AND BOOTSTRAP

Angular JS Templates - Creating the Blog Project - Adding a New Blog Controller - Adding a New Blog Template- Twitter Bootstrap - Adding a Bootstrap Menu - Adding Mock Blog Data - Using CSS3 to Style the Page - Adding Styles and Presentation Logic - Viewing the Blog Post - Running the Blog Application – Angular JS and REST Services.

UNIT - V: ANGULAR JS SECURITY AND SEO

Authentication - Adding a Login Service - Adding a Login Controller - Security Modifications to Other Controllers - Adding a Logout Controller - Adding a Login Template - Adding New Routes - Adding a Logout Link - Running the Blog Application – MEAN Cloud and Mobile – Angular JS and SEO

TEXTBOOK

Ken Williamson (O'Reilly). "Learning Angular JS", by Copyright 2015 Ken Williamson.

Unit – I: Ch. 1

Unit – II: Ch. 2

Unit – III: Ch. 3, 4, 7, 8, 9

Unit – IV: Ch. 5, 6

Unit – V: Ch. 10, 11, 12

REFERENCES

AsimHussain, "Angular: From to Practice". CodeCraft, 1st Edition, 2017

WEB REFERENCES

<https://angularjs.org>

<https://docs.angularjs.org>

<https://www.w3schools.com/angular>

SUPPLEMENT LEARNING

Moderate knowledge of HTML, CSS and JavaScript

Basic MVC Concepts

JavaScript Events, Functions and Error Handling

| Semester | Course Code / Name of the Course | L | P | C | CA | SEM |
|----------|---|---|---|---|----|-----|
| III | CA315B - Discipline Specific Elective – I : Object Oriented Analysis and Design | 3 | 0 | 3 | 50 | 50 |

COURSE OVERVIEW

Object-oriented analysis and design is a technical approach for analyzing and designing an application, system, or business by applying object-oriented programming, as well as using visual modeling throughout the software development process to guide stakeholder communication and product quality.

PREREQUISITES

Basic understanding of computer programming, OOPs and programming paradigms.

COURSE OUTLINE

UNIT – I: MODELING IN GENERAL

Introduction to OO development - Modeling Concepts: Modeling – Abstraction - The Three Models – Overview of Unified Modeling Language and introduction to UML diagrams. Class Modeling: Object and Class Concepts – Link and Association - Inheritance - Advanced Class Modeling: Advanced Object & Class Concepts - Association Ends -N-ary Associations – Aggregation – Abstract Classes – Multiple Inheritance –Metadata – Reification – Constraints - Derived Data – Packages.

UNIT – II: STATE MODELING

State Modeling: Events – States – Transitions & Conditions - State diagrams - State Diagram Behavior - Advanced State Modeling: Nested State Diagrams - Nested States – Signal Generalization – Concurrency - Sample State Model - Relation of Class & State Models.

UNIT – III: INTERACTION MODELING

Interaction Modeling: Use Case Models – sequence Models – Activity Models – Advanced Interaction Modeling: Use Case Relationship – Procedural sequence Models – Special Constructs for Activity

Models.

UNIT – IV: SYSTEM ANALYSIS AND DESIGN

Process Overview: Development Life Cycle – System Conception : Devising a System Concept – Elaborating a Concept – Preparing a problem statement. System Design : Overview of system Design – Estimating performance – Making a Reuse plan – Breaking a system into Subsystems – Identifying Concurrency – Allocation of Subsystems – Management of Data Storage – Handling Global Resources – Class Design.

UNIT – V: IMPLEMENTATION

Overview of implementation – fine-tuning classes- fine tuning generalizations – realizing associations – testing – Databases: Introduction – Implementing structure basic and advanced – implementing functionality – object oriented databases.– StarUML (OpenSource)

TEXTBOOK

Michael Blaha and James Rumbaugh, “Object-Oriented Modeling and Design with UML”,
Prentice Hall of India Private Limited, New Delhi,2006.

Unit– I: Ch. 1 – 4

Unit– II : Ch. 5 – 6

Unit– III: Ch. 7 – 8

Unit– IV: Ch. 10, 11-15

Unit– V: Ch. 17, 19

REFERENCES

Ali Bahrami, “Object-oriented Systems Development using UML”, McGraw Hill, Boston,1999.
Satzinger Jackson Burd, “Object Oriented Analysis and Design”, First Edition 2005.
Ivan Jacobon, Christerson Johnson, “Object Oriented Software Engineering”, Fifth Edition,
Pearson publication,2000.

WEB REFERENCES

Online Tutorial

http://dev.tutorialspoint.com/object_oriented_analysis_design/index.htm

<http://oaduml.com/>

https://onlinecourses.nptel.ac.in/noc16_cs19/preview

Online Quiz

<https://gcc.gnu.org/onlinedocs/>

<http://interviewquestionsanswers.org/quiz/Designing/Object-Oriented-Analysis-and-Design-OOAD>

StarUML Tool

<https://staruml.io/>

SUPPLEMENT LEARNING

Domain Analysis

Application Analysis

Databases

Iterative Development

Legacy Systems

| Semester | Course Code / Name of the Course | L | P | C | CA | SEM |
|-----------------|--|----------|----------|----------|-----------|------------|
| III | CA315C - Discipline Specific Elective – I :- System Analysis and Design | 3 | 0 | 3 | 50 | 50 |

COURSE OVERVIEW

Systems Analysis and Design is an active field in which analysts repetitively learn new approaches and different techniques for building the system more effectively and efficiently. The primary objective of systems analysis and design is to improve organizational systems. This course provides a basic understanding of system characteristics, system design, and its development processes.

PREREQUISITES

Problems solving skills and basics on software designs.

COURSE OUTLINE

UNIT – I : INTRODUCTION TO SYSTEM ANALYSIS AND DESIGN

Introduction to Information System Development: System Analysis and design- Business system concepts – Categories of Information systems – System Development Strategies - Managing the application development portfolio.

UNIT – II : SYSTEM REQUIREMENT AND STRATEGIES

Tools for determining system requirement: Requirements determination – Fact finding techniques Tools for documenting procedure and decision. Structured Analysis development strategies: Structured analysis – Developing Data flow diagram. Computer Aided systems tools: Role of tools – Categories of automated tools – CASE Tools – Benefits of CASE.

UNIT – III : DESIGN TRANSITION

The Analysis to design transition: Specifying application requirements – Objectives in designing Information systems – Features - Design of computer output: How to identify computer Output needs –

Designing visual Display output. Design of input and control: What concerns guide input design – Capturing data for input – Input validation.

UNIT – IV : DESIGN OF ONLINE DIALOGUE AND AUXILIARY STORAGE DEVICES

Design of online dialogue: Online difference – Interface – Designing dialogue – Dialogue strategy – Data entry dialogues- Design of files and use of auxiliary storage devices: Basic file terminology – Data structure Diagrams – Types of files – Methods of file organization.

UNIT – V : SYSTEMS ENGINEERING AND QUALITY ASSURANCE

Systems engineering and Quality assurance: Design objectives – Program structure charts – Design of software – Managing Quality assurance – Managing testing practices. Managing system implementation: Training Conversion – post Implementation review, Managing information systems development: Estimation and management of development time –Estimation Personnel and development management. Hardware and Software selection: Hardware selection – Software Selection.

TEXTBOOK

- i) James A.Senn, “Analysis and Design of Information Systems”, Second Edition, TMH, New Delhi.

Unit – I:Ch. 1

Unit – II :Ch. 3 – 6

Unit – III :Ch. 7 – 9

Unit – IV :Ch. 10, 11

Unit – V:Ch. 14 – 17

REFERENCES

I.T. Hawryszkiewicz, “Introduction to System Analysis and Design”, Third edition, Prentice Hall India, New Delhi.

Elias M. Awad, “System Analysis and Design”, Second edition, Galgotia Publications (P) Ltd., 1999.

WEB REFERENCES

Online Tutorial

www.w3computing.com/systemsanalysis/

www.tutoruniverse.com/system-analysis-design-online-tutoring.html

Online Quiz

www.indiabix.com › Engineering › Computer Science

<http://withoutbook.com/OnlineTestStart.php?quizId=42>

SUPPLEMENT LEARNING

Web based Development Design

Structured Analysis and Design
 Temporal Semantic Data Models
 Financial Information System Design
 System Security Analysis and Design

| Semester | Course Code / Name of the Course | L | P | C | CA | SEM |
|----------|--|---|---|---|----|-----|
| III | PCA307 - Practical – III – Programming with JAVA | 0 | 3 | 4 | 50 | 50 |

COURSE OBJECTIVES

The course introduces object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. To build confidence among the learners to solving real world problems using java collection frame work.

PREREQUISITES

Fundamental knowledge on algorithms and basic programming skills.

COURSE OUTLINE

Data types, variables, Control Statements, loops

Arrays

Class and Objects

Constructors

Inheritance and Interface

Exception Handling

Applet: Labels, textbox, button, list box, panels.

SWING Containers: Panel, tabbed pane, split pane, scroll pan, desktop pane, tool bar

SWING controls: Label, button, text box, radio button, progress bar, check box, combo box, group box

SWING Menu Controls: Menu, file chooser, color chooser, Dialog, frame, option pane.

| Semester | Course Code / Name of the Course | L | P | C | CA | SEM |
|----------|--|---|---|---|----|-----|
| IV | CA413 - Enterprise Applications Using .NET | 3 | 0 | 4 | 50 | 50 |

COURSE OVERVIEW

This course covers the practical aspects of multi-tier application development using the .NET framework. The goal of this course is to introduce the basics of distributed application development. And lead the Web Service development and .NET remoting. Technologies covered the Common Language Runtime (CLR), .NET framework classes, C#, ASP.NET, and ADO.NET. And also covers service oriented architecture, design, performance, security, content managements systems and deployment issues encountered in building multi-tier distributed applications.

PREREQUISITES

Basic Programming skills, OOPs concepts, UI controls

COURSE OUTLINE

UNIT – I : INTRODUCTION TO C#

Introduction to .NET – Features of C# - Data Types – Value Types – Reference Types - Variables and Constants – Declaring – Assigning values – variables of nullable types – Operators – Type Conversions – Implicit and Explicit Type Conversions – Arrays – Single Dimensional and Multidimensional – Control Flow Statements – Selection – Iteration and Jump – Classes and Objects – Access Modifiers – Defining a Class – Variables – Properties and Methods – Creating Objects – Inheritance – Polymorphism- Constructor and Destructors.

UNIT – II : WINDOWS FORMS

Windows Forms – Form Class – Common Operations on Forms – Creating a Message Box –Handling Events – Mouse Events – Keyboard Events – Common Controls in Windows Forms – Label – TextBox – Button – Combo Box – List Box – Check Box – Radio Button – Group Box – Picture Box – Timer – Open File Dialog – Save File Dialog – Font Dialog – Color Dialog – Print Dialog – Tree View – Menu.

UNIT – III : WEB FORMS

Setting up ASP.NET and IIS - .NET Architecture - IIS manager - Creating a Virtual Directory-Virtual Directories and Applications - Folder Settings - ASP.NET Applications – File Types – The bin Directory Application Updates – A Simple Application - The Page Lifecycle. – Input Controls – Display Controls – Action Controls – Selection Controls

UNIT –IV : VALIDATION AND RICH CONTROLS

Validation and Rich Controls – The Calendar Control – Formatting the Calendar – Restricting Dates – The AdRotator – Validation Controls – Validation Process Validation Classes – Server Side Validation – Manual Validation – Understanding Regular Expressions – Literals and Metacharacters – Finding a Regular Expression.

UNIT-V : DATA ACCESS

About ADO.NET-Data objects-Simple Data access – Simple Data Updates – Creating a Connection – Defining a Select Command – Using a Command with a DataReader – Updating Data – Selecting Multiple Tables – Grid View – Reporting Plugins.

TEXTBOOKS

Kogent Solutions, “ C# 2008 Programming Black Book”, Dream Tech Press, New Delhi, Platinum Edition, 2009

Unit – 1: Ch. 3 - 6

Unit – II: Ch. 8

Mathew MacDonald, “ASP.NET: The Complete Reference”, Tata McGraw Hill Publishing Company Ltd., New Delhi 2018.

Unit – III: Ch. 7

Unit – IV: Ch. 9

Unit – V: Ch. 13

REFERENCES

Rebecca M.Riordon, “Microsoft ADO .Net 2.0 Step by Step”, Prentice Hall of India Private Limited, New Delhi, 2007.

VikasGupta , “Comdex .NET Programming “ , Dream Tech Press, New Delhi, 2011.

David S.Platt , “Introducing Microsoft .Net”, Prentice Hall of India(Private) Limited, Third Edition, New Delhi, 2006.

Stephen Walther,” ASP.NET 2.0 Unleashed”, Second Edition, Pearson Education, 2005.

WEB REFERENCES

<http://csharp.net-tutorials.com/index.php>

<http://csharp.net-tutorials.com/classes/introduction/>

<http://www.homeandlearn.co.uk/csharp/csharp.html>

<http://www.indiabix.com/c-sharp-programming/questions-and-answers/>

<https://www.wiziq.com/online-tests/43860-c-basic-quiz>

http://www.compileonline.com/compile_csharp_online.php

SUPPLEMENT LEARNING

ASP.NET Administrative Tasks

AJAX extensions, Working with XML data

WCF, SQL Basics

| Semester | Course Code / Name of the Course | L | P | C | CA | SEM |
|----------|--|---|---|---|----|-----|
| IV | CA414 - Relational Database Management | 3 | 0 | 4 | 50 | 50 |

| | | | | | | |
|--|----------------|--|--|--|--|--|
| | Systems | | | | | |
|--|----------------|--|--|--|--|--|

COURSE OVERVIEW

The RDBMS is the most popular database system which facilitates functions to maintain the security, accuracy, integrity and consistency of the data. RDBMS provides methods for storing and retrieving large amounts of data and uses Structured Query Language (SQL) to access the database. The objective of the course is to present an introduction to database management systems and how to organize, maintain and retrieve information efficiently and effectively from a DBMS.

PREREQUISITES

Basic knowledge about the data organization and data storage.

COURSE CONTENT

UNIT – I : BASIC CONCEPTS AND DATA MODELS

Basic Concepts: Data modelling for database - The three level architecture proposal for DBMS – Components of DBMS - Advantage and Disadvantage of a DBMS. Data Models: Data Models Classification - Entity Relationship Model – Relational Data Model – Network Data Model - Hierarchical Model - Comparison.

UNIT – II : INTRODUCTION TO SQL

Overview of SQL Query Language – SQL Data Definition – Basic Structure of SQL Queries – Additional Basic Operations – Set Operators – Null Values – Aggregate Functions – Nested Sub queries – Modification of the Databases.

UNIT – III : ADVANCED SQL

Join Expressions - Views – Integrity Constraints – Authorization – Stored Procedures and Functions – Indexing: Basic Concepts.

UNIT – IV : DATABASE DESIGN AND E-R MODEL

Overview of the design process – The Entity-Relationship Model – Constraints – Entity – Relationship – Entity-Relationship Diagrams – Entity Relationship design issues – Extended E-R Features – Other aspects of Database Design.

UNIT – V : RELATIONAL DATABASE DESIGN

Features of Good Relational Designs – Atomic Domains and First Normal Form – Decomposition using Functional dependencies – Decomposition using Functional Dependencies – Decomposition using Multivalued Dependencies – More Normal Forms.

TEXT BOOKS

Bipin C Desai, “An Introduction to Database System”, Galgotia Publications Pvt.Ltd, New Delhi 1999.

UNIT – I: Ch.1.1, 1.4 - 1.6, 2.3 - 2.4 & 2.6 - 2.9

Abraham Silberschatz , Henry F Korth, S Sudharshan , “Database System Concepts” MC Graw Hill, 6th Edition 2013.

UNIT – 2: Ch. 3, 4

UNIT – 3: Ch. 4.1, 4.2, 4.4, 4.6, 5, 11.1

UNIT – 4: Ch. 7

UNIT – 5: Ch. 8

REFERENCES

Peter Rob, Carlos Coronel, “Database Systems – “Design, Implementation and Management”c, GalgotiaPublicaitons.

C.J. Date, “Introduction to Database System”, Vol 1, Narosa Publishing House, New Delhi.

S. K. Singh, “Database Systems”, Third Edition. 2009.

Ramakrishnan. Gehrke, “Database Management Systems”, International Edition, 2003.

RajeshkharSunderraman, “Oracle 8 Programming A Primer”, Addition Wesley Publication, New Delhi, 2000.

WEB REFERENCES

Online Tutorial

<https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm>

<http://searchoracle.techtarget.com/tutorial/Learning-Guide-RDBMS-fundamentals>

Online Quiz

<https://www.quia.com/quiz/164512.html>

<https://www.wiziq.com/online-tests/22152-rdbms-concepts>

Online Compiler

https://www.tutorialspoint.com/execute_sql_online.php

<https://kripen.github.io/sql.js/GUI/>

SUPPLEMENT LEARNING

SQL Wild cards

Temporary Tables, Clone Tables

Using Sequences, Handling Duplicates

| Semester | Course Code / Name of the Course | L | P | C | CA | SEM |
|----------|----------------------------------|---|---|---|----|-----|
|----------|----------------------------------|---|---|---|----|-----|

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|-----------|---|----------|----------|----------|-----------|-----------|
| IV | PCA406 - Practical – IV : Enterprise Applications Using .NET | 0 | 2 | 2 | 50 | 50 |
|-----------|---|----------|----------|----------|-----------|-----------|

COURSE OVERVIEW

This course covers the practical aspects of multi-tier application development using the .NET framework. The goal of this course is to implement the console-based applications, windows based applications and web applications.

PREREQUISITES

Basic Programming skills, OOPs concepts, UI controls.

LIST OF EXERCISES

Variables and Control Structures and Arrays

OOP Concepts

Windows Form Controls (Label, Text, Button, Check Box, Radio, List, Combo, Timer, Group Box, Picture Box, Menu)

Sample ASP.NET Application

Web Controls (Input and Display)

Web Controls (Action and Selection)

Validation Controls

Rich Controls

Data Access

Grid View (Reporting)

| Semester | Course Code / Name of the Course | L | P | C | CA | SEM |
|-----------------|---|----------|----------|----------|-----------|------------|
| IV | PCA407 - Practical – V : Relational Database Management System | 0 | 2 | 2 | 50 | 50 |

COURSE OVERVIEW

The MySQL is the most popular open source database tool provides methods for storing and retrieving large amounts of data and uses Structured Query Language (SQL). It also facilitates data control queries to maintain the security, accuracy, integrity and consistency of the data and PL/Sql procedures and functions to integrate programming aspects in database queries. The objective of the course is to know, understand and learn how to organize, maintain and retrieve information efficiently and effectively from a MySQL database.

PREREQUISITES

Basic knowledge about database and SQL queries.

BASIC MySQL Queries

MySQL Database and Tables (Create, Alter, Drop, Rename, Truncate)

MySQL Queries (Insert, Update, Delete)

MySQL Clauses (Distinct, Condition, Order By, Group By)

MySQL Aggregation Functions and Built-In Functions

MySQL Privileges (Grant, Revoke)

ADVANCED MySQL Queries

MySQL Constraints (Unique, Not Null, Referential and Check)

MySQL Sub queries and Views

MySQL Set Operators and Joins

MySQL Procedures and Functions

MySQL Procedures

MySQL Functions and Triggers

MCA

I SEMESTER

MCA160T ENTERPRISE APPLICATIONS WITH JAVA

4-1-0-0:100

Introduction

This course will enable you to build desktop application using Swing components. Provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business. This course will cover web technologies in Java and Struts 2 framework.

Prerequisite

Class and Objects – Inheritance – Interface – Package – Exception Handling – Multi Threading – I/O Streams

Participatory Assessment

Application development using Swing components with JDBC.

Establish client server applications using RMI and Servlet

Design application using MVC pattern in JSP

Application development using Struts 2 with JDBC

Course Content

ADVANCED JAVA

Java Collections: Collection Interface, List, Set, ArrayList, LinkedList, HashSet, Map, HashMap – Applet: Life Cycle, Applet Class, Execution of a Simple Applet – AWT : Events, Listeners, UI Component Classes, Layout, Windows and Frames, Menus, Dialogs, Mouse Events and Listeners- Swing – Swing Components, Swing with JDBC.

SOCKET, OVERVIEW OF J2EE, RMI AND SERVLET

Sockets: Ports, TCP, Server Socket Class with examples, UDP approach with examples – RMI: Introduction, Remote Interface, RMI Server Package, Naming Class, RMI Security Manager Class, Exception, Steps to create RMI application, Example Programs- Servlet: Servlet Basics, Handling the Client Request, Servlet with JDBC- Handling Cookies - Session Tracking.

JAVA SERVER PAGES

Overview of JSP Technology - JSP Scripting Elements - The JSP page Directive - Including Files and Applets – Java Beans - Integrating Servlets and JSP using MVC Architecture, Program using JSP, Servlet, MVC with JDBC.

JSTL, ENTERPRISE JAVA BEAN

JSTL Tags : Core Tags, SQL Tags – Enterprise Java Bean : Introduction to Enterprise Beans: Session Bean, Entity Bean, Message driven Bean, clients access with interfaces, life cycle of enterprise Bean, Creation of Enterprise Bean with example programs.

5. STRUTS 2.0

Struts 2 Framework - Declarative architecture - Simple Struts 2 program - Struts 2 actions- Struts tags-Exploring the validation framework– Internationalization - Advanced action using JDBC connection.

TEXT

UNIT 1, 2: Muthu C, “Programming with Java”, 2nd Edition, McGraw-Hill Education, 2010.

UNIT 3: Marty Hall, Larry Brown, “Core Servlets and Java Server Pages”, 2nd Edition, Pearson Education, 2004.

UNIT 4: Stephanie Bodoff etl, “The J2EETM Tutorial”, Pearson Education, 2005.

UNIT 5: Donald Brown, Chad Michael Davis, Scott Stanlick, “Struts 2 in Action”, 2008.

WEB REFERENCE

www.roseindia.net, www.javapassion.com, www.r4r.co.in, www.java2.com, www.javatutorial.com

MCA161T

SCRIPTING TECHNOLOGY

3-1-0-0:100

Introduction

Scripting Technology is a programming language for a runtime system that automates the execution of tasks that would otherwise be performed individually by a human operator. They are usually interpreted at runtime rather than compiled. Scripting languages aim to reduce the workload for the programmer. To do so, these languages give the programmer a range of tools. They include complex data structures like strings, lists, fields, and objects. There are many scripting languages used by web developers at present, jQuery and Java Script are most widely used scripting languages providing cross platform support and are open source tools.

This course is based on the development of web-based applications and to gain knowledge about the scripting technology and various formats and standards. The course aims to teach the mark-up languages HTML, CSS and web standards for formatting and transforming web content, interactive graphics and multimedia content on the web.

Prerequisite

Knowledge in HTML and CSS

Participatory Assessment

Quiz on basics of HTML, CSS, and jQuery.

Develop static webpages.

Create School webpage using CSS.

Creating Educational Blog with relevant course online course content

(HTML tags, CSS , Java Scripting and jQuery)

Course Content

WEB DESIGN – GETTING STARTED

Working of Web - The Internet Versus the Web.. - Web Page Addresses - Sticking with the Standards - HTML Markup for Structure - Creating simple page- A Web Page, Step by Step- Marking up text- Paragraphs - Headings. Lists - Organizing Page Content

HTML MARKUP FOR STRUCTURE

Adding Links - Pages on the Web - Mail Links- Adding Images - The img Element- A Window in a Window- Table Markup - Minimal Table Structure- Spanning Cells- Wrapping Up Tables- Forms- The form Element- Variables and Content- Form Layout and Design - HTML5- XHTML 2.. Video and Audio.

CASCADING STYLE SHEETS

CSS - Benefits of CSS -Formatting text - Colours and Background - Padding, Borders and Margins - Floating and positioning - Page Layout with CSS - Transition, Transforms and Animation.

CLIENT SIDE SCRIPTING

Client-Side Programming: The JavaScript Language-History and Versions Introduction JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators-Literals-Functions-Objects-Arrays-Built-in Objects-JavaScript Debuggers.

JQUERY

Expanding Your Interface- jQuery UI - Adding Messages, Dialog Boxes- Tooltips- Pannel- Menus to a Page-Forms Revisited. -Stylish Dates, Menus, Buttons, Radio Buttons and Checkboxes- UI Form Widget Tutorial -Customizing the Look of jQuery UI- Theme Roller-New them -overriding styles. Interaction and Efforts - Draggable Widget - Drag-and-Drop Tutorial - Sorting Page Items - jQuery UI Effects.

TEXT

Jennifer Niederst Robbins, "Learning Web Design", Forth Edition, O'Reilly, 2012.

UNIT 1: Ch: 2 – 5

UNIT 2: Ch: 6 – 10

UNIT 3: Ch: 11 – 17

Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2011.

UNIT 4: Ch: 4

David Sawyer McFarland “.JavaScript & jQuery: The Missing Manual”, O’Reilly Media, 2014.

UNIT 5: Ch: 9-12

REFERENCE

Paul Deitel, Harvey Deitel & Abbey Deitel, “Internet and World Wide Web: How to Program”, Fifth Edition, Pearson Education, 2018.

“HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)”, Second Edition, DT Editorial Services, Dreamtech Press, 2016.

Ryan Benedetti & Ronan Cranley, "Head First jQuery", O’Reilly Media, 2011.

MCA162T OPTIMIZATION TECHNIQUES

3-1-0-0:100

Introduction

Optimization is a rigorous approach that takes into account all the factors that influence business decisions. The major optimization considerations are based on Decision variables and constraints. Optimization functionality is a logical extension to many software products, making them more valuable to their clients. There are three main advantages of optimization in software engineering viz operational efficiency, cost optimization, and sensitiveness.

This course covers the basic concepts in optimization techniques in the perspective of a software engineer. The course aims to deliver techniques to improve productivity by delivering the basics and solutions of linear programming problems, orientating towards the formulation of transportation problems, teaching the techniques involved in assignment and project management.

Prerequisite

Basic mathematical skill.

Participatory Assessment

Quiz in linear programming, transportation, assignment, inventory, queuing theory, project management and game theory.

Problem solving in linear programming, transportation, assignment, inventory, queuing theory, project management and game theory.

Course Content

LINEAR PROGRAMMING

Introduction – Concept of Linear Programming Model – Graphical Method – Linear Programming Methods (Simplex Method and Big M Method) – Duality.

TRANSPORTATION AND ASSIGNMENT PROBLEM

Transportation: Introduction – Mathematical Model – Types of Transportation Problem (Balanced and Unbalanced) – North West Corner Method, Least Cost Method, Vogel’s Approximation Method, UV Method.

Assignment: Introduction – Zero-One Programming Model – Types of Assignment – Hungarian Method (Balanced and Unbalanced Problem).

INVENTORY CONTROL AND QUEUING THEORY

Inventory: Introduction – Models of Inventory (Only Problems Using Models) – Queuing: Introduction – Terminology – Empirical Queuing Models. (Only Problems Using Models).

4. PROJECT MANAGEMENT

Introduction – Phases of Project Management – Guidelines for Network Construction – Critical Path Method – Project Evaluation and Review Technique.

5. DECISION THEORY AND GAME THEORY

Decision Theory: Introduction – Decision under Certainty – Decision under Risk – Decision under Uncertainty – Game Theory: Introduction – Game with Pure Strategies – Game with Mixed Strategies – Dominance property – Graphical Method for $2 \times n$ or $m \times 2$.

TEXT

R. Panneerselvam, “Operations Research”, 2nd edition, Prentice Hall of India, New Delhi, 2011.

UNIT 1: (Chapter 2: Sections 2.1, 2.2, 2.4, 2.5 (2.5.1, 2.5.2) and 2.7 (2.7.1))

UNIT 2: (Chapters 3 & 4: Sections 3.1 - 3.4 and 4.1 - 4.4)

UNIT 3: (Chapters 7 & 9: Sections 7.1 - 7.2 and 9.1 - 9.3 (9.3.1-9.3.3))

UNIT 4: (Chapter 10: Sections 10.1-10.4, 10.6)

UNIT 5: (Chapters 11 & 12: Sections 11.1 - 11.4 (11.4.1-11.4.3) and 12.1-12.5)

REFERENCE

1. Kanti Swarup, P.K.Gupta, Manmohan, “Operations Research”, Sultan Chand & Sons, New Delhi, 2008.
2. Sasieni, Arthur Yaspan, Lawrence Friedman, “Operations Research Methods and Problems”, Wiley International Edition, 1959.
3. S.D. Sharma, “Operations Research”, 15-e, Kedarnath RamNath & Co Publishers, 2007.
4. Hamdy A.Taha, “Operations Research”, Prentice Hall of India, New Delhi, 2007.

WEB REFERENCES

<http://mathworld.wolfram.com>

MCA163T SOFTWARE TESTING AND QUALITY ASSURANCE 4-0-1-0:100

Introduction

In today's world, software is essential. It automates all of our tasks, allowing us to be free of manual labour. A thorough verification and validation procedure is essential for delivering reliable software. The objective of the course is to make the learners to be aware about the importance of the software testing during software development. Its aim is to enable the learners to learn and explore a range of software testing methods and give them confidence that a trustworthy, safe, and secure software product will delivered to the client though testing and quality assurance process.

Prerequisite

Basics of Software Engineering (SDLC)

Participatory Assessment

Writing Test Scenario

Creating Test Cases

Boundary Value Analysis

Equivalence Class Partitioning

Preparing Test Plan

Testing Tools

Selenium IDE

JUNIT

Course Content

1. INTRODUCTION TO TESTING AN QUALITY

Principles of Testing - Software Development Lifecycle Models: – Phases of software project – Quality, Quality Assurance and Quality Control – Testing verification and validation-Process model to represent different phases – life cycle models - Spiral or Iterative model - The V Model - Modified V Model – Comparison of Various life cycle models.

2. WHITE BOX TESTING

Software Testing Types: White box testing – What is white box testing – Static testing – Structural testing – Challenges in White box testing.

3. BLACK BOX TESTING

Black box testing - What is black box testing – Why black box testing – When to do black box testing – How to do black box testing - Integration testing - What is integration testing integration testing as a type of testing - integration testing as a phase of testing – Scenario testing.

4. SYSTEM AND ACCEPTANCE TESTING

System and acceptance testing – System testing overview – Functional Versus Non Functional testing – Functional System testing – Non Functional testing - Acceptance testing – Summary of Testing Phases.

5. NON – FUNCTIONAL TESTING

Performance testing – Factors Governing Performance testing - Methodology for Performance testing – Tools for Performance testing – Process for Performance testing - Regressing testing – What is regression testing – Types of regression testing - When to do regression testing – How to do regression testing.

TEXT

Srinivasan Desikan and Gopaldaswamy Ramesh, “Software Testing Principle and Practices”, Sixth Impression, 2008, ISBN: 978 – 81 – 7758 – 121 – 8.

REFERENCES

Illene Burnstien, “Practical Software Testing”, First Edition, Springer International Edition, 2004, ISBN: 81-8128-0 89-X.

William E Perry, “Effective Methods for Software Testing”, Second Edition, John Wiley & Sons, 2005, ISBN: 9971–51–345–5.

Sandeep Desai and Abhishek Srivastava, “Software Testing a Practical Approach”, PHI Learning, 2012, ISBN: 978-81-2034-534-8.

S.A. Kelkar, “Software Quality and Testing - A Concise Study”, PHI Learning Private Limited, 2012, ISBN: 978-81-203-4628-4.

Dorothy Graham, Erik van Veenendaal, Isabel Evans and Rex Black, “Foundations of Software Testing ISTQB Certification”, Cengage Learning India Private Limited, 2007, ISBN-13: 978-81-315-0218-1.

Jason Germbi, “Developing Secure Software”, Cengage Learning India Private Limited, 2008, ISBN 13: 978-81-315-0888-6.

SOFTWARE TESTING AND QUALITY ASSURANCE (TCP)

Writing Test Scenario

Creating Test Cases

Boundary Value Analysis

Equivalence Class Partitioning

Preparing Test Plan

Testing Tools

Selenium IDE

JUNIT

MCA164I OPEN SOURCE DATABASE MANAGEMENT SYSTEM 0-0-0-4:100

Introduction

This course makes the learner to self-study along with the tutor and to construct simple and moderately advanced database queries using Structured Query Language (SQL), PL/SQL, Cursors, and Triggers.

Prerequisite

SQL Data Types, SQL Constraints

SQL Statements (DDL, DML, DRL, DCL and TCL)

Database Normalization

Database Users Privileges, Roles and Rights

Participatory Assessment

Constructing Entity Relationship diagram for the specified problems

Handling simple SQL queries on the constructed E-R diagram.

Handling sub queries and Aggregate functions, String functions, Math functions, etc.,

Constructing PL/SQL block and handling Cursors and Triggers

Course Content

LIST OF PROGRAMS

1. Creating and Managing Tables

Constraints

2. SQL Statements – 1

Basic SQL SELECT Statements

Restricting and Sorting Data

Single-Row Functions

3. SQL Statements – 2

Displaying Data from Multiple Tables

Aggregating Data Using Group Functions

Subqueries

4. Manipulating Data

INSERT statement

DELETE statement

UPDATE statement

5. Creating and Managing Views

Creating Views

Implementing DML Statements on views

6. Using SET operators, Date/Time Functions, GROUP BY clause (advanced features) and advanced subqueries

7. PL/SQL Basics

Declaring Variables

Writing Executable Statements

Interacting with the Oracle Server

Writing Control Structures

8. Composite data types, cursors and exceptions

Working with Composite Data Types

Writing Explicit Cursors

Handling Exceptions

9. Procedures and Functions

Creating Procedures

Creating Functions

Managing Subprograms

Creating Packages

10. Triggers

Creating Triggers

Creating Triggers

11. DBA Commands

Creating Database

Users Creations and Privileges

Grant and Revoke

REFERENCE

Shio Kumar Singh, “Database Systems Concepts, Designs and Applications”, 2nd Edition, 2011,
Dorling Kindersly (India) Pvt.Ltd.

Kogent Solutions, “Oracle 10g Administration in Simple Steps”, First Edition, 2008, Dreamtech.

MCA165T PRACTICAL: JAVA

0-0-0-4:100

Java Collections

Applet, AWT

Swing Components

Socket programming, RMI

Servlet to manage http request and response, Servlet with JDBC

Handling Cookies, Session Tracking,

JSP Scripting Elements

JSP tags, JSP with Bean

Integrating Servlet, JSP with MVC and JDBC

JSTL Tags

Creating Session Bean

Creating Entity Bean

Struts 2 actions

Struts 2 Tags

Struts 2 with Validation

Struts 2 with JDBC Connection

MCA166T

PRACTICAL : SCRIPTING TECHNOLOGY

0-0-0-4:100

Creation of interactive web sites - Design using HTML and authoring tools
basic HTML tags, different styles, links and with all Basic control elements.

Create a webpage with two tables. First one should have 1 row and 5 columns and the second one with 3 rows and 4 columns. The contents of the first table should be center aligned and contents of the second table should be right aligned. Each column of the first table should have separate colors and each row of the second table should have separate colors.

Create a framed webpage with different frames.

Collect of Personal Information using forms.

Create a web page with all types of Cascading style sheets.

Inline

Internal

External

Handling multimedia content in websites.

Client-Side Scripts for Validating Web Form Controls using DHTML.

Create webpage with following using jQuery.

Selectors

Events

Hide and Show

Fade

Slide

Animate

Generate jQuery Programs using CSS.

Create Custom animations with jQuery.

II SEMESTER

MCA260T

ENTERPRISE APPLICATIONS WITH .NET

4-0-0-0:100

INTRODUCTION

Enterprise application development is the approach used by organizations to support business operations, solve business problems, and manage day-to-day tasks through an integrated digital platform. These applications should be able to run across various computing platforms such as standalone, network, web based and mobile versions. .NET for enterprise application development is a setup specifically designed for run-time components with APIs and languages, compilers, and more. In addition, it works on Windows, Linux, and Mac OS with both the .NET Framework and .NET Core. The platform's vision is to support .NET applications, including JIT and other native models that can run on the desktop, Web and mobile devices.

This course aims to deliver the basics of structured programming and object oriented programming and to enable the learners to develop console and window based applications. The course is expected to enable the learners to become proficient in developing database, web and mobile applications in .Net by integrating the various components of the .NET framework.

PREREQUISITE

Basics on Structured and Object Oriented Programming Paradigm

Knowledge in Graphical User Interfaces

Handling of Data Bases

Basics of HTML and WWW

Scripting Language

Participatory Assessment

Quiz on basics of Structured Programming

Quiz on basics of object oriented programming

Developing a windows calculator application

Developing a windows notepad application

Developing a data base application with report

Designing a asp.net application for online reservation

Course Content

1. FUNDAMENTALS OF C#

.NET Framework Architecture – C# Language– Literals, Variables and Data Types – Operators and Expressions – Decision Making and Branching – Decision Making and Looping – Methods in C# - Handling Arrays – Structures and Enumerations – Classes and Objects – Inheritance and Polymorphism –Interface – Operator Overloading – Delegates and Events – Managing Errors and Exceptions – Multithreading in C#.

2. WINDOWS FORMS

Introducing the Form Class – Performing Common Form Operations – Creating Message Boxes – Creating Input Boxes – Creating Dialog Boxes – Handling Events — Using the Label Control, Using the TextBox Control, Using the Button Control, Using the RadioButton Control, Using the CheckBox Control, Using the ComboBox Control, Using the ListBox Control, Using the GroupBox Control, Using the Panel Control, Using the PictureBox Control, Using the Timer Control, Using the Progress Control - Using the ToolStrip Control- Using the MenuStrip Control – Using the StatusStrip Control – Working with Dialog Boxes.

3. WINDOWS PRESENTATION FOUNDATION

Using XAML in WPF – Working with WPF Controls: Textbox, label, Button, listbox, ComboBox, radio button , Check Box, PasswordBox, TextBlock, Border, Grid, GridSplitter, Canvas, StackPanel, DataGrid, Calendar, DatePicker Controls – Working with Resources and Styles.

4. ASP.NET

Standard Controls: Introducing the WebControl Class – Using the Label Control – Using the TextBox Control – Using the Button Control – Using the ImageButton Control – Using ListBox Control – Using the RadioButton Control – Using the CheckBox Control – Using the Table Control – Using the Wizard Control – Using the Calendar Control – Using the AdRotator Control – Navigation Controls : Working with the SiteMapPathControl – Working with Menu Control – Working with TreeView Control – Validation Controls: Introducing the BaseValidator Control – Using the RequiredValidator Control – Using RangeValidator Control – Using RegularExpressionValidator Control – Using the CompareValidator Control – Using the CustomValidator Control – Using the ValidationSummary Control.

5. LINQ AND ADO.NET

LINQ: Create a Simple LINQ Query – Working with Standard Query Operators – Implementing LINQ to ADO.NET – Using Anonymous Types in Queries – Using Lambda Expressions in Queries – Exploring PLINQ – Working With ADO.NET: Introducing ADO.NET – Accessing Data in ADO.NET – Implementing Data Binding: Data Binding in Windows Forms – Data Binding in WPF – ASP.NET

Database Controls: Working with ADO.NET – Introducing DataSource Controls – Working the Data-Bound Controls.

TEXT

E.Balagurusamy, “Programming in C#”, Third Edition, McGrawHill Higher Education, New Delhi, 2010.

UNIT 1: Chapter – 4,5,6,7,8,9,11,12,13,14,15,16,18,19

VikasGupta, “Comdex .NET 4.5 Programming”, Dream Tech Press, New Delhi, 2014.

UNIT 1: Chapter 2

UNIT 2: C# 2012 - Chapter 2 and 3

UNIT 3: Visual Basic – Chapter 5

UNIT 4: ASP.NET 4.5 – Chapter 1, 2, 3, and 4

UNIT 5: C# - Chapter – 4, 5, 6 and ASP.NET 4.5 – Chapter 6

REFERENCE

1. Kogent Solutions, “C# 2008 Programming Black Book”, Dream Tech Press, New Delhi, 2009.
2. David S.Platt, “Introducing Microsoft .Net”, Prentice Hall of India, Private Limited, New Delhi, 2008.

MCA261T

COMPUTER GRAPHICS

4-1-0-0:100

Introduction

Computer graphics is the aesthetic manipulation of visual and geometric information using computational techniques. It focuses on the mathematical and computational foundations of image generation and processing rather than purely aesthetic issues.

The course introduces the basic concepts of computer graphics. It provides the necessary theoretical background and demonstrates the application of computer science to graphics. The course further allows students to develop programming and acquire game development skills in computer graphics through programming assignments like OpenGL and DIRECTX.

Prerequisites

Basics of Computer Graphics and C++

Introduction to Problem Solving and Algorithms

Participatory Assessment

Problem solving ability in Line drawing, 2D and 3D transformations.

Implementation of algorithms in OpenGL software.

Create an application using DIRECTX software.

Course Content

LINE-DRAWING ALGORITHMS

DDA, Bresenham Technique, Circle-Generating Algorithms: Properties of Circles, Midpoint Circle Algorithm–Filled Area Primitives: Boundary-Fill Algorithm, Flood-Fill Algorithm.

2D TRANSFORMATIONS, VIEWING AND GRAPHICAL USER INTERFACE

Two Dimensional Transformations: Basic Transformations, Matrix representations and Homogenous Coordinates, Composite Transformations: Translation, Rotation, Scaling, Other Transformations: Reflection, Shear – Window to Viewport Coordinate Transformation – Line Clipping: Cohen-Sutherland Algorithm, Liang - Barsky Line Clipping, Nicholl – Lee – Nicholl Line Clipping– Polygon Clipping: Sutherland Hodgeman Algorithm, Weiler-Atherton Polygon Clipping – Text Clipping – Input of Graphical Data - Interactive Picture Construction Techniques.

INTRODUCTION TO OPENGL

OpenGL Command Syntax – Drawing Geometric Objects – Viewing and Modeling Transformations – Specifying a Color and a Shading Model – Lighting: Real world OpenGL Lighting – Selecting a Lighting Model – Defining Material Properties –Blending, Antialiasing, Fog Techniques.

3D TRANSFORMATIONS, VIEWING AND PROJECTION METHODS

Three Dimensional Geometric Transformations: Translation–Rotation: Coordinate-Axes Rotations, Scaling, Other Transformations: Reflections, Shears - Composite Transformations.Three Dimensional Display Methods – Projections: Parallel Projection, Perspective Projection – Visible Surface Detection Methods: Classification, Back-Face Detection, Depth-Buffer, Scan-Line, BSP-Tree Methods, Area Sub-Division and Octree Methods – Polygon Rendering Methods.

5. INTRODUCTION TO DIRECTX

Directx history – Architecture – Using Directx – DirectInput – Initializing DirectInput – Using Directinput – Action Mapping – Bulding the Input Sub-System – Input Sample Program.

TEXT

Hearn D and Baker M.P, "Computer Graphics – C Version", Second Edition, Pearson Education, 2004.

UNIT 1: Chapter 3.2.1, 3.2.2, 3.5, 3.11.3, 3.11.4

UNIT 2: Chapter 5.1, 5.2, 5.3.1 - 5.3.3, 5.4, 6.3, 6.7.1 - 6.7.3, 6.8.1, 6.8.2, 6.10, 8.2, 8.5.

UNIT 4: Chapter 11.1, 11.2.1, 11.3, 11.4, 9.1, 12.3, 13.2, 13.3, 13.5, 13.7, 13.8, 13.9, 14.5.

Dave Shreiner, Mason Woo, Jackie Neider, Tom Davis, "OpenGL Programming Guide: The Official Guide to Learning OpenGL", Addison-Wesley Professional, 2008.

UNIT 3: Chapter 1.4, 2.2.3, 3.2, 4.4, 5.2, 5.3, 5.5, 5.6, 6.1, 6.2, 6.3.

Kevin Hawkins, "OpenGL Game Programming" First Edition, Prima Publishing, 2001.

UNIT 5: Chapter 1 and Chapter 16.

REFERENCE

R. Stuart Ferguson, "Practical Algorithms for 3D Computer Graphics", First Edition, AK Peters, 2001.

WEB REFERENCES

www.glprogramming.com/red

MCA262T

DESIGN AND ANALYSIS OF ALGORITHMS

3-1-0-0:100

Introduction

Algorithm design refers to scientific methodology or process applied to evolve a mathematical model in problem solving paradigm. Applied algorithm design is also called as algorithm engineering and strongly correlates with problem solving and software engineering, making this an important area of study in computer applications.

The analysis of algorithms is the determination of the computational complexity of an algorithm in terms of time and space. The scope for analysis in problem solving to decide on the best suitable solution makes it another rudimentary study in computer applications.

Prerequisite

Basics on discrete mathematics – sets, functions, relations, recurrence relations, proof by derivation and induction – Boolean logic – variables, operators, tautology, contradiction.

Probability theory – conditional probability, unconditional probability, baye's theory, random numbers.

Data Structures – primitive, composite and user defined data structures, stacks, queues, linked lists, trees, graphs and heaps.

Participatory Assessment

Implementation of Algorithms in a Programming Language of choice

(Merge sort, Kruskal's method, Travelling Salesperson, 4 Queens problem, Primality Testing, Shortest-path, Non deterministic searching)

Analysis of Algorithms

Merge sort, Knapsack problem, sum of subsets, Non deterministic sorting

Building Models

Multiplication of two Matrices in Bounded Degree, Mesh, Star, Hypercube networks

Course Content

1. INTRODUCTION TO ALGORITHMS

Basics of Algorithm: Introduction – Upper Bound of Polynomial Form of Time Complexity –

Divide and Conquer: Introduction – Merge Sort - Multiplication of Two n Bit Numbers – Greedy

Method: Introduction – Minimum Cost Spanning Tree – Dijkstras' single source shortest path.

2. DYNAMIC PROGRAMMING, BACKTRACKING AND BRANCH AND BOUND

Dynamic Programming: Introduction – Travelling Salesperson – 0/1 Knapsack Problem –Backtracking:

Introduction – Four Queens Problem – Branch and Bound – Assignment Problem.

3. RANDOMIZED AND APPROXIMATION ALGORITHMS

Randomized Algorithm: Introduction – Primality Testing – Majority Element – Approximation

Algorithms: Introduction – Job Scheduling – Bin Packing.

4. REDUCTION METHOD AND NON DETERMINISTIC ALGORITHMS

Reduction Method: Non Deterministic Algorithms – Non Deterministic Searching – Non Deterministic Sorting – Satisfiability.

5. PARALLEL ALGORITHMS

Introduction – PRAM Algorithms: List Ranking – Finding Maximum of an Array of Elements –

Bounded Degree Network Algorithms: Networks – Network Algorithms – Summation on Multiprocessors.

Text and References

S.K.Basu, "Design Methods and Analysis of Algorithms", Prentice Hall of India, New Delhi, 2008.

REFERENCES

- Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Galgotia Publications Pvt.Ltd. New Delhi, 2001.
- Alfred Aho, John Hopcroft, Jeffrey Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, Delhi, 2003.
- Thomas Cormen, Charles Leiserson, Ronald Rivest, "Introduction to Algorithms", Prentice Hall of India, New Delhi, 1998.

MCA263TA ELECTIVE I: ARTIFICIAL INTELLIGENCE 3-0-0-0:100

Introduction

This course provides a comprehensive, graduate-level introduction to artificial intelligence, emphasizing advanced topics such as advanced search, reasoning and decision-making under uncertainty, and machine learning.

Prerequisite

Data Structures, Algorithms, Discrete Mathematics, Probability and Statistics.

Participatory Assessment

- Problem Solving - Propositional Logic, FOPL, Wffs and Inference Rules
- Constructing Knowledge representations
- Search Problems in knowledge representations
- Problems in Parsing Techniques and Pattern Recognition
- Problems in inductive Bias

Course Content

CONCEPT AND SYMBOLIC LOGIC

What is AI, Importance of AI, AI and Related Fields – Knowledge: Definition and Importance of Knowledge, Knowledge Based Systems, Representation of Knowledge, Knowledge Organization, Knowledge Manipulation, Acquisition of Knowledge – Symbolic Logic: FOPL, Syntax and Semantics for Propositional Logic, Syntax and Semantics for FOPL, Properties of Wffs, Conversion to Clausal Form, Inference Rules, Resolution principle.

KNOWLEDGE REPRESENTATION

Structured Knowledge: Introduction, Associative Networks, Frame Structure, Conceptual Dependencies and Scripts – OO Representation: Introduction, Overview of OO Systems, Objects, Classes, Messages, Methods, Simulation Using OOS Program – Fuzzy Logic and Natural Language Computations.

KNOWLEDGE ORGANIZATION AND MANIPULATION

Control Strategies: Preliminary Concepts, Uniformed or Blind Search, Informed Search, Searching And-Or Graphs, Examples of Search Problems – Matching Techniques: Introduction, Structures used in Matching, Measure for Matching, Matching Like Patterns, Fuzzy Matching Algorithms – Indexing and Retrieval Techniques.

EXPERT SYSTEM

Natural Language Processing: Overview of Linguistics, Grammars and Languages, Basic Parsing Techniques, Sematic Analysis and Representation, Natural Language Generation, Natural Language Systems – Pattern Recognition: Recognition and Classification Process, Learning Classification Patterns – Expert System Architecture: Introduction, Rule Based System Architectures, Nonproduction System Architecture, Dealing with Uncertainty, Knowledge Acquisition and Validation, Knowledge System Building Tools.

LEARNING BY INDUCTION

Intelligent Editors – Basic Concepts, Some Definitions, Generalization and Specialization, Inductive Bias, Example: Inductive Learner – ID3 System – LEX System – INDUCE System – Learning Structure Concepts.

TEXT

Dan W. Patterson, “Introduction to Artificial Intelligence and Expert Systems”, Pearson Education, 2nd Edition, 2015.

REFERENCE

Peter Jackson, “Introduction to Expert Systems”, Third Edition, Pearson Education, 2007.

Stuart Russel and Peter Norvig, “AI – A Modern Approach”, Second Edition, Pearson Education 2007.

Deepak Khemani, “Artificial Intelligence”, Tata Mc Graw Hill Education 2013.

MCA263B

ELECTIVE I: INTERNET OF THINGS

3-0-0-0:100

Introduction

Internet of Things (IoT) is a new paradigm that has changed the traditional way of living into a high tech life style (Smart city, smart homes, pollution control, energy saving, smart transportation, smart industries). IoT explore best opportunity for career oriented creators as they can learn, build and understand system on its own.

The course (IoT) describes the network of physical objects - “things” - that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet and to analysis the data which are made to flow among the devices. The application of IoT in several verticals has been made opened for study (case study).

Prerequisite

Topology connectivity, Networking Layer Models,
Basics of TCP/IP.

Networking devices, Configuring of devices in the network.

Participatory Assessment

Various sensors, actuator and other related components are studied through videos and by witnessing physical components.

Different networking layers of IoT are discussed among the student team.

Developing the prototypes models on the domain specific problem using Arduino.

The passed data are analyzed using the analytics approach.

Course Content

ARCHITECTURES AND MODELS

IoT Architectures – IoT Functional Stack, Sensors, and Actuators Layer, Communications Network Layer, Applications and Analytics Layer – IoT Data Management and computer Sack, Fog Computing, Edge Computing, Cloud Computing - Smart Objects, Sensor Networks.

CONNECTIVITY

Communication Criteria – Access Technologies – IP as IoT Network Layer – Profiles and Compliances – Application Protocols – Transport Layer – Application Transport Methods.

SYSTEM DEVELOPMENT

Design Methodology – Case study – Basic blocks of IoT device – Arduino – Raspberry Pi – Board, Interfaces, Setting up, Programming – Other IoT Devices.

4. DATA ANALYTICS

Data Analytics for IoT – Big Data Analytics Tool and Technology, Edge Streaming Analytics – Network Analytics.

5. IoT IN INDUSTRY

Manufacturing Industry, Architecture and Use cases - Smart Cities, Architecture and Use cases – Transportation, Architecture and Use cases.

TEXT

Olivier Hersent, David Boswarthick, Omar Eloum, “The Internet of Things-Key applications and Protocols”, Wiley Publication, 2012.

REFERENCE

Jan Ho’ller, VlasiosTsiatisis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand, David Boyle, “From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence”, Elsever, 2014.

Arshdeep Bahga, Vijay Madiseti, “Internet of Things- A hands-on-approach”, Universities Press, 2015.

Michael Miller, “The Internet of Things”, Pearson Education, 2015.

MCA264I

ANDROID APPLICATION DEVELOPMENT

0-0-0-4:100

Introduction

The course is for designing and building mobile applications using Android open-source platform. This course encourages students to build meaningful mobile applications using GUI components, Layout Manager, SQLite and various other tools.

Prerequisite

Mobile Application Model, Frameworks and Tools.

Multimodal and Multichannel UI, Screen Elements and Layouts, Voice XML.

Work flow for Application Development, Java API, Plug-ins and Rule of Thumb for using DLLs.

Android Application Architecture, Android basic Components, Storing and Retrieving Data,

Packaging and Deployment.

Participatory Assessment

Handling various GUI components in constructing an app using Java and XML file.

Designing UI for the various problems using Layout managers and fixing the process logic using event listeners.

Constructing a simple app such like Calculator, Alram Clock and GPS.

Design and develop application using SQLite.

Course Content

LIST OF PROGRAMS

Develop an application that uses GUI components, Fonts, and Colours.

Develop an application that uses Layout Managers and Event Listeners.

Develop a native calculator application.

Develop an application that makes use of database.

Develop a native application that uses GPS location information.

Write an application that creates alarm clock.

REFERENCE

Reto Meier, “Professional Android 4 Application Development”, Wiley Publication, 2012.

MCA265P

PRACTICAL: .NET

0-0-0-4:100

CONSOLE APPLICATION

1. Branching, Looping and Methods
2. Handling Arrays, Structures and Enumerations
3. Classes and Objects, Inheritance and Polymorphism, and Interface
4. Delegates and Events, Managing Errors and Exceptions, and Multithreading

WINDOWS APPLICATION

5. Message Box, Input Box and Dialog Box
6. Label, TextBox, Button, Radio Button, CheckBox, GroupBox, and Panel Controls
7. ComboBox, ListBox, Timer, Progress Controls
8. Tool Strip and Menu Strip Controls
9. Working with Dialogs

WINDOWS PRESENTATION FOUNDATION

10. Grid, Button, TextBox, PasswordBox, TextBlock, Border, GridSplitter, and Canvas
11. StackPanel, DataGrid, Calendar, and DatePicker Controls
12. Working with Resources and Styles

WEB APPLICATION

13. Label Control, TextBox Control, Button Control, and ImageButton Control

14. ListBox Control, RadioButton Control, and CheckBox Control
15. Calendar Control and AdRotator Control
16. Working with Navigation Controls
17. Working with Validation Controls

ADO.NET

18. Implementing LINQ to ADO.NET
19. Working with Windows Forms and ADO.NET
20. Working with WPF and ADO.NET
21. Working with ASP.NET and ADO.NET

MCA266P

PRACTICAL: COMPUTER GRAPHICS

0-0-0-4:100

OPENGL

- Drawing Geometric Objects with Animation.
- Viewing and Modeling Transformations.
- Using Colors for the Objects.
- Using Flat Shading.
- Using Smooth Shading.
- Using Lighting Effect.
- Using Material Properties.
- Using Blending.
- Using Antialiasing.
- Using Fog Techniques.

DIRECTX

- Mouse Activity.
- Robot Example.

RESEARCH DOMAIN [II and III SEMESTER]

ELECTIVE I: RESEARCH DOMAIN I

ELECTIVE II: RESEARCH DOMAIN II

a. OVERVIEW

As the Department specializes on selected technologies such as Different Types of Computing, Open Source Software Technology, Language Technology, and e-Learning, students are invited to join these research groups and they are provided an intensive training in 1st semester.

Each group of students is assigned a problem in the area of their research and asked to develop a solution or the papers to be published in Conference / Journals during 2nd and 3rd semesters.

For their final project, these students may continue their research project or be directly placed in related Research Centre's or Companies for project work and recruitment.

Based on the research focus and problems posed, the students are expected to prepare an individual technical report (at least 50 pages) on the field of their study. Theme for Technical Report in 2nd and 3rd semesters will be different. Based on the technical report, a written and oral examination is conducted.

Each student is expected to publish a paper in one of the national conferences or journals. In these research papers, they will present the outcome of their experiments and analysis.

This course aims to achieve an understanding of the research challenges by assigned readings, technical report writing, discussions and presentations on the qualitative and quantitative aspects of the subject under study. Two research outputs shall be submitted by the students as their Research Portfolio namely Technical Report and Research Survey. An input session is given on research methodology for the selected students.

b. COURSE ELEMENTS

i. RESEARCH METHODOLOGY

Input Sessions shall be given for the students in the 2th semester (fixed days or hours) to know the methodology for research work and to apply the same.

Semester II

INTRODUCTION: Definition and objectives of Research – Types of research, Various Steps in Research process, Mathematical tools for analysis, Developing a research question – Choice of a problem – Literature review, Surveying, synthesizing, critical analysis, reading materials, reviewing, rethinking, critical evaluation, interpretation, Research Purposes, Ethics in research – APA Ethics code.

QUANTITATIVE METHODS: Statistical Modeling and Analysis, Time Series Analysis, Probability Distributions, Fundamentals of Statistical Analysis and Inference, Multivariate methods – Research

Planning – Reflections on research – Designing experiments – Measurements and coding – Contribution – Evaluation of papers.

REPORTING: Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a research report, referencing in academic writing - Plagiarism.

ii. TECHNICAL REPORT

Based on the research focus and problems posed, the students are expected to prepare the individual Technical Report (at least 50 pages) on the field of their study. The Technical Report (TR) is a comprehensive understanding of the subject through which students communicate their study of the subject. TR should present core understanding of the subject developed logically along clearly identified perspective. The TR must include the Concepts, Technology, Tools, and Application of the expounded topic. This report is worth 50% of the course. Theme for Technical Report in 2nd and 3rd semesters are different.

iii. RESEARCH SURVEY

Research Survey (RS) focuses on a research problem related to the selected field of work. Students should pick a problem, gather materials on the research done in the field, discuss the current state of understanding on the topic and describe particular areas where progress appears possible. This paper is worth 50% of the course. The evaluation of the research paper is done by external reviewers along with the internal supervisor. Each student is encouraged to publish the survey paper in one of the national conferences or journals.

c. TOPICS FOR RESEARCH STUDY

To facilitate students into the area of research, potential topics for study in each chosen field are given below. The students can choose one of these topics or suggest a relevant topic in consultation with the Research Supervisor, however, since the number of faculty getting into research is on the rise every year, the research areas are not limited to the below, they can be chosen according to the specialization of the supervisor.

Semester II and III

eLearning

Data Quality Assurance

Network and Security

Data Analytics

Software Metrics

Cloud Computing

Ontology and Semantics

Internet of Things

Note: *The topics mentioned above are subject to change, any upcoming research area during the period of research can be considered after being passed in the standing committee of the respective academic years.*

d. EVALUATION SCHEME

The following guidelines shall be applied in evaluation of technical reports and Research Papers. For the Students admitted from the year 2022 – 2023 onwards:

Evaluation Components

Internal Assessment (Research Guide) Total 50 Marks

| | |
|-----------------------|----------|
| Technical Report (TR) | 15 Marks |
| Research Survey (RS) | 15 Marks |
| CA Tests | 15 Marks |
| Regularity | 5 Marks |

External Assessment Total 50 Marks

| | |
|-----------------------|----------|
| Technical Report (TR) | 10 Marks |
| Research Survey (RS) | 10 Marks |
| Paper Publication | 15 Marks |
| Viva Voice | 15 Marks |

Evaluation of Technical Report and Research Survey are done on the basis of their scientific merit, effective presentation, and appropriateness for assignment. Student is rewarded based on thorough analysis, originality, and insightfulness found in the Technical Report. Scientific merit includes correctness, significance, novelty, non-triviality, and completeness.

Students shall individually and periodically meet their Research Guide and shall maintain a record describing their following activities: Review of Task, Points for Discussion, Resource Document (Output) and Action Item.

The Technical Report and Research Survey Paper shall be sent for blind review to at least two external subject experts. A Research Paper should be prepared from the output of TR and SP and is recommended to be presented in a Conference or published in a Journal. The Head of the Department nominates the external subject experts (who are interested in the area of study) to review the students' work by sending the work to them by email.

Research Domain subjects will not have term-end examination, instead they have viva voce conducted by a committee of two examiners (Internal and External) after the review of their works by the Internal Examiner. Remuneration for the committee members will be as per the university norms. The viva voce will be conducted on the same day/time while the other Domain elective semester examinations are being conducted. The duration of viva voce for each student shall be at least 15 minutes. (8 minutes for presentation and 7 minutes for question and answers)

The Head of the Department will finally submit the cumulative of the following marks to the COE: Technical Report, Research Survey, and Viva Voce.

If a candidate fails he/she has to redo the course by paying for the examination fee along with the students of next batch and select a topic from the list of topics published by the department.

INTERNAL COURSES

SOFT SKILLS

2-0-0-0:100

| Content | Topics | Hours |
|----------------------------|---|----------|
| Introductory Module | Being someone and knowing someone Setting expectations Non-verbal Communication Move like a Machine | 6 Hours |
| Understand self | Brief account of life My life roles rainbow Who am I Communication skills SWOT Conflict resolution Decision making Time management | 10 Hours |
| Understand career | Life after college/ITI Career and me Understanding career Interests & Abilities Multiple Intelligence | 6 Hours |

| | | |
|---------------------------|--|---------------|
| Preparing for work | Workplace expectation (Digital lesson) Resume & Interview (Digital lesson) LinkedIn Week (Digital lesson) My Image (Digital lesson) Preparing for interview (Digital lesson) Mock Interview | 8 Hours |
| TOTAL HOURS | | 30 HRS |

TECHNICAL APPTITUDE

2-0-0-0:100

- C
- C++
- Java
- DBMS
- Data Structures
- .NET MVC Framework
- Software Quality Assurance
- Software Testing
- Computer Network
- Linux
- PHP
- Python

B. A. ENGLISH

English – I: Basic Communication

Semester - I

Hour: 5

Sub. Code: EN111T

Credits: 3

Unit - I

- Listening** : Introduction and Lesson 1 – The Airport
- Speaking** : Greeting People and Dialogues at Home from Dawn to Dusk
- Reading** : EFL Reading Cards – Level I
- Writing** :
- Vocabulary** : **Nouns** – Various Parts of a House/Room,
Various Parts of the Body
Verbs– From Dawn to Dusk
- Writing** : Using the Nouns and Verbs Taught in the Unit
- Grammar** : An Introduction to Parts of Speech
- Short Story:**The Land Where There Were No Old Men by Jean Ure

Unit - II

- Listening** : Lesson 2 – Football
- Speaking** : Introducing Oneself and Others – Dialogues at Play
- Reading** : EFL Reading Cards – Level II
- Writing** :
- Vocabulary** : **Nouns**–Games and Sports
Verbs– At Play
- Writing** : Using the Nouns and Verbs Taught in the Unit
- Grammar** : Word Order
- Short Story:**My Lost Dollar by Stephen Leacock

Unit - III

- Listening** : Lesson 3 – Our Rooms
- Speaking** : Inviting, Requesting – Dialogues at College
- Reading** : EFL Reading Cards – Level II
- Writing** :

- Vocabulary** : **Nouns** –College/Classroom
Verbs– At Study
- Writing** : Using the Nouns and Verbs Taught in the Unit
- Grammar** : Nouns, Pronouns, Determiners and Adjectives

Prose : ‘A Fellow Traveller’by A.G. Gardener

Unit - IV

- Listening** : Lesson 4 – Food
- Speaking** : Offering Help, Accepting it and Declining it – Dialogues Related to Cooking and Eating
- Reading** : EFL Reading Cards – Level III
- Writing** :
- Vocabulary** : **Nouns**– Kitchen, Spices, Pulses, Grains and Vegetables
Verbs– Related to Cooking and Eating
- Writing** : Using the Nouns and Verbs Taught in the Unit
- Grammar** : Verb, Verb Tenses and Adverbs

Poems: Mending Wall by Robert Frost

The Windhover (To Christ Our Lord) byG.M. Hopkins

Unit - V

- Listening** : Lesson 5 – The Newsagent’s
- Speaking** : Seeking Permission, Asking for Advice, Expressing Gratitude and Related Dialogues
- Reading** : EFL Reading Cards – Level III
- Writing** :
- Vocabulary** : **Nouns** – Dressing room, Bedroom, Bathroom
Idioms– of Daily Chores and Household Activities
- Writing** : Using the Nouns and Idioms Taught in the Unit
- Grammar** : Prepositions, Conjunctions and Interjections

Short story:The Verger bySomerset Maugham

Reference Books

English for Basic Communication - 1, Textbook, Rev. Dr. K. A. Maria Arokiaraj and Mr. Leo Maria Francis, Oxford Bell Books, 2021.

CIEFL, ENGLISH 400 READING PROGRAMME, Orient Longman Ltd.1992.

D Victor and associates, ENGLISH READER, Book XII, Tamil Nadu Textbook Corporation, 2003.

Dr. Xavier Alphonse SJ, Walking the Extra Mile, MCRDCE Publication, Chennai, 2005.

Ed. Dr. M S Nagarajan, SPECTRUM – AN ANTHOLOGY OF MODERN PROSE, AnuChithra Publications, Chennai, 1988.

Ed. Mary T. David and V S Muthiah, DRUMBEATS – AN ANTHOLOGY OF PROSE BY NOBEL LAUREATES, B I Publications Pvt. Ltd.1992.

Eds. Dr. Robert Ilson, Prof. David Crystal, READER’S DIGEST UNIVERSAL DICTIONARY, Reader’s Digest, 1993.

G Radhakrishna Pillai, K Rajeevan, SPOKEN ENGLISH FOR YOU, Emerald Publishers, Chennai, 2002.

J E Metcalfe, THE RIGHT WAY TO IMPROVE YOUR ENGLISH, Jaico Publishing House, 1998.

M L Tickoo & Paul Gunashekar, READING FOR MEANING, S Chand & Company Ltd, New Delhi.

M P Bhaskaran and D Horsburg, STRENGTHEN YOUR ENGLISH, Oxford University Press, 1983.

M. Leo Maria Francis, HAND BOOK OF ESSENTIAL VOCABULARY

P C Wren, MA and H Martin, MA, HIGHSCHOOL GRAMMAR AND COMPOSITION, Chand & Company, New Delhi, 2004.

Prof. A C Gimson, & associates, ENGLISH COURSE – LINGUAPHONE, Linguaphone Institute Ltd. London, 2000.

Professor A C Gimson, ENGLISH COURSE, LINGUAPHONE, Linguaphone Institute Limited, London, 2000.

S J A Packiaraj, G M James, S J Sundar, COMMUNICATION COMPANION, Department of English, LOYOLA COLLEGE, Chennai.

Sarah Freeman, WRITTEN COMMUNICATION IN ENGLISH, Orient Longman, 1994.

English – II: Basic Communication

Semester – I

Hours: 5

Sub.Code:EN112T

Credits: 3

Unit - I

Listening : Lesson 6 – The Beardsley Hotel

Speaking : Remembering Someone, Persuading Someone – Dialogues in Hospital

Reading : EFL Reading Cards – Level VI

Writing:

A. Vocabulary:

Nouns:Sickness/Disease

Verbs:Verbs used in Hospital

Idioms :of Sickness and Health

B. Grammar:Subject Verb Agreement, Punctuation

C. Exercises: Using Subject Verb Agreement and Punctuation taught in the Unit

Prose: Autobiography: *Wings of fire* Chapter 16 “Leaders” by A.P.J. Abdul Kalam

Unit - II

Listening : Lesson 6 – The Beardsley Hotel

Speaking : Complimenting and Congratulating, Expressing Sympathy, Dialogues at Work

Reading : EFL Reading Cards – Level VI

Writing:

A. Vocabulary:

Nouns:Various Trees and Plants

Verbs:Gardening and Farming

Idioms :of Trees and Plants

B. Grammar: Direct and Indirect Speech, Verb Complements

C. Exercises: Using Direct and Indirect Speech, Verb Complements taught in the Unit

Prose: Manners and Etiquettes - Anonymous

Unit - III

Listening : Lesson 7 – A Journey Part I

Speaking : Complaining, Apologising – Dialogues related to Transportation, Professions **Reading**

:EFL Reading Cards – Level VII

Writing :

A. Vocabulary :

Nouns: Vehicles and their parts, Professions

Verbs : Related to Transportation and Professions

Idioms :Love related Idioms

B. Grammar: Conditional Statements

C. Exercises :Using Conditional statements taught in the Unit

Short Story: After Twenty Years by **O. Henry**

Unit - IV

Listening : Lesson 7 – A Journey Part II

Speaking : Making suggestions, Warning someone, Dialogues related to weather, season, etc.

Reading : EFL Reading Cards – Level VII

Writing :

A. Vocabulary :

Nouns: Earth, Weather, Climate, Seasons and Natural Calamities

Verbs:Related to weather, climate, seasons and natural calamities

Idioms :of earth, weather, climate and seasons

B. Grammar:Questions, Negation, Command and Request

C. Exercises :Using the Questions, Negation, Command and Request taught in the Unit

Poem:Ode to the West Wind by **P.B. Shelley**

On Children by **Khalil Gibran**

.Unit - V

Listening : Lesson 7 – A Journey Part III

Speaking : Asking about possibility, asking if someone is sure and Related Dialogues on Universe, Roads and Traffic Signals

Reading : EFL Reading Cards – Level VII

Writing :

A. Vocabulary :

Nouns:Universe, Roads and Traffic Signals

Verbs :995 Most Frequently Used Verbs

Idioms :Universe, Roads and Transportation

B. Grammar :Active and Passive Voice, Run-on Sentences

Exercises :Using Active and Passive Voice, avoiding Run-on Sentences

Drama: ‘Never Never Nest by **Cedric Mount**

Reference Books

English for Basic Communication - 2, Textbook, Rev. Dr. K. A. Maria Arokiaraj and Mr. Leo Maria Francis, Oxford Bell Books, 2021.

CIEFL, ENGLISH 400 READING PROGRAMME, Orient Longman Ltd.1992.

Dr. Xavier Alphonse SJ, Walking the Extra Mile, MCRDCE Publication, Chennai, 2005.

G Radhakrishna Pillai, K Rajeevan, SPOKEN ENGLISH FOR YOU, Emerald Publishers, Chennai, 2002.

J E Metcalfe, THE RIGHT WAY TO IMPROVE YOUR ENGLISH, Jaico Publishing House, 1998.

M L Tickoo & Paul Gunashekar, READING FOR MEANING, S Chand & Company Ltd, New Delhi.

M P Bhaskaran and D Horsburg, STRENGTHEN YOUR ENGLISH, Oxford University Press, 1983.

M. Leo Maria Francis, HAND BOOK OF ESSENTIAL VOCABULARY

Prof. A C Gimson, & associates, ENGLISH COURSE – LINGUAPHONE, Linguaphone Institute Ltd. London, 2000.

Professor A C Gimson, ENGLISH COURSE, LINGUAPHONE, Linguaphone Institute Limited, London, 2000.

S J A Packiaraj, G M James, S J Sundar, COMMUNICATION COMPANION, Department of English LOYOLA COLLEGE, Chennai.

Sarah Freeman, WRITTEN COMMUNICATION IN ENGLISH, Orient Longman, 1994.

V Kootha Nainar, SPECTRUM ENGLISH COURSE, Book IV, Samba Publishing Co. Pvt. Ltd, 2000.

English - III: Public Communication

Semester - I

Hour: 5

Sub. Code: EN113T

Credits: 3

Unit - I

Speaking: Introduce oneself to the gathering - Describe one's village - Speak about one's family - Narrate a story/incident

Writing:

Prose: 'Six Thinking Hats' by Edward De Bono

Poem: 'Punishment in Kindergarten' by Kamala Das

Phrasal Verbs: Starting with A, B and C

Unit - II

Speaking: Welcome the gathering – Introduce a guest to the audience - Thank the gathering and the organizers of an event

Writing: Writing Short Speeches

Prose: 'The Gift of the Magi' by O. Henry

Poem : 'Journey of the Magi' by T. S. Eliot

Phrasal Verbs: Starting with D, E and F

Unit - III

Speaking: Give his/her opinion on any current national issue - Support / oppose a given idea / concept / opinion - analyse and report on the advantages/disadvantages of any social issue

Writing:

Short Story: 'The Lady, or the Tiger?' by Frank T. Stockton

Poem: 'Satan's Speech' by John Milton

Phrasal Verbs: Starting with G, H and I

Unit - IV

Speaking: Prose (Speeches) – Podcast and Text

: Quit India by Mahatma Gandhi

: Gettysburg Address by Abraham Lincoln (Concluding part)

: Swami Vivekananda's speech at the World Parliament of Religions

: Making presentations and presenting

Writing:

A Project - Preparing a Project Presentation

Effective Communication in Business Contexts – some principles and samples and preparing presentations

Short Story: A Case of Suspicion by Ed Wallace

Phrasal Verbs: Starting with J, K and L

Unit - V

Speaking: Preparing news items of local events and speak about them

Writing: Read newspapers and magazines and write to the Editor and/or comment on it.

Play: Drama– 'Chandalika' by Rabindranath Tagore

Phrasal Verbs: Starting with M, N and O.

Reference Books

English for Public Communication, Textbook, Rev. Dr. K. A. Maria Arokiaraj and Mr. Leo Maria Francis, Oxford Bell Books, 2021.

Charles K. Atkin, *Public Communication Campaigns*, 4th Ed., Thousand Oaks, CA: Sage.1981.

Stephen E. Lucas, *The Art of Public Speaking*, 10th Ed., McGraw-Hill, 2008.

Mike Acker, *Speak With No Fear: Speak With No Fear: Go from a nervous, nauseated, and sweaty speaker to an excited, energized, and passionate presenter*, Advance, Coaching and Consulting, 2019.

William E. Lee, Daxton Stewart and Jonathan Peters, *The Law of Public Communication*, 11th Edition by Routledge, USA, 2020.

Dr. Xavier Alphonse SJ, *Walking the Extra Mile*, MCRDCE Publication, Chennai, 2005.

Ed. Dr. M S Nagarajan, *SPECTRUM – AN ANTHOLOGY OF MODERN PROSE*, AnuChithra Publications, Chennai, 1988.

Eds. Dr. Robert Ilson, Prof. David Crystal, *READER’S DIGEST UNIVERSAL DICTIONARY*, Reader’s Digest, 1993.

J E Metcalfe, *THE RIGHT WAY TO IMPROVE YOUR ENGLISH*, Jaico Publishing House, 1998.

M L Tickoo & Paul Gunashekar, *READING FOR MEANING*, S Chand & Company Ltd, New Delhi.

M P Bhaskaran and D Horsburg, *STRENGTHEN YOUR ENGLISH*, Oxford University Press, 1983.

Mary K McCaskill, *A HAND BOOK FOR TECHNICAL WRITERS AND EDITORS*, Langley Research Centre, Hampton, Virginia.

Sarah Freeman, *WRITTEN COMMUNICATION IN ENGLISH*, Orient Longman, 1994.

English - IV: Business Communication

Semester - I

Hour: 6

Sub.Code:EN114T

Credits: 3

Unit - I

Speaking: Facing an interview, Tele-interviews

Writing:

Applying for Jobs, Preparing Resumes, Standard Business Letters

Prose: The Four Brothers by **Walter De La Mare**

Poem: The Lamb by **William Blake**

The Tiger by **William Blake**

Phrasal Verbs: Starting with P, Q and R

Unit - II

Speaking: Telephone manners, Asking for information and giving information, Making Appointment, canceling and rescheduling Appointments

Writing:

Writing minutes of a meeting, writing short reports

Short Story: Kabuliwalaby Tagore

Poem :Telephone Conversation byWole Soyinka

Phrasal Verbs:Starting with S, T and U.

Unit - III

Speaking: Handling customers/clients, receiving visitors

Writing:

Thanking letters, congratulatory letters, letters of sympathy, condolence letters

Prose:The Necklace by Guy de Maupassant

Poem: Night of the Scorpion byNissim Ezekiel

Phrasal Verbs: Starting with V, W, X, Y and Z

Unit – I

Speaking: Negotiation

Writing:

A Case study – involving negotiation and submitting a written report

Prose : X = X + 1 Syndrome by R. K. Narayan

Poem : The River by A.K. Ramanujan

Idioms: Spirituality related

Unit - V

Speaking: Group Discussion

Writing:

A Case study : involving group discussion and submitting a written report

Play:The Trial of Billy Scottby Mazie Hall

Idioms: Job/Profession related

Reference Books

English for Business Communication, Textbook, Rev. Dr. K. A. Maria Arokiaraj and Mr. Leo Maria Francis, Oxford Bell Books, 2021.

Written Communication in English- Sarah Freeman. Pub: Orient Longman.

Business Communication Process and Product; 6th ed

Communication Matters, Porter, et al

Examine your English: Margaret M. Maison(Orient Longman)

English for Practical Purposes by Patil, Valke, Thorat& Merchant (Macmillan)

Macmillan Foundation English By R.K. Dwivedi& A. Kumar (Macmillan)

Mable Chan, *English for Business Communication*, Routledge, USA, 2020.

Simon Sweeney, *Communicating in Business - Student's Book*, Cambridge University Press, 2004.

Raymond V. Lesikar, *Lesikar's Basic Business Communication*, McGraw-Hill, 1999.

Chaucer and Elizabethan Age

Semester - II

Hours: 5

Sub code: EN211

Credits: 5

Course Content

Unit – I (Poetry)

Introduction to Chaucer and Elizabethan age

Geoffrey Chaucer 'The Wife of Bath's Prologue' (Detailed)

Edmund Spenser Selection from *Amoretti*: Sonnets XXXIV

'Epithalamion' (Non-Detailed)

Unit – II (Poetry)

George Herbert *The Pulley*, *The Collar* (Detailed)

John Donne *The Sun Rising*, *The Canonization* (Detailed)

Philip Sidney Selection from *Astrophel and Stella* (Detailed)

Sonnets 1, 15, 27 (Non-Detailed)

Unit – III (Drama)

Shakespeare *As You Like It* (Detailed)

Thomas Kyd *Spanish Tragedy* (Non-Detailed)

Unit – IV (Prose)

Philip Sidney *An Apology for Poetry* (Detailed)

Thomas More *Utopia – Book I* (Non-Detailed)

Unit- V (Prose)

Francis Bacon *Of Truth*, *Of Studies*, (Detailed) *Of Marriage and Single Life* (Non-Detailed)

Philip Sidney *The Countess of Pembroke's Arcadia* (Book-I)

(Non-Detailed)

Reference Books:

1. Abrams M H. *A Glossary of Literary Terms*. New Delhi: Macmillan, 1978.
2. Edward Alfred's *History of English Literature*, University Express, 2000.
3. Prasad B. *A Background to the Study Of English Literature*. Chennai: Macmillan, 1999.
4. Baldick, Chris. *Concise Dictionary Of Literary Terms*. Oxford University Press, 1990.
5. Coyle, Martin. *Literary- Literary Terms and Criticism*. London: Macmillan, 1984.
6. Abrams M H. *A Glossary of Literary Terms* 11th Edition, 2014

18th Century English Literature

Semester - II

Hours: 5

Sub. Code: EN212

Credits: 5

Course Content

Unit - I

James Tomson *The Seasons (Winter)* (Detailed)

Robert Burns *A Red, Red Rose* (Detailed)

William Collins *Ode to Evening* (Detailed)

William Cowper *The Rose* (Detailed)

Unit - II

Samuel Johnson *The Vanity of Human Wishes* (Detailed)

Oliver Goldsmith *Selections from The Deserted Village* Lines 35-84, 195-238,

Unit – III

Mary Wollstonecraft *A Vindication of the Rights of Woman*, chapter 2 (Penguin, 1975), pp. 100-5, 106-9, 111-113) (on Milton's Adam and Eve, Rousseau, and Fathers of daughters).

Sir Roger at the Theatre *Coverley Papers*.

Unit - IV

Richard Brinsley Sheridan *School for Scandal* (Detailed)

[George Lillo](#) *The London Merchant*

Unit – V

Jonathan Swift Gulliver's Travels (Detailed)

Daniel Defoe Moll Flanders (Non – Detailed)

Reference Books:

1. B. Prasad: A Background to the Study of English Literature, Macmillan
2. Sanders, Andrew. Short Oxford History of English Literature. OUP, 2004
3. Rogers, Pat. (ed.) An Outline of English Literature. Oxford University Press, 1998
4. Richard Brinsley Sheridan: School for Scandal, Bloomsbury, 2015
5. Lillo, George: The London Merchant. Edward Arnold, 1965

Literary Forms

Semester - II

Hours: 5

Sub. Code: EN213

Credits: 5

Course Content

Unit – I

Prose and Non Fiction

The Essay and the types of Essays, The Short Story, Biography, Autobiography and Travelogue, Memoir, Criticism, Anecdote and Twitterature

Unit – II

Poetry

The Lyrics, The Sonnet, The Elegy, The Ode, The Ballad, The Folk, The Legend, The Epic, Haiku Stanza, Limerick.

Unit – III

Poetry Forms

The Heroic Couplet, The Blank Verse, The Spenserian stanza, Terza Rhyma and The Ottava Rhyma and Free verse.

Unit – IV

Drama

The Origin of English Theater, The Miracle and Mystery Plays, Comedy, Tragedy, Tragic-Comedy. The Dramatic Monologue, Soliloquy and Aside, The Absurd Drama, The One Act Play

Unit - V

Fiction

The Detective Novel, The Stream of Consciousness Novel, The Realistic Novel, Bildungsroman, Fantasy Fiction.

Reference Books

M.H. Abrams: *A Glossary of Literary Terms*, Macmillan

Baldick, Chris. *Concise Dictionary Of Literary Terms*. Oxford University Press, 1990.

Coyle, Martin. *Literary- Literary Terms and Criticism*. London: Macmillan, 1984.

B. Prasad: *A Background to the Study of English Literature*, Macmillan.

An introduction to English literature / R.J. Rees. Author. Rees, R. J..Edition. 2nd ed.

Published.London : Macmillan, 1968.

Social History of England

Semester - II

Hours: 6

Sub. Code: EN214

Credit: 4

Unit - I: The 16th Century

The Renaissance

The Reformation in England

Dissolution of the Monasteries

The Tudor Navy and the Spanish Armada

Unit - II: The 17th Century

English Colonial Expansion

The Puritan Revolution

The Restoration England

Coffee- House Life

Unit - III: The 18th Century

Causes and Effects of Agrarian Revolution

Causes and Effects of Industrial Revolution

The French Revolution and its Impact on Society

The Methodist Movement

Unit - IV: The 19th Century

The Victorian Age

The Influence of Science on Victorian England

Humanitarian Movements

The Reform Bills

Unit - V: The 20th Century

Means of Transport and Communication)

The World Wars and Social Security

Poor Laws

Education in the 20th Century

Reference Books:

1. G.M. Trevelyan: *The English Social History*, London.
2. A.G. Xavier: *An Introduction to the Social History of England*
3. Padmaja Ashok: *The Social History of England, Orient Black swan*
4. Albert CrollBaugh. *A Literary History of England*. Appleton-Century-Crofts, 1967.
5. Asa Briggs. *A Social History of England*, Penguin books, 1986.

Romantic Age

Semester: III

Hours: 5

Sub. Code: EN313

Credits: 5

Course Content

Unit - I

Introduction to Romanticism

William Blake *The Lamb*, (Detailed)

The Chimney Sweeper (Detailed)

The Little Black Boy (*The Songs of Innocence*) (Detailed)

The Tyger (*The Songs of Experience*) (Detailed)

Walter Scott *Lochinvar* (Detailed)

Thomas Gray *Elegy Written in a Country Churchyard* (Detailed)

Unit - II

William Wordsworth *Ode: Intimations of Immortality*, (Detailed)

Lines Composed upon Westminster Bridge (Non – Detailed).

Samuel Taylor Coleridge *Kubla Khan*, (Detailed)

Dejection: An Ode (Non – Detailed)

Unit - III

Percy Bysshe Shelley *Ode to the West Wind* (Detailed),

Ode to Liberty, (Non – Detailed)

John Keats Ode to a Nightingale, (Detailed)

La Belle Dame Sans Merci (Non – Detailed)

Lord Byron English Bards and Scotch Reviewers (Detailed)

Tithonus

Unit - IV

Jane Austen Pride and Prejudice (Detailed)

Walter Scott Ivanhoe (Non – Detailed)

Unit - V

Percy Bysshe Shelley The Cenci (Detailed)

Mary Shelley Frankenstein (Non – Detailed)

Reference Books:

C.N. Ramachandran Ed. Five Centuries of Poetry (Macmillan)

Addison, Paul. The Road to 1945: British Politics and the Second World War, rev.edn. London, 1994

3. Dominic Head. The Cambridge Introduction to Modern British Fiction, 1950-2000. Cambridge University Press, 2000.

Marwick, Arthur. British Society since 1945, London, 1989

Rogers, Pat. (ed) An Outline of English Literature. Oxford University Press, 1998

Sanders, Andrew. Short Oxford History of English Literature. Oxford University Press, 2004

Waugh, Patricia. Harvest of the Sixties: English Literature and its Background 1960- 1990, Oxford, 1995

Albert, Edward. *History of English Literature*. Kolkata: Oxford University Press, 2000.

Jones, John. *The egotistical sublime: A History of Wordsworth Imagination*. Chatto and windus, 1964.

Punter, David. *William Blake - Songs of Innocence and of Experience*. London: york press, 2001.

Rawson, Claude. *The Cambridge Companion to English Poets* . Cambridge: Cambridge University Press, 2011.

Vine, Steve. *William Blake*. Delhi: Atlantic, 2010.

Nayar, K Pramod. *The English Romantic Poets: An Anthology*. Orient Blackswan Private Limited. 2013.

Adams, Charles L. "The Structure of the Cenci." *Drama Survey*, 4,2 (Summer, 1965)

Sir Walter Scott, *Talisman*, ed. by Dwight Holbrook, Boston: published by gin and company, 1886.

Ode to a Nightingale - I <https://www.youtube.com/watch?v=gKRMbiQ8>

American Literature

Semester - III

Hours: 6

Sub. Code: EN314

Credits: 6

Course Content

UNIT I

Introduction: Richard Gray: A History of American Literature

Poetry

Detailed

Robert Frost Mending Wall

Maya Angelou Still I Rise

Non-Detailed

Walt Whitman O Captain! My Captain

Langston Hughes The Weary Blues

UNIT II – PROSE

Detailed

Thoreau Battle of the Ants

Non-Detailed

[William Faulkner- Nobel Prize Acceptance Speech](#)

UNIT III – DRAMA

Detailed

Edward Albee Our Town

Non-Detailed

Eugene O'Neill The Hairy Ape

Tennessee William A Streetcar Named Desire

UNIT IV – SHORT STORIES

Detailed

N. Hawthorne Feather Top

Non-Detailed

Mark Twain Luck

UNIT V – FICTION

Detailed

Hemingway Farewell to Arms

Non-Detailed

Alice Walker The Temple of My Familiar

Henry James The Portrait of a Lady

Reference Books

Gray, Richard J ,A History of American Literature, Blackwell Publishing.

Bigby, C.W. E. A Critical Introduction to Twentieth Century American Drama, London: CUF, 1984.
Print.

Oliver, Egbert. S. American Literature 1890 – 1965, An Anthology, New Delhi: Eurasia, 1970.
Print.

Jeffrey, Meyers ed. Hemingway: The Critical Heritage, London: Boston and Henley, 1982. Print.

Hemingway, Ernest, ed. Singh R.N. The Old Man and The Sea, New Delhi: Atlantic Publishers,
1999. Print.

Fisher, William J, ed. American Literature of the Nineteenth Century,-An Anthology. New Delhi: S.
Chand,
1970. Print.

Gates, Henry Louis and McKay, Nellie y, ed. Norton Anthology of African American Literature,
New York:

W.W. Norton and Company, 1997. Print.

O'Neill, Eugene. The Plays of Eugene O'Neill: Vol 1. Delhi: East-West Press Pvt. Ltd., 1989. Print

History of English Literature -I

Semester - III

Hours: 6

Sub. Code:EN315

Credits: 4

Course Content

Unit – I: Age of Chaucer

1. Geoffrey Chaucer
2. William Langland
3. John Gower
4. Sir Thomas Malory
5. Wyatt and Surrey
6. Tottel's Miscellany

Unit II: The Age of Shakespeare

Edmund Spenser

Sir Philip Sidney

- 3 .Francis Bacon and his Essays

4. University Wits
5. William Shakespeare
6. Ben Jonson

Unit –III: The Age of Milton

1. John Milton
2. The Metaphysical Poets-Donne and his followers
3. Robert Herrick, Richard Lovelace, Sir John Suckling
4. Sir Thomas Browne, Philip Massinger

Unit IV: The Age of Dryden

John Dryden

Samuel Butler

John Bunyan

John Evelyn and Samuel Pepys

Unit V: The Age of Pope

1. Alexander Pope
2. Jonathan Swift
3. Daniel Defoe
4. Addison and Steel
5. Matthew Prior, John Gay,
6. Edward Young, Thomas Parnell

Reference Books:

Edward Albert, History of English Literature, 1971.

Ronald Carter and John Mcrae, The Routledge History of Literature in English, 2001.

Compton Rickett A. History of English Literature.1981.

Hudson, Outline History of English Literature. G. Bell and Sons Ltd, 1947.

Sampson, Concise Cambridge History of English Literature, 1975.

Daiches David, A Critical History of English Literature, e-Book,

History of English Language

Semester - III

Hours: 5

Sub. Code: EN316

Credits: 4

Unit - I

Introduction to English Language

The Descent of the English Language
General Characteristics of English
The Indo-European Family of Languages

Unit - II

The Influence of Shakespeare and Milton on the English Language.

Unit - III

The Growth of English Vocabulary, Change of Meaning

Unit - IV

The Evolution of Standard English

Unit - V

Idioms and Metaphors, Foreign Contribution in English Language (Latin, Greek, Scandinavian, Italian, German, French, Indian, Hebrew, Persian)

Reference Books:

English Language- C. L. Wren, Vikas publication, 2009.

An Outline History of English Language- F. T. Wood, Revised edition, New Delhi –Trinity press, 2015.

History of English Language – A. C. Baugh and Thomas Cable, 6th edition, Routledge Publications, 2012.

[A History of English Literature](#) by Fletcher, Robert Huntington, Newyork public library – 1919.

[http:// www.slideshare.net/sarabdulaziz/history-of-english-language-37299376](http://www.slideshare.net/sarabdulaziz/history-of-english-language-37299376)

[http:// www.slideshare.net/sabiraqamar1/origin-of language](http://www.slideshare.net/sabiraqamar1/origin-of-language)

[http://preply.com/en/blog/214/03/11/9- language-that-have-influenced- vocabulary/](http://preply.com/en/blog/214/03/11/9-language-that-have-influenced-vocabulary/)

[http:// www.slideshare.net/RRbaldovino/history-of- english-language-17119630](http://www.slideshare.net/RRbaldovino/history-of-english-language-17119630)

<http://youtu.be/allnQ7nkrI>

Major English Tragedies

Semester - IV

Hours: 5

Sub. Code: EN414

Credits: 5

Unit - I

Christopher Marlowe Edward II

Unit - II

William Shakespeare Macbeth

Unit - III

John Webster The White Devil

Unit - IV

George Bernard Shaw Saint Joan

Unit - V

T.S. Eliot Murder in the Cathedral

Reference Books:

Richard Dutton and Jean.E. Howard. *A Companion to Shakespeare's Works. (Volume One) The Tragedies*. Blackwell Publishing. 2003.

Prasad, Birjadish. *A Background of the Study of the English Literature*. Third Edition. Calcutta. 1950.

Webster, John. *The White Devil* by Anthony TrOtt

Marlow, Christopher. *Dr. Faustus*. [DattaKitty](#) (Editor). 1997.

Watson C.J. Drama

History of English Literature – II

Semester - III

Hours: 6

Sub. Code: EN415

Credits: 4

Unit – I: The Age of Transition

Dr. Johnson

Oliver Goldsmith

Samuel Richardson, Henry Fielding, Tobias Smollet

William Blake, Burns, Cowper, Gray

Congreve, Sheridan

Unit– II: The Romantic Age

1. William Wordsworth, Samuel Coleridge,

2. P.B. Shelley, John Keats & Lord Byron

3. Walter Scott, Jane Austen

4. Charles Lamb, De Quincey, Hazlitt

Unit – III: The Victorian Age

1. Tennyson, Browning

2. Charles Dickens, William Makepeace Thackeray,

3. Thomas Hardy, Emily Bronte, Macaulay

4. John Ruskin, Mathew Arnold, Carlyle

Unit - IV: Twentieth Century Literature

1. W.B. Yeats, G.M. Hopkins, T.S. Eliot
2. A.G. Gardiner, G.K. Chesterton, Kipling
3. Oscar Wilde, G.B. Shaw, Conrad, Synge
4. Virginia Woolf, D.H. Lawrence, Galsworthy

Unit – V: Twenty first Century Literature

V.S. Naipaul, Michael Morpurgo, Neil Gaiman,
J.K. Rowling, Alain de Botton, Doris Lessing, Sarah Waters
Carly Chrchill, Tom Stoppard, David Hare, Sarah Kane, Camilla Whitehall
Al Alvarez, Seamus Heaney, John Berger, Carol Ann Duffy

Reference Books:

Edward Albert, History of English Literature, 2018, Oxford University Press
Ronald Carter and John Mcrae, The Routledge History of Literature in English, 2001.
Compton Rickett A. History of English Literature.1981.
Hudson, Outline History of English Literature. G. Bell and Sons Ltd, 1947.
Sampson, Concise Cambridge History of English Literature, 1975.
Daiches David, A Critical History of English Literature, e-Book,

Indian Writing in English – I (Pre- Independence Era)

Semester: IV

Hours: 5

Sub code: EN416

Credits: 5

Unit – I Poetry

Introduction to Indian literature
Arrival of East India Company and the associated impact
History of Indian Writing in English
Bengal Renaissance
Introduction of English Studies in India (Macaulay's speech)
Sri Aurobindo The Stone Goddess,
Agha Shahid Ali Postcard from Kashmir
Toru Dutt Our Casuarina Tree
Sarojini Naidu Love and Death

Unit – II Prose

Mahatma Gandhi Hind Swaraj (Chapter 13) What is true civilization?
Jawaharlal Nehru A Tryst with Destiny (Non-Detailed)

Unit – III Short Stories

Premchand *The Holy Panchayat*

R.K. Narayan *The M.C.C. (Non- Detailed)*

Unit – IV Fiction

Raja Rao *Kanthapura*

Bankim Chandra Chattopadhyay *Rajmohan's Wife (Non- Detailed)*

Unit – V(Drama)

Harindranath Chattopadhyaya *Siddhartha Man of Peace*

Extensive Reading:

Swami Vivekananda *Kali the Mother*

R. K. Narayan *The English Teacher*

Henry Derozio *The Harp of India*

Rabindranath Tagore *The Post Office*

Ismat Chughtai *'Lihaf' (The Quilt)*

Ambai *Squirrel*

Reference Books

Krishna Mehrotra, Arvind. *A History of Indian Literature in English*. Delhi: oxford university press, 2011.

Iyengar, K R Srinivasa. *Indian Writing in English*. Delhi: Sterling, 2019. Print.

Dasgupta, Subrata. *The Bengal Renaissance*. India: Permanent Black, 2019. Print.

An Anthology of Commonwealth Poetry edited by C D Narasimhaiah, Macmillan, 1990.

The Complete works of Sri Aurobindo. Vol 3 & 4. Pondycherri: Aurobindo Ashram

Gems of English Prose and Poetry, Orient Blackswan, 2013

Gandhi, M.K. *Hind Swaraj or India Home Rule*, Navajivan Publishing House, Ahmedabad.

Premchand. *The Holy Panchayat. Modern Indian Literature: Poems and Short Stories*. New Delhi:

Oxford University Press, 2007 (seventh impression). Print.

Anand, Mulk Raj. [1935] 2001. *Untouchable*. New Delhi: Penguin.

Rao, Raja. *Kanthapura*. New York: OUP, 1998. Print.

Chattopadhyaya, Harindranath, *Siddhartha: The Man of Peace*, Mumbai: Jaico Publishing House, 2002.

Phonetics

Semester: IV

Hours: 6

Sub. Code: EN417

Credits: 4

Course Content

Unit - I

Introductory Remarks
Components of Linguistics
The Organs of Speech
The Air-Stream Mechanism

Unit - II

The Classifications and Description of Speech, Sounds I: Consonants
The Consonants of English
Phonology- Phonemes & Allophones
Consonant Clusters in English

Unit - III

1. The Classification and Description of Speech, Sounds II: Vowels
2. The Vowels of English

Unit - IV

Intonation
Syllable
Word-Accent
Accent and Rhythm in Connected Speech

Unit - V

1. Assimilation & Elision
2. Practice in phonetic Transcription

Reference Books

- T. Balasubramanian – A Text book of English Phonetics for Indian Students; Macmillan.
Chennai. Chapters: 1,2,3,4,5,8,10,11,14,15, and 16 and Trinity Publications Second Edition
Chapter 3.
- Verma S.K. Krishnaswamy N. Modern Linguistics An introduction, New Delhi; Oxford, 1989.
- Bansal R.K. An Outline of General Phonetics. Bombay: OUP, 1971
- Sinha, Thakur. Better English Pronunciation, Chennai: Vijay Nicole Imprints, 20005.
- Ogden. Richard. An Introduction to English Phonetics (Edinburgh Textbooks on the English
Language) 1st ed. 2009.
- English Phonetics for Indian Student – Work Book, Trinity Publications, Jan. 2012.

M. A. ENGLISH

World Classics in Translation

Semester - I

Hours: 6

Sub. Code: EN718

Credits: 5

Course Content

Unit - I: Epic (Detailed)

1. Homer *Odyssey* Book 1 and 2
2. Dante *Inferno* – Canto 1-3

Epic (Non-Detailed)

3. Elango *Silapadikaram* – Ch: I-VI
4. Virgil *The Aeneid*, tr. Robert Fitzgerald (New York: Vintage, 1984).

Unit - II: Poetry (Detailed)

1. Thiruvalluvar *Thirukural* – Ch: Education and Discipline
2. Omar Khayyam *Rubaiyat* (Songs 1 - 10)
3. Khalil Gibrahin *The Prophet*

Poetry (Non-Detailed)

4. Pablo Neruda *The Word*

Unit - III: Prose (Detailed)

1. The Bible *The Book of Job* – Ch 1 to 4
2. Michel de Montaigne *Of Conscience, Of Books*

Prose (Non-Detailed)

3. Michel de Montaigne *Of Idleness, Of Fear*

Unit - IV: Drama

(Detailed)

1. Nikos Kazantzakis *Zobra the Greek*
2. Tchekhov *The Cherry Orchard*

Drama (Non-Detailed)

3. Moliere *The Miser*
4. Sophocles *Oedipus*
5. Kalidasa *Shakuntala*

Unit - V: Fiction

(Detailed)

1. Dostoevsky Crime and Punishment

2. Cervants Don Quixote

(Non –Detail)

3. Herman Hesse Siddhartha

4. Franz Kafka Metamorphosis

Books for Reference

1. Bhattnagarji, Amal-Four Essay on Tragedy-Calcutta: OUP, 1977.

2. Canning, John, ed-Hundred great Books-New Delhi: Rupa&co, 1993.

3. Chandran, Narayana-Text and their Worlds II-New Delhi: Foundation Books Pvt.Ltd, 2005.

4. Fischer, Carl-The Myth and Legend of Greece-Geo A, Pflaum, Publisher, Inc, 1968.

5. Frazer, James George-The Illustrated Golden Bough-London: George Rainbird Limited, 1978.

6. Translated Thirukural.

7. Khayyam, Omar. Rubaiyat of Omar Khayyam. New Delhi: Rupa Publications, 2000, Print.

Chaucer and Elizabethan Age

Semester - I

Hours: 6

Sub. Code: EN719

Credits: 5

Course Content

Unit – I (Poetry)

(Detailed)

Geoffrey Chaucer From The Prologue to the Canterbury Tales:

The Knight, The Prioress, The Wife of Bath, The Monk, The Doctor of Physic, The Parson

(Non- Detailed)

Edmund Spenser *The Faerie Queene*: Book II

Unit – II (Poetry)

(Detailed)

Sir Thomas Wyatt Sonnet 39: Such is the Course that Nature's kind hath wrought Whoso List to Hunt

Abraham Cowley Drinking

John Donne. Death Be not Proud , A Valediction Forbidding Mourning.

George Herbert, Discipline; The Flower

(Non- Detailed)

Shakespeare Venus and Adonis

Unit – III (Prose)

(Detailed)

Francis Bacon Of Counsels, Of Envy, Of Adversity, Of Revenge, Of Love

(Non- Detailed)

Thomas More Utopia Book - I

Sir Philip Sidney Apology for Poetry

Unit – IV (Drama)

(Detailed)

Christopher Marlowe Edward – II

Thomas Norton & Thomas Sackville Gorboduc

(Non – Detailed)

Thomas Dekker The Shoemaker's Holiday

Ben Jonson: Every Man in his Humour

Unit – V (Fiction)

(Detailed)

Thomas Nashe The Unfortunate Traveler

(Non – Detailed)

John Lily Euphues

Reference Books

Fremor, Una Ellis-The Jacobian Drama-London: University Paperback, 1995.

Ford, Boris-A guide to English Literature. Vol 1.The Age of Chaucer-
London: Penguin, 1961.

Grierson H.J.C-Metaphysical Lyrics and Poems of the Seventeenth Century-Oxford
University Press, 172.

Inglis, Fred-The Elizabethan Poets –London: Evans Brothers Ltd.1969.

Parker.M.P-The Allegory of the Faerie Queene-London: Oxford at the Clarendon
Press, 1966.

Renwick W.L-Spenser Selections: Introduction and Notes-London: Oxford at the
Clarendon Press, 1946.

Rickert, Edith-Chaucer's World-London: Columbia University Press, 1964.

Thomas Nashe, The Unfortunate Traveller; or, The Life of Jacke Wilton. ed.H.F.B. Brett Smith
Oxford Blackwell, 1920

Dekker, Thomas: The shoemaker's Holiday, Bloomsberry, 2002.

Semester: I

Hour: 6

Sub. Code: EN720

Credits: 4

Course Content

Unit I: Major Trends in ELT

A Brief History of Language Teaching – Grammar Translation Method – The Direct Method – The Oral and Situational Language Teaching - The Audiolingual Method

Activity Corner: Debate over GTM and DM

Unit II: Current Approaches and methods

Communicative Language Teaching – Content and Language Integrated Learning (CLIL) – Task-based Language Teaching – Multiple Intelligences- Computer-Assisted Language Learning (CALL)

Activity Corner: Learning a poem through MI

Unit III: Alternative Twentieth-Century Approaches and Methods

The Natural Approach – Total Physical Response – The Silent Way – Community Language Learning

Activity Corner: Role play

Unit IV

A. Developing the Language Skills (Using Technology)

Listening: Role of listening in ELT – listening process – uncertainties of foreign language listeners and its implications for English language classroom

Speaking: Skills and strategies in speaking English – Speaking English competently – Phonological aspects of English and its implications for classroom practice

Reading: Making sense of a text – process of second language reading and its implications for the teaching of reading

Writing: A contemporary writing classroom – process of writing: process approach – analyse and describe the structure of written texts – text-based approach

B. Teaching Language through Literature(Using Technology) – Online Teaching

Teaching through Poetry – Teaching through Drama – Teaching through Fiction

Activity Corner: Demonstration of teaching L/S/R/W through Poetry/ Drama/ Fiction

Unit V

The Teaching and Learning Environment

Learners, Approaches, and Methods,

Teachers, Approaches, and Methods

B. Mini- Project: Hands on training

Writing a lesson design to teach English language by using any two methods taught in the above units.

Teach English language to any one learner (preferably the younger brother/sister at home). The video should be submitted for evaluation.

Problems of Online Teaching

Viva-voce

Books for Reference:

- Allan B. Harold – Teaching English as a Second Language: A Book of Reading – Tat McGraw Hill Publishing Company Ltd., New Delhi, 1965.
- Bagchi, Dinesh – Teaching Poetry in Schools and Colleges – TR Publications, Madras, 1994
- Bennett W.A. – Aspects of Language and Language Teaching - London: Cambridge University Press, 1969.
- Bright J.A., McGregor – Teaching English as Second Language – Essex, ELBS & Longman, 1982.
- Corder, Pit S. – Introducing Applied Linguistics – London: Penguin Books, 1973.
- Hughes, A. – Testing for Language Teachers – Cambridge University Press, 1989.
- Kumar, Suresh E. and Srehari P. – A Handbook of English Language Laboratories. Chennai: Cambridge University Press, 2007.
- Lado, Robert – Language Teaching: A Scientific Approach – Faridabad and Haryana: Tata McGraw Hill, 1964,
- Larsen, Diane and Freeman – Techniques and Principles in Language Teaching – Delhi, Oxford University Press, 2004.
- Richards, Jack C. and Theodore Rodgers – Approaches and Methods in Language Teaching – Third Edition, India: Cambridge University Press, 2016.
- Soundararaj, Francis - Teaching Spoken English and Communication Skills – TR Publications, Madras, 1995.
- Widdowson, H.G. – Teaching Language as Communication – Oxford University Press, 1978.
- Davis, G., Hewer, S., Rendall, H., and Walker, R. ICT4LT Module 1.4: Introduction to Computer-assisted language learning (CALL). <http://www.ict4lt.org/en/en_mod1-4.htm>
- Warschauer, M. (1996). Computer-assisted language learning: An introduction. <<http://www.gse.uci.edu/markw/call.html>>
- <http://www2.nkfust.edu.tw/~emchen/CALL/unit1.htm>

Literary Criticism

Semester: I

Hours: 6

Sub. Code: EN720

Credits: 5

Course Content

Unit - I

Benjamin Jowett (New York: Random House, 1957).

OUP) (Detailed)

Plato The Republic, Book X tr.

Aristotle The Poetics, tr Ingram
Bywater (New Delhi)

Horace Ars Poetica

Longinus On the Sublime

Unit - II

Bharata Muni Natyashastra

Sethuramana) Indian Aesthetics: Its role in the
teaching of Literature

b) Schools of Criticism in Sanskrit

Unit – III

John Dryden Essay of Dramatick Poesie

Alexander Pope Essay on Criticism

Samuel Johnson Lives of Poets

Unit - IV

William Wordsworth Lyrical Ballads

Samuel Taylor Coleridge Biographia Literaria, chapters IV, XIII, XIV.

Percy Bysshe Shelley A Defense of Poetry

John Keats Letters

Unit - V

Mathew Arnold The Study of Poetry

Water Pater The Renaissance

Oscar Wilde The Critic as Artist

T.S. Eliot Tradition and Individual Talent.

I.A. Richards The Four Kinds of Meaning.

Extensive Reading:

Mark Schorer Technique as Discovery

Northrop Frye The Archetypes of Literature

Virginia Woolf Modern Fiction

Books for Reference:

Aiken Conrad- Collective criticism- New York and London, Oxford University Press, 1968.

Das and Kumar, Bijay-Twentieth Century Literary Criticism-Atlantic Publishing, 2005.

Lodge, David, ed. Modern Criticism and Theory-II edition, New Delhi; Pearson Education, 1998.

Sethuraman, ed.-Indian Aesthetic: An Introduction- New Delhi: Macmillan, 2005.

Theory into Practice: An Introduction to Literary Criticism THIRD EDITION by Ann B. Dobie

Elective I: Children's Literature

Semester - I

Hours: 6

Sub. Code : EN722A

Credits : 3

Introduction

Content

Unit I: Introduction

Definition, Difference of Adult Literature and Children's Literature, Significance of studying Children's Literature

Types of Children's Literature – (Nursery Rhymes, Fairy Tales, Fables and Legends)

Unit - II: Poetry

Detail

Robert Browning The Pied Piper of Hamelin

2. Edward Lear The Owl and the Pussy Cat

3. William Blake The Lamb

4. Maya Angelou Life Doesn't frighten me

Non Detail

5. William Wordsworth The Kitten and Falling Leaves

6. Mary Howitt The Spider and the Fly

Unit - III: Drama

Detail

Rabindranath Tagore The Post Office

Non- Detail

James Matthew Barrie Peter Pan

Unit - IV: Short Stories

Detail

Panchatantra Tales War and Peace or the Crows and the Owls,
Birds Elect King, Elephant, Hares and Moon, Cat, Partridge and Hare

Hans Anderson Fairy Tales Thumbelina, The Emperor's New Clothes, The Ugly
Duckling, The Little Mermaid

Non-Detail

Richary Burton Selected Tales Thousand One Arabian Nights Alibaba and the Forty
Thieves, Aladdin and the Wonderful Lamp

Unit - V: Fiction

1. R.K. Narayan Swami and Friends
2. C.S. Lewis- The Tale of Narnia the Lion, the Witch and The Wardrobe
3. Rudyard Kipling The Jungle Book
4. Salman Rushdie Luka and the fire of life

Extensive reading

1. J.K. Rowling- *Harry Potter and the Philosopher's Stone*
2. Sudha Murthy- *Grandma's Bag of Stories*
3. Johanna Spyri- *Heidi*
4. Frances Hodgson Burnett -*The Secret Garden*

Reference Books

1. Chaudhuri, Sukanta – Selected Short Stories: Rabindranath Tagore – Oxford University Press
2. Kingston E.F- Old Poems and new poems.1958
3. Lwire, Alism – Boys and Girls Forever –London: Chatto& Winders, 2003
4. Tiwari, Shubha – Children and literature – new Delh:Atlantic Publishers and Distributors,2006.
5. Winbott S.E – English Poetry for the Young – Blackie and Sons.
6. The Golden Gate: New Delhi: Oxford University Press.2006
7. Burnett Hodgson Frances – The Secret Garden : India: Wilco Publishing House -2005.
8. Hans Anderson – Hans Anderson Fairy Tales India: Wilco Publishing House -2005.
- 10.Spyri, Johanna *Heidi* , Fingerprint Classics, 2018.
11. Harry Potter and the Philosopher's Stone, Bloomsburry Publication, 2001.
12. Sudha Murthy- *Grandma's Bag of Stories*, Puffin Publication, 2015.
- 13.Barner, W(n.d.) *Types of Children's Literature*. Retrieved April 6, 2018 from <https://archie.org/details/typesofchildrens19barn>
- 14..*Children's Literature* (2008) Retrieved April 14,2018 from <http://www.fags.org/childhood/Children-s-literature.html>
15. <https://www.gutenberg.org/files/16/16-h/16-h.htm>

16. https://www.edhelper.com/poetry/Life_Doesnt_Frighten_Me_by_Maya_Angelou.htm

17. <https://g.co/kgs/dW9Uyj>

Elective I: Subaltern Studies

Semester - II

Hours: 6

Sub. Code: EN722B

Credits: 3

Course Content

Unit-I Introduction

1. Introduction to Subaltern Literature.
2. Who were the Sudhra? – Dr. Ambedkar(chapter 3- The Brahmanic theory of status of Sudhra)

Unit - II: Poetry

Detail

1. TrymbakSapkaleThat Single Arm
2. Waman Kardak Send My Boy to School
3. W.KapanThe Search
4. Sharan Kumar LimbaleWhite Paper
5. BaburaoBagulYou Who Have Made the Mistake

Non-Detail

6. F.M Shindo Habit
7. L.S Rokade To be or not to be born
8. Uttam KolgaokarHis House

Unit - III: Short Stories

Detail

1. Arjun Dangle Promotion
2. BandhumadhavThe Poisoned Bread

Non-Detail

3. Daya Pawan We are Kings!
4. BaburaoBagul Mother

Unit - IV: Essay

Detailed

1. B. R. Ambedkar Dr. Ambedkar's Speech at Mahad', in *Poisoned Bread*, ed. Arjun Dangle (Hyderabad: Orient Longman, 1992, rpt.1994), pp. 223-33.
2. Gayatri C. Spivak Can the Subaltern Speak?

Non- Detailed

3. Gautam Bhadra Four Rebels of 1857.

4. Aravind Malagatti Government Brahamana

Unit - V:

Drama (Detail)

Mahasweta Devi Draupdi

Novel

Bama Karuku

Om Prakash Valmiki Joothan

Extensive Reading

Perumal Murugan Season of the palm

Daya Pawar Baluta

Meena Kandasamy The Gypsy Goddess

Reference Books

1. Ranajit Guha, ed. *Subaltern Studies I: Writings on South Asian History & Society*. New Delhi: Oxford University Press India, 1982. 231 p.
2. Guha, Ranajit and Gayatri Chakravorty Spivak, eds. *Selected Subaltern Studies*. New York: Oxford University Press, 1988. 434 p.
3. Arjun Dangle-Poisoned Bread: Translation From Modern Marati Literature
4. ‘Survivance’ beyond canons: Emerald Publishers, 2008.
5. ‘The Scar’ by K.A. Gunasekaran, Orient Blackswan, 2009.
6. ‘The Poisoned Bread’, Orient Blackswan, 2009
7. ‘The Untouchable Spring’ by G. Kalyana Rao, Orient Blackswan, 2010.
8. ‘Dalit Personal Narratives’ by Raj Kumar, Orient Blackswan, 2010.
9. ‘Government Brahamana’ by Aravind Malagatti, Orient Longman, 2007.
10. Sarkar, Badal, *Evam Indrajit – A Three Act Play*. Oxford University Press, 1975.
11. http://daic.gov.in/SW_eng/Volume_07.pdf
12. <https://g.co/kgs/83RDNH>
13. <https://g.co/kgs/5WtHdF>
14. <https://www.pinterest.com/pin/299982025180122067/>

Elective I: Women’s Writing

Semester - I

Hours: 6

Sub. Code: EN722C

Credits: 3

Course Content

Unit I Poetry

Detailed

1. Daddy Sylvia Plath
2. The Mother Gwendolyn Brooks
3. Hope Emily Dickinson
4. Our Casuarina Tree Toru Dutt

Non - Detailed

4. If Everything Comes Crashing Down Meena Kandasamy
5. The old Play House Kamala Das

Unit II**Prose****Detailed**

1. Betty Friedan The Feminine Mystique (1-5 chapters)
2. Simon de Beauvoir The Second Sex

Non-Detail

Sojourner Truth Ain't I a Woman?

Unit III**Drama****Detailed**

1. Wit Margaret Edson

Non – Detailed

2. The League of Scarlet Pimpernel Baroness Orczy

Unit - IV Short Stories**Detail**

Shashi Deshpande The First Lady

A Liberated Woman

It was the Nightingale

(Short Stories)

Non- Detail

Sudha Murthy How I Taught My Grandmother to Read
Books for 'At Least one Library'

Salaam Abdul Kalam

Hassan's Attendance Problem

Unit - V Fiction**Detail**

Anne Frank The Diary of a Young Girl
Chitra Banerjee The last queen
Manju Kapur Difficult daughters

Extensive reading

Arundhati Roy Azadi
Anne Sexton House Wife
Doris Lessing The Grass is Singing

Reference Books

1. Tharu, Susie and Lalitha K.-Women Writing in India –New York; Oxford University.Press,2004
2. Deshpande, Shashi. *Collected Stories, Vol-1*: Penguin Books India, 2003
<http://g.co/kgs/E3j7Ab> (Second Sex)
3. <https://allpoetry.com/Our-Casuarina-Tree>
<https://www.poetryfoundation.org/poems/43309/the-mother-56d2220767a02>
<https://www.poemhunter.com/poem/if-everything-comes-crashing-down/>
<http://www.english-for-learners.com/the-old-playhouse.html>
7. <http://g.co/kgs/qX4Nmv>(Sudha murthy)
8. <https://www.poetryfoundation.org/poems/48999/daddy-56d22aafa45b2>
9. <https://www.poetryfoundation.org/poems/42889/hope-is-the-thing-with-feathers-314>
10. <http://www.gutenberg.org/cache/epub/5805/pg5805.html>
11. https://thehermitage.com/wp-content/uploads/2016/02/Sojourner-Truth_Aint-I-a-Woman_1851.pdf
<https://www.nps.gov/articles/sojourner-truth.htm>
12. <https://www.youtube.com/watch?v=Wk6eGwdFfoI>
13. <https://g.co/kgs/6FzZcF>

Restoration and Eighteenth Century

Semester: II

Hours: 6

Sub. Code: EN818

Credits: 5

Unit - I: Poetry

Detailed

1. John Milton Paradise Lost Book IV

Non-Detailed

2. Andrew Marvell To His Coy Mistress
3. Alexander Pope AnEssay on Man
4. Robert BurnsA Man's a Man for A' That, To a Louse
5. Thomas Grey Elegy Written in a Country Churchyard
6. William CollinsOde To Simplicity

Unit - II: Drama

Detailed

1. John Dryden All For Love

Non-Detailed

2. Oliver Goldsmith The Good- Natur'd Man

Unit - III: Drama

Detailed

1. Sir John VanbrughThe Provoked Wife

Non-Detailed

2. William CongreveThe Old Bachelor
3. George Etherege The Man of Mode
4. William Wycherley The Country Wife

Unit - IV: Prose

Detailed

1. Jonathan Swift The Battle of Books
2. Addison and Steele Coverley Papers
 - The Spectator's Account of Himself
 - Sir Roger and the Club

Non-Detailed

3. John BunyanThe Pilgrim's Progress

Unit - V: Fiction

Detailed

1. Daniel Defoe Robinson Crusoe

Non-Detailed

2. Henry Fielding Joseph Andrews
3. Laurence Sterne Tristram Shandy
4. Samuel RichardsonClarissa
5. Voltaire Candide

Reference Books

1. Braunmuller A.R. and Hattaway - The Cambridge Companion to English Renaissance Drama - UK - Cambridge University Press, 2003.

David, L. Hirs - Comedy of Manners: The Critical Idiom Series - London: Methuen & Co 1979.

Hammond, Gerald - The Metaphysical Poets: A Selection of Critical Essays
London: Macmillan, 1974.

King, Bruce - Seventeenth Century English Literature - London: Macmillan, 1986.

Novak E. Maximilian - Eighteenth Century English Literature - London: Macmillan, 1984.

Price, Markin - The Restoration and the Eighteenth Century - London: OUP, 2003.

Vanbrugh, Sir John. The Provoked Wife. A&C Black Publisher Ltd., 1993.

Defoe, Daniel. Robinson Crusoe. Kindle Unlimited, 2011.

Bunyan, John. The Pilgrim's Progress. Rupa Publication, 2000.

Contemporary Critical Theory and Terms

Semester - II

Hours: 6

Sub. Code: EN819

Credits: 5

Course Content

Unit - I:

Viktor Shklovsky Art as Technique

W.K. Wimsatt and Monroe Beardsley The Intentional Fallacy

Unit - II

Roland Barthes The Death of the Author.

Claude Levi Strauss Incest and Myth

Unit - III

Deconstruction – Jacques Derrida Sign, Structure and Play in the Discourse of the Human Sciences

Marxist – Terry Eagleton – Marxist Criticism

Unit - IV

Psycho – Analytic Jacques Lacan The Letter in the Unconscious

Reader – Response – Stanley Fish Interpreting the Variorum

Unit - V

Toril Moi Feminist Female Feminine

Homi K. Bhabha How Newness Enters the world:

Postmodern space, postcolonial time and the trial of cultural translation, in *The Location of Culture* (London: Routledge, 1994), pp.212-35

Extensive Reading

Humanism, Naturalism, Phenomenology, Dadaism, Magic Realism, Russian Formalism, New Criticism, Meta Fiction, Narratology, Intertextuality, Post-structuralism, Reception Theory, New Historicism, Common Wealth Literature, Fourth World Literature, Digital Literature, Eco Criticism, Post Modernism

Books for Reference

Allen, Graham – Roland Barthes – London and New York: Routledge, 2003.

Barry, Peter – *Beginning Theory* – Manchester and New York: Manchester University Press, 2002.

Belsey, Catherine – *Critical Practice* – London and New York: Routledge, 1979.

Bennett, Tony – *Formalism and Marxism*– London and New York: Routledge, 1979.

Bertens, Hans – *Literary Theory; the Basics* – London: Routledge, 2001.

Culler, Jonathan Barthes – *A Very Short Introduction* – New York: OUP, 2002.

Fillingham, Lydia Alix and MousheSusser – *Foucault for Beginners* – India: Orient Longman, 2000.

Hawkes, Terence – *Structuralism and Semiotics* – London and New York: Routledge, 1977.

Holquist, Michael – *Dialogism* – London and New York: Routledge, 1990.

Iyengar, Srinivasa K. R. – *The Adventures of Criticism* – New Delhi: Sterling Publishers, 1985.

Krishnasamy H. John Varghese and Sunita Mishra – *Contemporary literary Theory: A Student's Companion* – New Delhi: Macmillan, 2001.

Kundara, Milan – *The Art of the Novel* – New York: Penguin Books &Faber & Faber, 1980
Boston and New York: Bedford, 1998.

Lane, J. Richard – *Fifty Key Literary Theorists* – New York and London, Routledge, 2006.

Murfin, Ross and Supriya M. Raj – *The Bedford Glossary of Critical Terms* – Boston and New York: Bedford, 1998.

Nagarajan M.S. – *English Literary Criticism and Theory* – Hyderabad: Orient Longman, 2006.

Nooris, Christopher –*Deconstruct* – London and New York: Routledge, 1982.

Powell, Jim and Van Howell – *Derrida for beginners* – India: Orient Longmen, 2000.

Powell, Jim – *Postmodernism* – Chennai: Orient Longman, 2002.

Rainbow, Paul – *The Foucault Reader* – New York: Pantheon books, 1984.

Royle, Nicholas – *Jacques Derrida* – London and New York, Routledge, 1984.

Royle, Nicholas, Jacques and Derrida – London and New York, Routledge.

EN820 - New Literatures in English

Course Content

Unit I Poetry (Detailed)

Archibald Lampman A January Morning, Voices of Earth

Maya Angelou Phenomenal Woman, When I Think About Myself

Derek Walcott Ruins of a Great House, A Far cry from Africa

Poetry (Non-Detailed)

Judith Wright The Old Prison

George Bowering Grandfather

Unit II Prose (Detailed)

Maria Campbell Half breed

Alice Walker In Search of My Mother's Garden

Prose (Non-Detailed)

Margaret Atwood Nature as Monster', in *Survival* (Concord, Ont.: Anansi, 1972, rpt.1992), pp.45-67.

Barbara Jefferies The Drover's Wife, *Ibid.*, pp.265-72

C.L.R.James Beyond a Boundary, in *The Arnold*

Anthology of Postcolonial Literature in English, op.cit.

Unit - III: Drama (Detailed)

Manjula Padmanaban Harvest

Lorraine Hansberry A Raisin in the Sun

Drama (Non-Detailed)

Wole Soyinka's Death and the King's Horseman

Unit IV Short Story (Detailed)

Nasibu Mwanukuzi Killing Time

Short Story (Non-Detailed)

Carol Shield A Scarf

Unit V Fiction (Detailed)

J.M. Coetzee Waiting for Barbarians

Toni Morrison The Bluest Eye

Fiction (Non-Detailed)

Bapsi Sidhwa Ice – Candy man

Salman Rushdie The Moor's Last Sigh

Chimamanda Ngozi Adichí Purple Hibiscus

Books for Reference:

The Postcolonial Studies Reader ed. Bill Ashcroft, Gareth Griffiths, Helen Tiffin(London, Routledge,1995)

Barry, Peter. *Beginning Theory* (Manchester 1995)

Norris, Christopher. *Decosntruction: Theory and Practice* (Routledge 1982)

Ryan, Michael. *Literary Theory: A PracticleIntroduction.*(Blackwell 1999)

Nikam,M.J., *Colonial and Post Colonial Identity in R.K.Narayan 's Novels*, Dattason, Sadar , Nagpur.

MS Nagarajan ,English Literary Criticism and Theory , Orient blackswan Pvt. Ltd.

Research Methodology

Semester: II

Hours: 6

Sub. Code: EN821

Credits: 5

Unit - I: Research – Types of Research: Quantitative and Qualitative approaches – Action research – Research Process: Selecting a topic, Literature Review-Process in LR, Working Bibliography, Identifying authentic online resources, Methodology, Data Collection, Data Analysis, Research Findings.

Application: – Selecting a topic for Research and writing Literature Review

Unit - II: Taking Notes – Plagiarism and Academic Integrity – Outlining – Writing Drafts – Language and Style – The Form of Literary Argument

Unit - III: Spelling – Punctuation – Italics – Names of Persons – Numbers – Titles of Works in the Research Paper – Quotations – Capitalization and Personal Names in Languages

Application: Putting into practice the APA/MLA style of all the above topics

Unit - IV: Margins – Text Formatting – Heading and Title – Page Numbers – Tables and Illustrations

Documentation: (Using MLA/APA) Documenting sources – The List of Works Cited – One Author – Two or More Works by the same author – Citing Periodical and Non-periodical Print Publications – – Citing Common sources – Citing Web Sources (Manually & using App)

In Text Citation: Parenthetical Documentation and the list of works cited – Readability

Application: Putting into practice the APA/MLA style of all the above topics

Unit - V: Search Skills in Libraries and Online – Editorial Skills – Bibliographical Skills – Dissertation Skills – IT Skills – Presentation Skills

Application: Putting into practice the APA & MLA style of all the above topics

Books for Reference:

Anderson, Janathan, Berry H. Durston and Millicent Poole – Thesis and Assignment Writing – New York: Wiley Eastern Limited, 1988.

Kumar, AnandRaju – American British and Commonwealth – Chennai: Affiliated East-West Press Ltd, 1990.

Gibaldi, Joseph – MLA: Handbook for Writers of Research Papers, 8th Edition – Affiliated East-West Press Pvt. Ltd., New Delhi, 2009.

Lipson, Charles – CiteRight - A Quick Guide to Citation Styles - MLA, APA, Chicago, the Sciences, Professions, and More

Pirie, David B. – How to Write Critical Essays: A Guide for Learners of Literature – London and New York, Routledge, 2002.

Woolf, Judith – Writing About Literature – London and New York, Routledge, 2005.

Eliot Simon ed – A Hand Book to Literary Research – London Routledge, 1998.

Fabb Nigel and Durant Allan – How to Write Essays Theses Dissertations in Literary studies – London Longman Publishing 1993.

Goring Paul – Studying Literature: The Essential companion – Hodder education –

U. K.2001

9. Kothari C. R., Research Methodology: Method and Techniques (Second Revised Edition), New Age International Publishers, New Delhi.

EN822A - Elective II: Cultural Studies

Semester-II

Hours: 6

Sub.Code : EN822A

Credits: 3

Course Content

Unit I

Cultural Studies: An Introduction

Understanding Cultural Studies

Baldwin E. *Introducing Cultural Studies*

Unit II

Power-Agency, Identity-Subjectivity

Ideologies

Symbol-Semiotics

Gender-Feminism

Hall, Stuart. *What Is Culture? (Cultural Studies and Its Theoretical Legacies)*

During, S. *Cultural Studies: An Introduction*

Unit III

Race, Ethnicity, Nation

Orientalism

Subaltern

Globalization, Diaspora, Multiculturalism

Hooks, Bell. *A Revolution of Values: The Promise of Multicultural Change*

Tomlinson, John. *Globalization and Culture*

Unit IV

Popular Culture- Culture Industry- The Commodity

Media, Television, Cinema - Representation, Consumerism

Ross, Andrew. *The Challenge of Science*

Williams, Raymond. *The Analysis of Culture: Culture and Society*

Unit-V

Science, Technology and Cultural Studies

Cyberculture

Fiske, J. *Understanding Popular Culture*

During, S. *The Cultural Studies Reader*

References:

Saukko, Paula. *Doing Research in Cultural Studies: An Introduction to Classical and New Methodological Approaches*

Storey, John. *Cultural Theory and Popular Culture*. Routledge 1993
Walton, [David](#). [Introducing Cultural Studies](#). 2007

During, [Simon](#). *The Cultural Studies Reader*. 1993

McRobbie, Angela. *The Uses of Cultural Studies*. 2005

Nayar, [Prmod K](#) . *An Introduction to Cultural Studies*. 2008.

Ryan, [Michael](#) .[Musiol](#),[Hanna](#) . *Cultural Studies: An Anthology*. 2008.

Elective II: Gender and Mass Media

Semester-II

Hours: 6

Sub.Code : EN822B

Credits: 3

Course content

Unit – I Definition and Forms

Definition of gender, Difference between sex and gender, Gender and Language, Gender and Alternative Media.

Unit – II Terms and Analysis

Feminist terminology, Stereotyping, Patriarchy, Marginalization, Male Gaze, Feminist film criticism, thematic and semiotic analysis, Dyer, “The Matter of Whiteness”

Unit – III Laws and Ethics

Transgender bill, Indecent Representation of Women (Prohibition) Act, 1986, Code of Ethics for Advertisement, Stalking, Ethics for media.

Unit – IV Gender in Media

Types of media, feminism and cyber space, strategies to promote gender equality, Representations of Gender in Video games and Graphic designs, Gender and Music.

Unit – V Impacts

Influence of media in society, patriarchy in operation, Gender specific job responsibility in Media, use of feminist methods for critiquing media representation, practice sessions.

Activity:

Describe and analyze a media artifact(s) (film, television, magazines, newspapers, internet, transgender) outside of class screenings. Comment on the ways gender is portrayed and constructed in/by them. Comment on whatever you find interesting, engaging, hopeful, etc. about gender relations in contemporary media culture.

Reference Books:

- Dines, Gail and Jean M. Humez. *Gender, Race and Class in Media*. Sage:1994.
- Goffman, Erving. *Gender and Advertisement*. Harpet and Row: New York,1976.
- Laura, Mulvey.—*Visual Pleasureand NarrativeCinemall*. Screen 16.3 Autumn 1975.
- Macdonald, Myra. *Representing Women*. London: Arnold,1995.
- Van Zoonen, Lisbet. *Feminist Media Studies*.New Delhi; Sage,1994.
- Usha, V.T. *Gender, Value and Signification*. KRPLLD, CDS,2003.
- Thakur B.S., Binod. C.Agarwal. *Media Utilisation for the Development of Womenand Children*. New Delhi: Concept,2004
- D. Halder, (2013). *Examining the scope of Indecent representation of Women (Prevention) Act, 1986, in the light of Cyber Victimization of Women in India*. National Law School Journal, 11, 188-218.
- Chakrapani, Venkatesan. (December, 2010). *Hijras/Transgender woman in India: HIV, Human Rights and Social Exclusion*. United Nations Development Programme (UNDP), India.

Snelik, Anneke. 1998. *And the Mirror Cracked: Feminist Cinema and Film Theory*.
Hampshire: Macmillan.

Dyer, R. (1988). The matter of whiteness. In *White* (pp.1-14). London: Routledge.

Elective II: Post-Colonial Literature

Semester - II

Hours: 6

Sub. Code: EN822C

Credits: 3

Course Content

Unit – I (Poetry)

(Detailed)

A.D.Hope *The Lamp*

Kofi Awoonor

The Weaver Bird

John Pepper Clark *The Causalities*

Kishwar Naheed

I am Not that Woman (Pakistani)

(Non- Detailed)

P.K. Page *Autumn*

Jessie Mackay *October in New Zealand*

Almaghir Hashmi *So, What if I Live in a House Made by Idiots*

Lorna Goodison *On Becoming*

Unit – II (Prose)

(Detailed)

Helen Tiffin *Post-Colonial and Counter discourse*

Homi K. Bhabha *The Location of Culture*

(Non – Detailed)

Leela Gandhi *Post-Colonial Theory- After Colonialism*

Meenakshi Mukherjee *Interrogating Post colonialism*

Unit – III (Drama)

(Detailed)

Manjula Padmanabhan *Harvest*

Kee Thuan Chye (Malaysia) 1984 *Here and Now*

Non- Detailed

Wole Soyinka *The Road*

Chin Woon Ping

Details Cannot Body Wants

Unit – IV (Short Stories)

(Detailed)

Nadine Gordimer *The Soft Voice of the Serpent*

Ngugi wa Thiong'o *A Meeting in the Dark*

Non- Detailed

Kate Grenville *Mate* (Australia)

Andrew Salkey *Anancy* (Caribbean Islands)

Unit – V (Fiction)

(Detailed)

Kiran Deasi *The Inheritance of Loss*

[Hanif Kureishi](#) *The Buddha of Suburbia*

(Non – Detailed)

Khaled Hosseini *The Kite Runner*

Michael Ondaatje *The English Patient*

Books for Reference:

Bassuett Susan- *Post colonial Theory and Practice.*

Bill, Ashcroft, Garresh Griffiths and Helen Tiffin - *The Empire Writes Back – London and New York: Roulledge, 1989.*

Chanadran Narayana – *Texts and their Worlds II – New Delhi: Foundation Books Pvt. Ltd, 2005.*

King Bruce – *New National and Postcolonial Literature – Clarendon Paper backs*

Landry, Donna – *the Spivak Reader.*

Narasimah C.D. *Anthology of Commonwealth Poetry – Macmillan*

Pewho, Esidore – *The Heritage of African Poetry Longman England 1985.*

Griffiths, Gareth; Tiffin, Helen; Ashcroft, Bill - *The Post-colonial studies reader Routledge, 2003*

The Arnold Anthology of Post-colonial Literature - Ed. John Thieme

An Anthology of Commonwealth Poetry – Ed. C.D. Narasimhiah

JOURNALS:

The Cambridge Journal of Postcolonial Literary Inquiry –ISSN: 2052 – 2614

Post Colonial Studies – ISSN: 1368 – 8790

E- LEARNING RESOURCES:

<https://www.britainica.com/art/African-literature>

<https://www.ajol.info/index.php>

<https://www.aurealis.com>

<https://www.academicjournals.org/AJHC>

[https:// www.austlit.edu.au](https://www.austlit.edu.au)

[https:// www.thecanadianencyclopedia.com](https://www.thecanadianencyclopedia.com)

<http://www2.tf.jcu.cz/~klapetek/GandhiPostcolonial.pdf>

<https://libgen.is/book/index.php?md5=2E982C7D8D15B3367117A01EF4F2FA36>

Romantic and Victorian Age

Semester - III

Hours : 6

Sub. Code :EN918

Credits: 5

Unit - I

Important Concepts:

The Romantic Movement, The Aesthetic Movement, The Pre-Raphaelite Brotherhood

Poetry (Detailed)

P.B.Shelley Hymn to Intellectual Beauty

John Keats Eve of St. Agnes

(Non – Detailed)

William Blake The Marriage of Heaven and Hell

Alfred Tennyson Tithonus

S.T. Coleridge Christabel

William Wordsworth Immortality Ode

Unit – II (Poetry) (Detailed)

G.M. Hopkins The Windhover

D.G.Rossetti: The Blessed Damozel

(Non- Detailed)

Byron Darkness

Robert Browning Rabi Ben Ezra

Unit – III (Prose)(Detailed)

Matthew Arnold The Study of Poetry

(Non- Detailed)

William Hazlitt On Going on a Journey

Charles Lamb Dream Children: A Reverie

Unit- IV (Drama) (Detailed)

Oscar Wilde A Woman of No Importance

(Non- Detailed)

John Millington Synge The Playboy of the Western World

Mary Shelley & P.B Shelley Midas

Unit - V (Fiction) (Detailed)

Charles Dickens *Bleak House*

Sir Walter Scott *Waverley*

(Non- Detailed)

Jane Austen *Northanger Abbey*

Thomas Hardy *Tess of the d'Urbervilles*

Books for Reference

Abrams M.H. – *English Romantic Poets : Modern Essays in Criticism*- New York: Oxford University, 1960

Bowra C.M- *Romantic Imagination*. London: Oxford University Press,1976.

Buckley, Jerome H.- *The Words of Victorian Fiction*- London: Harvard University

Sethuraman V.S. and Indra C.T. ed – *Victorian prose*

Wright, Austin- *Victorian Literature: Modern Essays in Criticism*- London : Oxford University Press, 1961.

The collected works of John Stuart Mill. University of Toronto Press.1981.

Kumar Shiv K.: *British Romantic Poets Recent Revaluations*- New York, 1995.

Language and Linguistics

Semester - III

Hours: 5

Sub. Code: EN919

Credits: 4

Course Content

Unit – I Over View of Language

Language as the object of linguistic studies: Defining language - Language as a tool for communication vs. Language as communication. Human language vs. animal communication systems: Points of convergence and divergence. Language as a symbolic system: Defining symbols--Vocal symbols consisting of signifier and signified. Branches of linguistic studies: Descriptive and Prescriptive Linguistics.

Unit – II Modern Linguistics

Structuralism: Ferdinand de Saussure- synchronic and diachronic approaches-langue and parole-signifier and signified-syntagmatic and paradigmatic relations-Semiotics.

Unit – III Component of Language and TG Grammar

Phonology- Phonetics- Morphology- word classes-inflection, Class-changing and class-maintaining morphemes-derivation-compounding-supra segmental features inflections. Word accent: Syllables and syllabification Stress: Primary and secondary Stress timed-languages and syllable-timed languages.- Intonation: Patterns of intonation Correspondence between intonation change and meaning change - Tone, tonality -Rhyme and rhythm.

Syntax: Formal and functional labels, Traditional and modern labeling Phrase, clause and sentence, categories and constituents, predicates and argument structure, Phrase Structure Grammar and Immediate Constituent Analysis. Subordination and co-ordination, Embedding.

Transformational Generative Grammar - Kernel sentences and transforms, Rules of transformation.

Unit – IV Linguistics and its Application

Semantics- Hermeneutics -Translation—Interpretation- **Discourse Analysis** - lexical Meaning relations, implicature, entailment and presupposition, maxims of conversation, speech act- Stylistics, Pragmatics.

Unit – V Branches of Linguistics

Psycho-linguistics: The relation between language and mind Language and thought Language and dreams.-**Socio-linguistics:** Language in society and society with language - **Language and dialects-** Bilingualism- Multilingualism-Code switching and code mixing- Registers-Pidgin and Creole- Language and Ethnicity, Language and Culture, **Language Education-Language-related issues:** Language and gender -Language and power- Globalization and the vernaculars- Language as Identity

Books for Reference

- Balasubramanian-A Textbook of English Phonetics for Indian Learners- Madras Macmillan, 1993.
Corder, Pit S- Introducing Applied Linguistics- London: Penguin Books.
Lyons, John- Language and Linguistics, an Introduction- New York: Cambridge University Press, 1990
Wood F. T. - An Outline history of English Language- London: Macmillan, 1969.
Krishnaswamy N., S.K Verma-Modern Applied Linguistics-Chennai: Macmillan.1992.
Gleason, H.A. An Introduction to Descriptive Linguistics
Balasubramaniam. An Introduction to English Phonetics
Verma, S.K; and Krishnaswami, N. Modern Linguistics
Crystal, David.(ed.) Encyclopedia of Language
Asher, R.E.(ed.) Encyclopedia of Language and Linguistics
Brown, Keith.(ed.) Encyclopedia of Language and Linguistics
Mc Arthur. Concise Companion to English Language
Swan, Michael. Modern English Usage
Peters, Palm. Guide to English Usage
Mesthrie, Rajend and Rakesh M Bhatt. 2008. *World Englishes: The study of new Linguistic varieties*. Cambridge: Cambridge University Press.
Pinker, Steven. 1994 *The language instinct*. Harmondsworth: Penguin.
De Saussure, Ferdinand. 1966. *Course in General Linguistics*. New York: McGraw Hill

Akmajian, A., R. A. Demers and R. M. Hamish, *Linguistics: An Introduction to Language and Communication*, 2nd ed. (Cambridge, Mass.: MIT Press, 1984; Indian Edition, Prentice Hall, 1991).

Chomsky, Noam. 1965. *Aspects of the Theory of Syntax*. Cambridge, Massachusetts: MIT Press.

American Literature

Semester – III

Hours: 6

Sub. Code: EN920

Credits: 5

Course Content

Unit- I (Poetry)

(Detailed)

Walt Whitman I Sit and Look Out

Wallace Stevens Anecdote of the Jar

Louise Elizabeth Gluck The Mountain

(Non- Detailed)

Emily Dickinson I Heard a Fly Buzz – When I Died

Langston Hughes I Too

Carl Sandburg Chicago

Nikki Giovanni Love Is

Sylvia Plath Lady Lazarus

Unit – II (Prose)

(Detailed)

R.W Emerson Self- Reliance

Thomas Paine The American Crisis

(Non- Detailed)

Thoreau Civil Disobedience

Theodore Roosevelt Abraham Lincoln

Unit – III (Drama)

(Detailed)

Arthur Miller Death of a Salesman

Edward Albee The American Dream

(Non- Detailed)

Tennessee Williams The Glass Menagerie

Eugene O’Neil The Emperor Jones

Unit – IV (Short Story)

Detailed

Edgar Allan Poe The Purloined Letter

Ernest Hemingway The Fifth Column and the First Fort (No. 1&3)

Non- Detailed

Washington Irving The Legend of a Sleeping Hallow

O Henry The Robe of Peace

Unit – V (Fiction)

(Detailed)

Scott Fitzgerald The Great Gatsby

Nathaniel Hawthorne The Scarlet Letter

(Non- Detailed)

Kurt Vonnegut Jr. Galapagos

Ken Kesey One Flew over Cuckoo's Nest

Books for Reference

Donald, Heiney and Lenteil H.- Essentials of Contemporary Literature of the Western World, (Vol.3&4)- USA: Barron's Educational Series

Hoffman, Daniel-Contemporary Guide to American Writing. New Delhi: Indian Reprint, OUP,1981.

Mac Gowan, Chistopher - Twentieth Century American Poetry-Blackwell Pub,2005.

Massa, Ann-American Literature in Context-iv -London & New York: Methuen & co.Ltd.,1982.

Vinson, James – Twentieth Century American Literature-London: Great Writers Learners Library, Macmillan,1980.

Literary Criticism in America – New York: The Liberal Arts Press, 1957.

Allen, Paula Gunn. *Studies in American Indian Literature*.

New York: Modern Language Association.1983.

Andrews, W., F. Foster, and T. Harris (eds.). *The Oxford Companion to African American Literature*. Oxford, 1997.

Baym, Nina (ed). *The Norton Anthology of American Literature*, New York: W.W Norton & Co. 2003.

Project

Semester – III

Hours: 6

Sub. Code: EN922J

Credits: 3

Elective III: Teaching Communicative English for the Beginners

Semester-III

Hours: 6

Sub.Code: EN921A

Credits: 3

Course Content

Unit I

Introduction to teaching Language skills – tested standard procedures

Listening: Introduction - 44 Sounds + Indian Speakers' Audios and Videos

Speaking: Situational and Functional Dialogues - Greeting People, Introducing Oneself and Others,
Asking about remembering

Reading:

Most Frequently Used Sentences in English (Day 1-10)

EFL Reading Cards – Level I & II

Writing: Parallel Writing - Greeting People

Unit II

Listening : 44 Sounds + BBC Lesson 1 by Native Speakers of English

Speaking: Seeking Permission, Requesting, Complaining and Apologizing

Reading:

Most Frequently Used Sentences in English (Day 11-20)

EFL Reading Cards – Level III & IV

Writing: Parallel Writing - Introducing Oneself and Others

Unit III

Listening : 44 Sounds + BBC Lesson 2

II.Speaking: Expressing Gratitude, Expressing Sympathy, Dialogues in the Hospital, Complementing and Congratulating

III.Reading:

A.Most Frequently Used Sentences in English (Day 21-30)

B.EFL Reading Cards – Level V & VI

IV.Writing: Writing Letters – Seeking Permissions

Unit IV

Listening : 44 Sounds + BBC Lesson 3

II.Speaking: Making Suggestion, Warning someone, Asking about possibility, Asking if someone is sure

III.Reading:

A.Most Frequently Used Sentences in English (Day 31-40)

B.EFL Reading Cards – Level VII& VIII

IV.Writing: Writing Letters – Asking for Advice and Expressing Gratitude

Unit V

Listening : 44 Sounds + BBC Lesson 4

II.Speaking: Dialogues related to weather, season and natural calamities, Universe, roads and traffic signals, Transportation, Professions

III.Reading:

A.Most Frequently Used Sentences in English (Day 41-60)

B.EFL Reading Cards – Level IX & X

IV.Writing: Writing Letters – Complaining and Apologizing

References:

Maria Arokia Raj K. A. and Leo Maria Francis. *English for Communication 1*. Textbook at Sacred Heart College, Tirupattur.

CIEFL, Graded Reading Cards. Orient Longman Ltd, 1992.

Swan, Michael. Practical English Usage. OUP, 1980.

Grant, Taylor. English Conversation Practice

Spoken English: A Practical Course for Speaking English Correctly & Effectively

BBC Linguaphone Lessons

<https://www.ef.com/wwen/english-resources/english-vocabulary/top-3000-words/>

<https://www.talkenglish.com/vocabulary/english-vocabulary.aspx>

<https://www.slideshare.net/dianasyahfitripbiunit2/lexical-approach-35819910>

Elective III: Modern English Grammar and Usage

Semester-III

Hours: 6

Sub.Code : EN921B

Credits: 3

Course Content

Unit 1:

Introduction to grammar and types of grammar, Parts of Speech, Formal and Functional

Analysis of simple sentence

Unit 2:

Structure of simple sentence, types of simple sentences, constituents of simple sentence,

finite and non-finite clause

Unit 3:

Structure of complex sentence, matrix clause and subordinate clause, constituents of

complex sentence, types of complex sentence, and their analysis

Unit 4:

Compound sentences

Modality, discourse markers, common errors in subject-verb agreement

Unit 5:

Grammar for Competitive Examinations - Error analysis – Tests

Transformation of sentences – synthesis of sentences – (in detail)

Reference:

J.C. Nesfield – The English Grammar, Composition and Usage

R. W. Burchfield, The New Fowler's Modern English Usage, Third Revised Edition, Oxford University Press, 1998.

S. H. Burton, Mastering English Grammar, Macmillan, 1984.

S. H. Burton, Mastering English Language, Macmillan Master Series, 1982.

David Crystal, Who Cares About English Usage?, Penguin Books, London, 1984.

Charles Darling, Guide to Grammar and Writing, <http://ccc.comnet.edu>. Accessed 22.03.01.

I.C. B. Dear (ed.), Oxford English: A Guide to the Language, Oxford, NY, Oxford University Press, 1989.

Michael Doherty, Writing for Excellence, McGraw-Hill, 1992.

Gordon Jarvie, Grammar Guide, Bloomsbury, 1993.

Geoffrey Leech, Margaret Deuchar, & Robert Hoogenraad, English Grammar for Today: A New Introduction, Macmillan, 1986.

Raymond Murphy, English Grammar in Use, Cambridge University Press, 1986.

Randolph Quirk, The Use of English, Longmans, London, 1964.

Robin L. Simmons, Interactive Grammar Review.

Moira Kay Swift, & Sheila T. Stanwell, English in the Office, Edward Arnold, London, 1978.

L. Trask, The Penguin Guide to Punctuation, Penguin Books, London, 1997.

Arthur Waldhorn & Arthur Zeiger, English Made Simple, W. H. Allen, London, 1967

Online Writing Lab

The Oxford Compendium Dictionary, (9th ed.), Oxford University Press, 1995.

Judy Pearsall and Bill Trumble (eds.), The Oxford English Reference Dictionary (2nd ed.), Oxford University Press, Oxford, 1996.

Elective III: English for Competitive Examinations

Semester-III

Hours: 6

Sub.Code: EN921C

Credits: 3

Unit I

Different Literary Trends and Approaches

Different Schools and Movements

Unit II

Origin and Development of Poetry

Origin and Development of Prose

Unit III

Origin and Development of Drama

Origin and Development of Novel

Unit IV

Analysing a poem – Devices of Sound, Devices of Comparison (Figure of Speech), Analysing a prose work – Rhetoric, Formal, Informal, Expository, Narrative, Descriptive, Argumentative,

Devices of Grammar – Inversion, Elipsis, Juxtaposition, Apostrophe

Literary Forms and Terms

Important terms from Critical Theories

Unit V

Major Literary Characters and Quotations

Contemporary Literary Prizes, Authors and Works

References:

Prasad, Birjadish, *A Background to the Study of English Literature*. Revised Ed. Macmillan India Press, 2009.

Abrams, M. H. *A Glossary of Literary Terms*. (8th Ed), New Delhi, AkashPress, 2007.

Drabble, Margaret. *The Oxford Companion to English Literature*. 5th Ed. New York: OUP, 1995.

Masih, K. Ivan, et al. *An Objective Approach to English Literature for NET, JRF, SLET and Pre-Ph.D.* New Delhi: Atlantic Press, 2007.

Jain, B.B. *UGC NET/JRF/SLET English (Paper – II & III)* 1st Ed. Delhi: UpkarPrakashan, 2010.

Twentieth Century Literature

Semester - IV

Hours: 6

Sub. Code: EN1021

Credits: 5

Unit – I (Poetry)

(Detailed)

T.S Eliot The Waste Land

(Non – Detailed)

Hopkins The Wreck of the Deutschland
W.H. Auden The Unknown Citizen
Ted Hughes Crow's Theology
Larkin Church Going
Wilfred Owen Strange Meeting

Unit – II (Prose)

(Detailed)

Bertrand Russell The Limits of Human Power
George Orwell A nice Cup of Tea

(Non- Detailed)

C.P. Snow Two Cultures (Mention the chapters)
Orwell Politics and the English Language

Unit – III (Drama)

(Detailed)

Bernard Shaw Arms and the Man
John Osborne The Entertainer

(Non- Detailed)

Edward Bond Lear
Harold Pinter The Birthday Party

Unit – IV (Short Story)

(Detailed)

Conan Doyle The Dying Detective
D.H. Lawrence 'Tickets, Please!'

(Non- Detailed)

Maugham The Ant and the Grasshopper
Kate Atkinson Tunnels of Fish from *Not the End of the World* (

Unit – V (Fiction)

(Detailed)

James Joyce A Portrait of the Artist as a Young Man
Virginia Woolf To The Light House

(Non- Detailed)

John Galsworthy A Silver Box
Aldous Huxley Brave New World

Books for Reference:

- Heiney, Donald and Downs, Lenthiel H. – Twentieth Century and Critical Theory. Essentials of Contemporary Literature of the Western World – Vol.2
- Hudson, Derek –English Critical Essays: Twentieth Century (Second Series) –London: OUP, 1963.
- James, Pickering H.and Jeffery D.Hoeper –Concise Companion to Literature –New York, Macmillan Publishing Co., Inc., 1987.
- Jones M., Phyllis- English Critical Essays: Twentieth Century (First Series)-London: OUP, 1964.
- Temple, Ruth Zabriskie., and Martin Tucker. Twentieth Century British Literature: A Reference Guide and Bibliography. New York: F. Ungar Pub., 1968. Print.
- Kermode, Frank, and John Hollander. Modern British Literature. New York: Oxford UP, 1973. Print.
- Sauerberg, Lars Ole. Intercultural Voices in Contemporary British Literature: The Implosion of Empire. Houndmills, Basingstoke, Hampshire: Palgrave, 2001. Print.
- Ivory, James Maurice. Identity and Narrative Metamorphoses in Twentieth-century British Literature. Lewiston, NY: Edwin Mellen, 2000. Print

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc

MOOC – courses on Modernism and Post Modernism - Online Course

<https://www.classcentral.com/course/swayam-twentieth-century-fiction-17829> 2 YouTube lectures by IIT, NIT Professors

Shakespeare

Semester: IV

Hours : 6

Sub. Code: EN1022

Credits : 5

Unit - I: Renaissance & Elizabethan Drama

Shakespeare's Sonnets: 18, 24, 29, 116& 138

Shakespeare's sources, Variations from Greek classical drama.

Terms associated with Shakespeare Criticism.

Debates concerning authorship

Unit - II: The Comedy

Early comedies& later comedies: What marks the difference?

Feminist Readings-*Taming of the Shrew, Two Gentlemen of Verona*

Gender Bending, Androgyny & Transvestism in Comedies- *Twelfth Night, All's Well that Ends Well*.

Play within the play in the Comedy *Shrew, Merry Wives*.

Mikhail Bakhtin's concept of the Carnival, Henry IV, Part One I -

Shakespeare as a cultural critic.

Recent readings of the Comedies.

Unit - III: The Tragedy

Early & Later Tragedies, the Historical & Jacobean tragedy of Revenge, Seneca, Kyd & Shakespeare.

Hamlet The Oedipal question & Freudian readings, Post Freudian, Feminist objections to Shakespeare, The Malcontent in Comedies & Tragedies.

Lear- Electra complex, Aeschylus *Eumenides*, *Othello* Colonialist Discourse in Shakespeare, References to *The Tempest* & *The Merchant of Venice*, Postcolonial Readings of these plays.

Unit - IV: The Problem Play and the Roman Play

What is a Problem Play? *All's Well that Ends Well, Measure for Measure*

Problem plays & the Morality Tradition

Julius Caesar

Unit - V: Criticism

Inter-textuality & Postmodern versions of Shakespeare - *King Lear*.

Anachronisms, Puns & other Shakespeare idiosyncrasies.

Music in Shakespeare

Critical Essays

A.C. Bradley- Shakespearean Tragedy

Caroline F. E. Spurgeon- Shakespeare's Iterative Imagery

Reference Books

Bradley, A. C. - Oxford Lectures on Poetry, Macmillan, 1965.

Gibson, Rex- Perspectives: Teaching Shakespeare-Cambridge University Press.

Guerin, Wilfred L.- A Handbook of Critical Approaches- New York, OUP, 2003.

Spurgeon, Caroline F. E- Shakespeare Imagery and what it tells us- Boston: Bacon Press, 1958.

Wells, Stanley and Lena Cowen Orlin- Shakespeare, An Oxford Guide - New York; OUP, 2003.

Knight, Wilson- The Crown of Life- Essays in interpretation of Shakespeare's final Plays- Methuen & Co Ltd., 1969.

Studies in Shakespeare-Oxford Paperback

J.L. Styan- Shakespeare's Stagecraft-Cambridge University Press, 1967

Egan, Gabriel- Shakespeare- Edinburgh University Press, Edinburgh, 2007.

Harold Bloom - Series of lectures

Essays on Shakespeare and Elizabethan Drama ed. Richard Hosleyroutledge and Kegan Paul Ltd., London

The Growth & Structure of Elizabethan Comedy M.C. Bradbrook Chatto&Windus, London

<https://www.britannica.com/topic/Music-in-Shakespeares-Plays-1369568>

<https://academic.oup.com/sq/article-abstract/20/4/391/5109982?redirectedFrom=PDF>

https://www.researchgate.net/publication/320119903_Shakespeare's_Philosophy_of_Music

Recommended Essays

1. G. Wilson Knight : 'On the principle of Shakespeare Interpretation', 'Hamlet Reconsidered'
2. Elaine Showalter : 'Representing Ophelia: Women, Madness, and the Responsibilities of Feminist Criticism'.
3. Paul Brown : 'This thing of darkness I acknowledge mine: The Tempest and the Discourse of Colonialism,'

Recommended Reading

1. G. Wilson Knight The Wheel of Fire
2. Michael Mangan A Preface to Shakespeare's Tragedies
3. Caroline F E Spurgeon Shakespeare's Imagery and What it tells us
4. John Dover Wilson What happens in Hamlet
5. Gary Taylor and Michael Warren (ed)The Division of the Kingdoms: Shakespeare's two versions of King Lear
6. Michael Taylor Shakespeare Criticism in the Twentieth Century
7. Jonathon Dollimore& Alan Sinfield (ed) Political Shakespeare: New Essays in Cultural Materialism
8. Stephen Greenblatt : Learning to Curse: Essays in Early Modern Culture

Eco-Literature

Semester IV

Hours: 6

Sub. Code: EN1023

Credits:3

Course Content

Unit I : Introduction: Literature and Environment -

Relationship of literature to nature

Ideas of nature

Nature and history

Philosophy of nature

Poetry and painting
The idea of landscape
Environmental aesthetics
Gender and nature ecofeminism
Environmental ethics

Poetry

(Detailed)

A.K.Ramanujan A River
Robert Frost Stopping by woods on a Snowy Evening

(Non-Detailed)

William Cowper God Made the Country”
W. H. Davies Leisure

Unit II (Prose)

(Detailed)

Vinay Lal Gandhi and the Ecological vision of Life
Vandana Shiva Women in Nature

Non-Detailed

Vasudha Narayanan Water, Wood and Wisdom

Unit III: Criticism

(Detailed)

William Howarth Ecocriticism in Context
Karren J. Warren “What are the Ecofeminists saying?”

(Non-Detailed)

Literature Scott Slovic from *A Companion to Environmental Philosophy*, ed. Dale Jamieson. Malden, Massachusetts: Blackwell, 2001.

Unit- IV (Short Story)

(Detailed)

Anton Chekov The Lady with the Dog, The Grasshopper

Non-Detailed

Ruskin Bond No Room for a Leopard, The Tree Lover

Play

(Detailed)

Rabindranath Tagore Mukta Dhara

Non-Detailed

Henry Ibsen *Enemy of the People*

Unit V: Fiction

Detailed

Kate Chopin *The Awakening*

Barbara Kingsolver *Prodigal Summer*

Non-Detailed

Karen Tei Yamashita *Through the Arc of the Rainforest*

Indra Sinha *Animal's People*

Amitav Ghosh *The Hungry Tide*

Books for Reference:

Waugh, Patricia-*Literary theory and Criticism*-New Delhi: OUP, 2006

Theory Into Practice

An Introduction To Literary Criticism Third Edition By Ann B. Dobie

Peterbarry Beginning Theory By Mohamed Mbarki

A Reader's Guide To Contemporary-Literary-Theory-5th-Edition By Raman Selden .et al.

Ecocriticism: The New Critical Idiom, by Greg Garrard

Ghosh, Amitav. *The Hungry Tide*. NOIDA: Harper Collins, 2013.

Indian Literature in English

Semester: IV

Hours: 6

Sub. Code: EN1024

Credits: 5

Course Content**Unit - I (Poem)****Detail**

Tagore - *Gitanjali*(1-10 verses)

SubramaniyaBharaathi- *VandeMantaram*

Freedom (trans.) C. Rajagopalachari

Sarojini -Naidu *Palanquin Bearers*

Nissim Ezekiel - *Poet, Lover, Bird watcher*

Non-Detail

A.K.Ramanujan - *Small Scale Reflection on a Great House Obituary*.

R.Parthasarathy-Tamil

Home Coming

Kamala Das- The Freaks

Arun Kolatkar -Woman

Irani Restaurant Bombay

Unit-II (Prose)

Detail

Lord Macaulay - Minutes on Indian Education

Arundhati Roy- When the Saints Go Marching out (pg-81)

Non-Detail

William Jones - On the Poetry of Eastern Nations

Arundhati Roy- The End of Imagination (pg -45)

Unit- III (Drama)

Detail

Girish Karnad -Yaythi

Non-Detail

Badal Sirkar - Evam Indrajith

Unit - IV (Short Stories)

Detail

Kushwant Singh- The Mark of Vishnu

Ruskin Bond- The Tiger in the Tunnel

Non-Detail

Perumal Murugan – Water play

Unit - V (Novel)

Detail

Raja Rao- Kanthapura

Non-Detail

JumpaLahiri-The Namesake

Amithav Ghosh- The Shadow Lines

Extensive Reading

Shashi Tharoor- Pax Indica

Savi Sharma-Stories we never tell

Sudha Murthy- The Man from the Egg

Books for Study and Reference:

1. History of Indian English Literature. M.K. Naik Sahitya Academy – New Delhi, 2005.
2. The Works of Sir William Jones. AgamPrakasham, Vol.10

4. The Oxford Anthology of Twelve Modern Indian Poets. Oxford University Press, 1992.
5. Poisoned Bread. Arjun Dangle. Orient Longman, 1992
6. Subramania Bharathi: Chosen Poems and Prose. Ed.K. Swaminathan, 1984.
7. Srinivasa, Iyengar. Indian Writing in English. 5th Ed. Delhi: Sterling, 1985
8. M. K .Naik. Ed. Perspectives on Indian Prose in English. New Delhi: Abhinav, 1982.
9. Mehrotra, Rajaram. Indian English : Texts and Interpretation. Amsterdam and Philadelphia: John Benjamins, 1998.
10. Roy, Arundhati *The End of Imagination*. 2016.
11. <https://openlearningforall.blogspot.com/2019/09/the-tiger-in-tunnel-by-ruskin-bond.html>
12. <https://frontline.thehindu.com/arts-and-culture/literature/water-play-by-perumal-murugan-tamil-short-story-in-translation/article33047614.ece>
13. <https://youtu.be/27X8NFHxuFk>
14. https://youtu.be/gU_ZMqywHow
15. https://youtu.be/BWcmtKOAq_g
16. <https://youtu.be/te3CL6UXiWw>
17. <https://youtu.be/RmkQ0klcjhE>
18. <http://rupkatha.com/V2/n4/26GitanjaliTranslation.pdf>
19. <https://eportfolios.macaulay.cuny.edu/carroll2012/files/2012/11/Yayati.pdf>
20. <https://g.co/kgs/HJPw46>

Elective IV: Content Writing

Semester IV

Hours: 6

Sub. Code: EN1025A

Credits:3

Course Content

Unit 1: Introduction to Content Writing

Content Writing Basic - Effective Content Writing Process – Prewriting – Drafting - Sentence Construction - Paragraph Building – Revising - Editing & Proofreading
Publishing

Unit 2: Avoid Common Grammar Errors in your Writing

Sentence Construction - Subjects Verb Agreement -Fragments - Run-on Sentences – Punctuations - Wordy Sentences - Sentence Variety - Awkward Sentences - Verb Power - Shift-in-time - Pronoun Problems – Capitalization - Parallel Structure - Modifiers

Unit 3: Boost your Vocabulary and Learn Writing Tools, Tips & Techniques

Tips to Build your Vocabulary - Usage of Words - Understanding Technical Terms in a Particular Domain - Using Thesaurus - Reading List - Google tools

Learning Writing Tools: Grammarly – Copyscape – Ginger - Hemingway App - Internet Research Skills
- Writing Hacks

Unit 4: Enhance your Creative Non-fiction Writing Skills

Introduction to Digital Advertising - Copywriting basic - Web Content Writing -Writing compelling Ad Copy/Headlines/Subtitles - Writing impressive introductory lines/conclusions - Writing impressive Sales Proposal/Marketing content - Blogging skills

Persuasive writing style - Idea Generation Tools - Social Media/Viral Content Development - Writing effective email/newsletter/Google Ads/Facebook Ad/Landing Pages Content

Unit 5: Master Business Writing Skills

How Business Writing is Different - Different types of Business Communication - Usage of Relevant Facts and Statistics in Business Writing - Mastering Various Business – Domains - SEO Writing -

Usage of Business Jargons - Business Plan - White Papers - Press Releases - eBooks/Case

Study/Magazine/Newsletter Content Development -

Ghostwriting

References:

Robinson, Joseph. *Content Writing Step-By-Step: Learn How to Write*

Murry, Mike. *54 Content Writing Examples, Tools, Tips, and Resources*, EST READ TIME, June 3, 2016. <https://contentmarketinginstitute.com/2016/06/writing-examples-tools-tips/>

Antonio Tooley and Leona Hinton. *36 Content Writing Tools to Take You from Good to Great*, Jul, 12, 2018. <https://www.dreamgrow.com/content-writing-tools/>

Gupta, Kounal. *The Only Content Writing Handbook You'll Ever Need*. A Henry Harvin's Brand, 2021.

Schaefer, Mark. *The Content Code: Six essential strategies to ignite your content, your marketing, and your business*.

Schaefer, Mark. *The Content Code*, 2015.

Pulizzi, Joe. *Content Inc.: How Entrepreneurs Use Content to Build*, 2015.

Handley, Ann. *Everybody Writes: Your Go-To Guide to Creating Ridiculously Good Content*. 2014.

Kristina Halvorson and Melissa Rach. *Content Strategy for the Web*. 2009.

Elective – IV: Advanced Academic Writing

Semester IV

Hours: 6

Sub. Code: EN1025B

Credits: 3

Course Content

Unit - I

Introduction to Academic writing

Introduction and importance of Academic writing; Types of Academic writing; Elements of Academic writing; Process of Academic writing

Paragraphs with explicit unity

Writing in one's words: Summarizing and Paraphrasing

Descriptions: Objects, people, places, scenes, situations and processes

Narrations: Events, stories etc.

Unit - II

Letters: Formal and informal: Personal, official business etc.

Projects: Proposals, Scientific papers and reports

Unit - III

Study skills: Listening and note-taking, Reading and note-making

Information transfer: Transfer from non-verbal to verbal and vice versa.

Unit - IV

Critical Thinking: Syntheses, Analyses and Evaluation

Reference skills: Use of dictionaries, directories, encyclopedias, Thesaurus, articles etc.

Technical tools for Academic writing: Grammarly, Scrivener, Microsoft Word, Citavi, Ref-N-Write and TypeSet

Unit - V

Structuring an argument: Elements and types of argument

Mini- Project: Constructing a scientific paper

References

Liz Hamp-Lyons and Ben Heasley, Study writing: A Course in Writing Skills for Academic Purposes, CUP, [2006](#)).

Renu Gupta, A Course in Academic Writing (New Delhi: Orient BlackSwan, [2010](#)).

Ilona Leki, Academic Writing: Exploring Processes and Strategies, CUP, 2nd edn, [1998](#).

Gerald Graff and Cathy Birkenstein, They Say/I Say: The Moves That Matter in Academic Writing (New York: Norton, [2009](#))

Raymond Murphy: Murphy s English Grammar (CUP)

Tickoo& Sasikumar: Writing with a Purpose (OUP)

Narayanaswami: Strengthen Your Writing (Longman)

Pillai, Rajeevan& Nair: Written English for You (Emerald)

Coe, Rycroft & Ernest: Writing Skills (CUP)

David Jolly: Writing Tasks (CUP)

Michael Swan: Practical English Usage (CUP)

Elective IV: Technical Writing

Semester: IV

Hour: 6

Sub. Code: EN1025C

Credits: 4

Course Content

Unit – I Introduction to Technical Writing

What is Technical Writing?

Nature, Origin and Development of Technical Writing

Scope and Significance of Technical Writing

Principles of Technical Writing

Difference between Technical Writing and Creative Writing

Unit – II Properties and Process

Properties of Technical Writing

Style & its elements in Technical Writing

Expository techniques in Technical Writing

The Writing Process

Role of Technical Writer

Unit – III Skills, Mechanics and Grammar

Skills

Listening & Reading comprehension

Skimming and Scanning of the text

Mechanics of Presentation, Technical Vocabulary

Note Making and Paragraphing

Mechanics

Abbreviations, Numbers, Punctuation, Capitalization, Spelling

Grammar

Subject-Verb agreement, Sentence pattern, Tenses, Voices, Speeches

Unit – IV Tools and Technical Documentation

Types of Technical Documentation

Reviews, Reports, Newsletters, Presentations, Letters, Web pages, Mail, Memos

Basic Tools for Technical Writing

Advanced MS Word, Adobe Frame Maker

Unit – V Mini Project: Hands on Practice

Learners have to do a mini project on the types of technical documentation.

Viva -voce

References

M. Ashraf Rizvi, Effective Technical Communication, 2nd Edition, McGraw Hill Education, [2017](#).

Sharon J. Gerson and Steven M. Gerson, Technical Writing: Process and Product
Pearson, 3rd edition, [1999](#).

Booth-L. Diana, Project Work, Oxford University Press, Oxford: [2014](#).

Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: [2007](#)

Krishna Mohan & Meera Banerjee: Developing Communication Skills, Macmillan, 2000

Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad, [2015](#)

Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and [Practice](#).
[Oxford](#) University Press: New Delhi, [2014](#).

Sudharshana.N.P and Saveetha. C. English for Technical Communication, Cambridge University
Press: New Delhi, [2016](#)

<https://www.slideshare.net/mobile/RaissaGuldham/technical-writing-14880642>

<https://www.slideshare.net/mobile/ronabiojobert/technical-writing-69823239>

B.COM (CA)

Hours: 5 / Credit: 5

Subject Code: CC106

Financial Accounting – I

Course Objectives:

- To understand the fundamentals of accounts and basic concepts of accounting.
- To educate the students about various subsidiary books.
- To give an insight knowledge about single entry system.
- To inculcate the knowledge on process of preparing Final Accounts with Adjustments.
- To make the students aware about Depreciation methods.

Unit – I: Introduction

Accounting – Meaning – Definition – Accounting Cycle - Accounting concepts and conventions – Accounting Standards - Meaning and classification - Accounting Equation - Double entry system – Types of accounts – Accounting rules - Journal – Ledger

Unit- II: Subsidiary Books and Trial Balance

Subsidiary books – Benefits of subsidiary books system – Preparation of individual subsidiary book- Purchase book – Sales book – Purchase return book – Sales return book – Cash book – Petty cash book – Single column cash book – Double column cash book – Three column cash book – Trial balance – Methods of preparation: Total & Balance Method

Unit – III: Final Accounts

Introduction – Manufacturing Account – Trading Account – Profit and Loss Account – Balance Sheet – Adjustments – Closing stock – Outstanding and Prepaid items - Depreciation - provision for bad debts – Interest on capital and drawing.

Unit – IV: Single Entry System

Meaning – Definition – Difference between Double entry and single-entry systems – Ascertainment of Profit – Net worth method – Distinction between balance sheet and Statement of Affairs – Conversion Method – Calculation of Missing figures

Unit – V: Depreciation Accounting

Meaning – Factors affecting the amount of Depreciation – Methods of recording Depreciation – Straight-line Method – Written-down Value Method – Change in Method

Text Book

T.S Reddy & A. Murthy, Financial Accounting, Margham Publication, Chennai - 2016

Reference Books:

- S.N. Maheshwari, and. S. K. Maheshwari. Financial Accounting. Vikas Publishing House, New Delhi. 2015.
- M.C. Shukla and. T.S. Grewal, Advanced Accountancy, Sultan Chand and company, New Delhi 2004.
- R.L. Gupta and. M, Radhasamy, Advanced Accounts, Sultan Chand and Compnay, New Delhi 2006
- S.P. Jani and K.L. Narang, Financial Accounting, Kalyani Publishers, New Delhi 2008

Semester – I Hours: 5 / Credit: 5

Subject Code: CC107

Core: Modern Banking

Course Objectives:

- To impart knowledge on the basic functions and services of commercial banks
- To make them understand the functions of RBI
- To enrich students to learn about the principles of sound lending
- To enhance the knowledge about negotiable instruments and the importance of crossing in the cheque.
- To help the students to familiarize the modern banking services like e-banking, m-banking and internet banking

Unit – I: Introduction to bank

Meaning and definition of Banking – Features – Unit banking – Branch banking – Foreign banking - Classification of Banks – Primary and Secondary functions of commercial banks

Unit – II: Central bank

Central Bank – Meaning – Difference between Commercial bank and Central bank - Functions of RBI – Credit Control Mechanism – Credit Creation

Unit – III: Lending and Banker - Customer relationship

Principles of Sound Lending - Relationship between Banker and Customer – Rights of a Banker - Duties of a Banker – Dishonor of Cheque

Unit – IV: Negotiable Instruments

Negotiable Instruments – Meaning and Features of Bill of Exchange, Promissory Note and Cheque – Crossing - Types of crossing – Endorsement - Types of Endorsement

Unit – V: Technological Banking

ATM: Meaning, Facilities, Operating procedure and advantages; E-Banking: Meaning, Features, Services covered under e-banking, advantages and Drawbacks; Debit card and Credit Card: Meaning – Debit Card Vs Credit Card – Types; Meaning of NEFT, RTGS and Mobile banking and e-wallets

Field Activities:

- Every student should visit the banking premises, collect the various types of Challans /forms and fill it. It should be submitted as report.
- Every student should conduct a mini survey on any one of the banking techniques with 20 questions and submit the report by applying the MS Word and Excel.
- Every student should prepare a master table on the rules and regulations of any one of the loan provided by four different banks.

Text Book:

P.S. Saravanel, Modern Banking, Margham Publishers, Chennai 2016

Reference Books:

1. Naboshree Bhattacharya and SandeepKaur, Banking Law and Operations, Vikas Publishing, New Delhi 2014.
2. Varshney and Sundaram, Banking law and practice, Sultan Chand & Sons, New Delhi 2014.
3. K.P. Kandasami, S. Natarajan and Praamswaran, Banking Law and Practice- Sultan & Chand, New Delhi 2005
4. S.Natarajan and Parameswaran, Indian Banking, Sultan Chand & Sons, New Delhi 2010.

Semester – I

4 Hours/3 Credits

Course Objectives

- To know the history of computers.
- To understand the basic formatting features in word processor.
- To have knowledge on functions of spreadsheet.
- To understand the fundamental concepts of presentation.
- To explore knowledge on sending receiving mails.

Course Outline

UNIT – I: HISTORY OF COMPUTERS

Introduction – Characteristics of Computers – Evolution of Computers – Computer Generations – Input Unit – Output Unit – Storage Unit – Arithmetic Logic Unit – Control Unit – Central Processing Unit – The System Concept.

UNIT – II: WORD PROCESSOR

Starting MS Word 2007 – Creating, Saving, Applying Basic Formatting – Working with styles – Applying Bulleted and Numbered Lists – Using Cut, Copy, Paste – Using Find, Replace, and Go To – Printing a Word Document – Opening, Closing and Quitting MS Word - Working with Basic Graphical Objects – Editing Graphical Objects – Working with Tables.

UNIT – III: SPREAD SHEET

Creating a New Excel Workbook – Saving – Adding Data to cells – Adding Data using AutoFill – Inserting and Deleting Cells – Wrapping Text – Changing Number Formats – Adding Borders to Cells – Applying Conditional Formatting – Renaming a worksheet – Opening, Printing, Closing and Quitting an Excel Workbook – Working with Tables – Working with Charts.

UNIT – IV: PRESENTATION

Creating and Saving a Presentation – Basics of Presentation - Setting up and Running a slide show – Packaging your presentation – Opening, closing and Quitting MS Power Point – Changing the Layout of a slide – Applying Background to a slide – Applying Themes to a Presentation – Working with Basic Graphical Objects – Inserting Media Clips – Adding and Removing : Animation Effects and Transition Effects .

UNIT – V: MAIL

Configuring an Outlook account – User Interface – Arranging items inside the Contents Pane – Setting the current view – Performing an instant Search – Backup and Archiving Outlook Data – Composing and Sending messages – Reading Messages – Printing E-mail Message – Printing, Replying, Forwarding and Cleaning Mail box- Setting Rules – Managing Contacts.

3. Teaching Resources

i. Text

PradeepK.Sinha, PritiSinha, “Computer Fundamentals”, Sixth Edition, BPB Publications, New Delhi, 2011.

Unit – I:Ch. 1 – 2

Kongent Solutions Inc, “Office 2007 in Simple Steps”, Dreamtech Press, 2010.

Unit – II:Ch. 2 – 3

Unit – III: Ch. 5 – 6

Unit – IV: Ch. 8 – 10

Unit – V: Ch. 11- 12

ii. References

- Vikas Gupta, “Comdex Computer Course Kit”, DreamTech Press, New Delhi, 2010.
Wallace Wang, “ Microsoft Office 2010 for dummies”, Wiley India Pvt Ltd, New Delhi, 2010.
Wayne L. Winston, “Microsoft Office Excel 2007: Data Analysis and Business Modeling”, Prentice Hall of India Pvt Ltd, New Delhi, 2007.

iii. Web References

Online Tutorial

- http://www.officetutorials.com/microsoft_2007_office_tutorials.htm
<http://www.free-computer-tutorials.net/word-2007.html>

Online Quiz

- <http://mcquestions.com/online-quiz-on-microsoft-word-set-1>
<http://www.proprofs.com/quiz-school/story.php?title=microsoft-word-2007-exam>

4. Supplement Learning

- Proofing in Word Processor
- Macros in Word Processor
- Engineering Functions in Spreadsheet
- External Data Connections in Spreadsheet
- Drawing Tools in Presentation

Semester – I

2 Hours/1 Credit

PCC103 PRACTICAL-I : OFFICE AUTOMATION

Word Processor

- Basic Formatting
- Table Creation
- Page setup
- Mail Merge

Spreadsheet

- Inserting and Deleting Rows and Columns
- Chart
- Macros and Conditions (If...Else)
- Excel Functions (Text, Date, Time, Statistical, Mathematical, Financial, VLookup, Filter) and Macros

Mail

- Composing and sending Messages
- Managing contacts

Semester –II

Hours: 5 / Credit: 5

Subject Code: CC206

Financial Accounting – II

Course Objectives:

- To educate the students branch and department accounting preparation process

- To give an insight knowledge of Hire Purchase and Installment Purchase Systems.
- To educate the students about Admission of the partners.
- To know the accounting procedure related with Retirement and Death of the partners.
- To make the students understand Insolvency of partners and Dissolutions of the firm.

Unit – I: Branch Accounts and Departmental Accounting

Meaning – Objectives - Types of Branches – Dependent Branch – Debtors System – Stock and Debtor System – Departmental Accounting – Need for departmental Accounting – Distinction between Departments and Branches – Guidelines for apportionment of Expenses – Inter departmental transfer

Unit – II: Hire Purchase and Installment Purchase Systems

Hire Purchase system – Definition – Important Terms – Installment Purchase system – Distinction between Hire Purchase and Installment system – Accounting treatment for hire purchase system – Hire purchase Trading Account – Debtor Methods – Stock and Debtors system – Installment purchase system Accounting treatment

Unit – III: Admission of Partner

Admission of partner – calculation of New Profit Ratio – Calculation of Sacrificing Ratio – Revaluation of Assets and Liabilities – Calculation of Goodwill and treatment of Goodwill – Adjustment regarding capital

Unit – IV: Partnership Retirement and Death

Retirement and death of a partner: Calculation of ratios – Revaluation of assets and liabilities – Treatment of goodwill – Adjustment regarding capital – Disposal of amount due to outgoing partner – Joint life policy

Unit: V Dissolution of a Firm

Meaning of Dissolution – Modes of dissolution – Settlement of Accounts – Accounting Treatment – Insolvency of a partner – Garner Vs Murray - Capital ratio under fixed and fluctuating Capital method - Insolvency of all the partners – Piecemeal distribution – Proportionate Capital method – Maximum Loss method

Text Book:

T.S Reddy & A. Murthy, Financial Accounting, Margham Publication, Chennai. 2016

Reference Books:

- S.N. Maheshwari, and. S. K. Maheshwari. Financial Accounting. Vikas Publishing House, New Delhi 2013.
- M.C. Shukla and. T.S. Grewal, Advanced Accountancy, Sultan Chand and company, New Delhi.2013
- R.L. Gupta and. M, Radhasamy, Advanced Accounts, Sultan Chand & Coy, New Delhi 2002
- S.P. Jani and K.L. Narang, Financial Accounting, Kalyani Publishers, New Delhi 2011

Semester – II

Hours: 5 / Credit: 5

Subject Code: CC207

Core: Principles of Marketing

Course objectives:

- To make students to aware of marketing concepts and elements of marketing Mix
- To enhance the knowledge about Market segmentation, Marketing information system and Marketing Research
- To make the students to understand the product classification and product life cycle
- To know the different types of pricing and promotional strategies in realistic marketing situations
- To impart knowledge on technological marketing

Unit - I: Basics of Marketing

Meaning and Definition of Marketing - Features, scope and importance of marketing - Modern concept of marketing - Functions of marketing, Marketing Mix – The elements of marketing mix

Unit – II: Marketing Segmentation and Research

Market Segmentation: Meaning - Bases for Market segmentation; Market Research: Meaning - Objectives and Process; Marketing Information System: Meaning - Importance – Marketing Research Vs MIS

Unit – III: Product

Meaning - definition - Characteristics and Classification of products - Product mix decision - Product life cycle - Product planning - New product development process

Unit – IV: Pricing and Promotion

Pricing: Meaning and objective - Factors influencing pricing decisions - Price determination - Pricing methods, Policies and strategies. Promotion – Objectives and types of promotion – promotional Mixes and strategies

Unit –V: Technological Marketing

Online Shopping: Meaning, benefits and limitations - Mobile Marketing: Meaning and Strategies - Green Marketing, Relationship marketing and Virtual Marketing: Meaning, nature and importance - Social criticisms of Marketing

Field Activities:

- Every student should Visit the market and conduct a mini survey on any one of the marketing concepts with 20 questions and submit the report by applying the MS Word and Excel.
- Every student should create an original Virtual Advertisement for 2 minutes.
- Every student should prepare a list of 5 products/brands each stages of Product Life Cycle with the reason.

Text Book:

R.S.N. Pillai and Bhagavathi, Modern Marketing, S. Chand & Company, New Delhi 2016

Reference Books:

- Philip Kotler, Marketing Management, PHI Learning PvtLtd.2009
- David Meerman Scott, The New Rules of Marketing & PR, John Wiley & Sons, Inc, Hoboken, New Jersey, 5th Edition.2013
- Dr.C.B.Gupta and Dr.N.RajanNair, Marketing Management, Sultan Chand & Sons 2005.
- Sontakki C.N, Marketing Management, Kalyani Publications, Ludhiana 2009.

Semester – II 4 Hours/3 Credits

CC208 INTERNET CONCEPTS AND WEB DESIGN

Course Objectives

To know the concept of basics of Internet.
To become knowledgeable in Fundamentals of Html
To ensure that the students have a basic understanding of creating Forms and Frames.

To understand the concept of Cascading Style Sheet.

To be aware of the method of Java Script.

Course Outline

UNIT 1: INTERNET CONCEPTS

Introduction to Internet: Internet history – Internet Access –Internet Services and Features - TCP/IP – Telnet – Changing the Password – WWW – Web Page – Net Surfing – Web Browser – Internet Addressing – Internet Protocols – Searching the Web: Web Index – Web Search Engines – Meta Search Engines – Directories – Specialized Directories – Electronic Mail – E mail messages – Managing Mails – Signature Feature - Advantages and Disadvantages of E mail.

UNIT 2: BASICS OF HTML

Core Elements and Attributes: <html> Element, <head> Element, <title> Element<body> Element – Basic Text Formatting: Creating Paragraph – Creating Line Breaks – Creating Preformatted Text-Presentational Elements – Phrase Elements – Lists –Links: Linking to other Documents – Linking to E-mail Addresses –Creating Links with the <a> Element – Images: Adding Images to your site – Using images as Links – Tables: Basic table Elements and Attributes - Rowspan – Colspan.

UNIT 3: FORMS AND FRAMES

Forms Introduction: Creating a Form with the <form> Element – Action Attribute – Method attribute – Id Attribute – Name Attribute - Onsubmit Attribute - Onreset Attribute - Form Controls: Text inputs – Buttons – Check boxes – Radio Buttons – Select Boxes – File Select Boxes. Frames: Introducing the Frameset - The <Frameset> Element: Cols Attribute - rows Attribute – The <Frame> Element: The src Attribute – The name Attribute – The Frame Border Attribute – The margin width and height attribute - Creating Links between Frames

UNIT 4: CSS

CSS Introduction- CSS Rules: The <link> and <style> Element – CSS Properties: Controlling Fonts – Text Formatting –CSS3: CSS Rounded Corner – Border Images – Multi Background –Color – Gradients –Shadow – Text - 2D and 3d Transform.

UNIT 5: JAVASCRIPT

Jscript: Introduction –Adding a script to your Pages: Comments in a Javascript – The <noscript> Element - The Document Object Model: Objects, Methods and Properties – The Forms Collection - Form Elements - Starting to Program with JavaScript: Variables – Operators – Functions – Conditional Statements – Working with Javascript: Form Validation.

TEACHING RESOURCES

i. Text Book

Raymond Greenlaw , “Inline/Online Fundamentals of the Internet and the world wide web”,
2nd Edition, Tata McGraw Hill Edition, 2005

Unit 1: Ch 3.1, 3.3, 3.4

Ch 5.2 – 5.5

Jon Duckett, “Beginning Web Programming with HTML, XHTML and CSS”, 2nd Edition, 2008.

Unit 2: Ch 1,2,3,4

Unit 3: Ch 5, 6

Unit 4: Ch 7

https://www.tutorialspoint.com/css/css3_tutorial.htm

Unit 5: Ch 11, 12

ii. Web References

www.jquery.com

www.w3schools.com

www.hscripts.com

<http://www.html5andcss3.org/http://www.tutorialspoint.com/html5/>

<http://www.html-5-tutorial.com/>

Online Tutorial

<https://edu.gcfglobal.org/en/internetbasics/what-is-the-internet/1/>

<https://www.w3schools.com/html/>

Online Quiz

<https://www.geeksforgeeks.org/html-course-practice-quiz-1/>

https://www.w3schools.com/css/css_quiz.asp

Online Compiler

https://www.tutorialspoint.com/online_html_editor.php

https://www.w3schools.com/js/js_editor.asp

SUPPLEMENT LEARNING

Network

Meta Tag

Div Tag

Lay outs

Responsive Web Design(RWD)

Semester – II

2 Hours/1 Credit

PCC202 PRACTICAL II: INTERNET CONCEPTS AND WEB DESIGN

Basic HTML tags

Background color and Images

HTML Link and List

HTML Tables and Frames

HTML Form Controls

CSS Inclusion and Properties

CSS 2D and 3D Transform

Jscript – Variables, constants, functions

Jscript – Methods and Functions

Jscript Validation

Semester – III

Hours: 5 / Credit: 5

Subject Code: CC310 Mercantile Law

Course Objectives:

To understand the Indian Contract law.

- To know the basic knowledge of Indemnity and Guarantee
- To impart knowledge on legal rules regarding Sale of Goods Act 1930.
- To give an insight knowledge about Contract of Agency.
- To inculcate the knowledge of Sale of Goods Sold Act 1930.

Unit - I: Indian Contract Act 1872

Contract – Definition - Essentials of Valid Contract-Offer- Acceptance Consideration, Capacity of Parties-Free Consent-Contingent agreement contract- Performance of Contract- Discharge of contract-breach of contract-Remedies for breach of contract.

Unit - II: Contract of Indemnity and Guarantee:

Contract of Indemnity and Contract of Guarantee- Meaning – Definition - Distinction between Contract of Indemnity and Contract of guarantee- Consideration in Contract of guarantee- Discharge of rights of surety- Continuing guarantee.

Unit - III: Bailment and Pledge

Meaning – Definition - Essentials – Rights and Duties of Bailor and Bailee - Termination of bailment - Pledge-rights and duties of pledge - Pledge by non-owners - Pledge distinguished from Mortgage- Finder of lost in goods

Unit - IV: Law of Agency:

Meaning – Nature of Agency - Different kinds of Agents - Methods of creating Agency - Extent of Agents Authority - Termination of Agency Conditions and Warranties- Transfer of property in and title of goods - Duties and rights of an Agent

Unit - V: Sale of Goods Act 1930

Sale: Meaning - 'Delivery' Documents of the title of goods, Bill of lading, Delivery order – formation of contract of sale -Distinction between sale and agreement to sell- Sale and Hire purchase - Essentials of sale- rights and duties of seller and Buyer- Rights of an unpaid seller.

Text Book:

Kapoor.N.D, “Elements of Mercantile Law”, Sulthan&chand, New Delhi 2006

Reference Books:

Sundaram KPM & Varshney, “Introduction to Commercial Law”,Kalyani publications, New Delhi. 2007

RSN Pillai and Bagavathi., Business Law, S.Chand, Delhi. 2009

Ravinder Kumar and Virender Sharma, Practical Auditing, Prentice Hall of India Pvt. Ltd., New Delhi, 2012.

Avtar Singh Business Law: Principles of Mercantile Law - Eastern Book Company, 2011

Semester – III

Hours: 5 / Credit: 5

Subject Code: CC311 Corporate Accounting – I

Course Objectives:

- To gain comprehensive understanding of all aspects relating to corporate accounting.
- To develop a process for redemption of debentures and Preference shares.
- To develop the skills for preparation of final accounts according to new format.
- To calibrate the procedure involved in Amalgamation of companies.
- To facilitate the students to understand liquidation accounting

Unit - I Issue of Shares

Issue of Shares - At Par, Premium and Discount - Pro-rata Allotment - Forfeiture and Reissue of Shares (Pro-rata – Forfeiture and Reissue excluded)

Unit - II: Issue and Redemption of Debentures

Issue of Debentures - Redemption of Preference Shares - Redemption of Debenture (out of profit, fresh issue, sinking fund method only)

Unit – III: Acquisition

Acquisition of Business - Profit Prior to Incorporation - Final Accounts (Managerial remuneration Excluded) - Balance Sheet (New Method)

Unit – IV: Amalgamation

Amalgamation - Methods - Amalgamation in the Nature of Merger and Purchase - Purchase Consideration - Balance Sheet (New Method)

Unit -V: Liquidation

Liquidation Accounting - Order of Payments – Liquidators Remuneration– Liquidators Final Statement of Account - Statement of Affairs and Deficiency Accounts.

Text Book:

Reddy T.S. & Murthy A. Corporate Accounting, Margham Publications, Chennai 2016

Reference Books:

Shukla M.C.Grewal, T.S.Gupta S.C. - Advanced Accounts - S.Chand& Co. Ltd, New Delhi 2013.

Gupta R.L. &Radhaswamy M. - Advanced Accountancy, Sultan Chand & Sons, New Delhi 2014.

Jain &Narang - Advanced Accountancy - Kalyani Publishers Ludhiana 2012

Iyengar S.P. - Advanced Accounting - Sultan Chand & Sons, New Delhi 2012

Semester – III

Hours: 5 / Credit: 5

Subject Code: **CC312 Fundamentals of Cost Accounting**

Course Objectives

To familiarize the students with basic concepts of Cost Accounting

To make the students to understand about the purchase department and stock levels

To apply the various methods of stores ledger in cost accounting and identify the suitable method for issue of materials.

To analyse the various methods of determination of wages of employees and to identify the feasible method of computation of wage.

To impart knowledge on the allocation and distribution of overhead

Unit – I: Introduction to Cost Accounting

Nature and Scope – Objectives and Limitations – Financial Vs. Cost accounting. Costing system: Types of costing and Cost Classification – Cost Sheet and Tenders – Cost Unit – Cost Centre and Profit Centre.

Unit – II: Material Control

Purchase Department and its objectives – Purchase procedure – Classification and Codification of material. Material control: levels of Stock and EOQ – Perpetual Inventory System- ABC – simple problems – VED Analysis – Material Losses.

Unit – III: Pricing of Material

Cost Price Methods: FIFO, LIFO, Average Price Methods: Simple and Weighted Average Price Methods, Notional Price Methods: Standard Price and Market Price Methods.

Unit – IV: Labour Cost

Remuneration and Incentives: Time and Piece rate – Idle and Overtime – Labour Turnover – Taylor’s, Merricks and Gantt’s Task – Premium Bonus System – Halsey, Rowan and Emerson’s Plans. Calculation of earnings of workers

Unit – V: Overheads

Classification of Overhead Costs – Distribution of Overheads – Allocation, Absorption and Apportionment of Overhead Costs – Primary and Secondary distribution of Overheads – Computation of Machine Hour Rate and Labour Hour Rate.

Text Book:

T.S. Reddy and Reddy, Cost Accounting, Margham Publications, Chennai 2016

Reference Books:

Jain, S.P. and K.L. Narang. Cost Accounting: Principles and Methods. Kalyani Publishers, Ludhiana. 2007

R.S.N. Pillai and V. Bagavathi, Cost Accounting, S.Chand, Calcutta, 2008

Maheshwari, S.N. and S.N. Mittal. Cost Accounting: Theory and Problems. Shri Mahabir Book Depot 2006

A.Murthy& S. Gurusamy, Cost Accounting, Vijay Nicolas, New Delhi.2008

Semester – III

4 Hours/3 Credit

CC313 PROGRAMMING WITH C

Course Objectives

To enhance their analyzing and problem-solving skills and use the same for writing programs in C.

To develop logics and that will help them to create programs, applications in C.

To identify programming task involved in a given computational problem.

To identify tasks in which the numerical techniques learned are applicable and apply them to write programs.

Course Outline

UNIT – I: INTRODUCTION OF C PROGRAMMING

Steps Involved in Computer Programming – Problem Definition – Outlining The Solution – Flow Chart – Developing Algorithms - Structure of a C program – Basic data types– constants and variables– operators and expressions – Control Constructs (if, switch, while, do...while, for, break and continue, exit() function, goto and label).

UNIT – II: ARRAYS AND FUNCTIONS

Arrays (declaration, one and two dimensional arrays) - Character Arrays and Strings. Function Fundamentals (General form, Function Definition, Function arguments, return value) – Parameter passing: call-by-value and call-by-reference – Recursion – Passing Arrays to Function – Passing Strings to Function.

UNIT – III: POINTERS

Understanding Pointers – Accessing the Address of a Variable – Declaring the Pointer Variables – Initialization of Pointer Variables – Accessing a Variable through its Pointer – Pointer Expressions – Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments – Functions returning Pointers – Pointers to Functions.

UNIT – IV: STORAGE CLASSES, STRUCTURES AND UNIONS

Scope rules (Local variables and global variables, scope rules of functions) -Type modifiers and storage class specifier. Structures – Basics of Structure – Declaring of Structure – Referencing Structure elements - Array of Structures – Nesting of Structures - Passing Structures to function – Pointers and Structures - Unions.

UNIT – V: FILE MANAGEMENT IN C

Introduction – Defining and Opening a File – Closing a File – Input / Output Operations on Files – Command Line Arguments.

Teaching Resources

i. Text Book

E. Balagurusamy, “Programming in ANSI C”, Seventh Edition, McGraw Hill Education Private Limited, NewDelhi: 2017.

Unit – I: Ch. 1 – 6

Unit – II: Ch. 7 – 9

Unit – III: Ch. 11

Unit – IV: Ch. 10

Unit – V: Ch. 12

ii. References

Sukhendu Dey and Debobrata Dutta, “Complete Knowledge in C”, Narosa Publishing House Pvt Ltd, 2009.

Yashavant P. Kanetkar, “Let Us C, 13th Edition, BPB Publications, India, 2013.

iii. Web References

Online Tutorial

www.learn-c.org

<https://www.tutorialspoint.com/cprogramming/index.htm>

www.w3schools.in/c-tutorial

Online Quiz

https://www.tutorialspoint.com/cprogramming/cprogramming_online_quiz.htm

<http://www.mycquiz.com>

Online Compiler

https://www.tutorialspoint.com/compile_c_online.php

<https://www.remoteinterview.io/online-c-compiler>

Supplement Learning

Files

Memory management

Type casting

Recursion

Command line arguments

PCC302 PRACTICAL – III: PROGRAMMING WITH C

Data types
Operators and Expressions
Decision making statement
Looping statement
Arrays
Functions
Structures
Unions
Pointer
Files

Subject Code: **Certificate Course I: Stock Market Operation**

Course Objectives:

The objective of this paper is to gain comprehensive understanding of all aspects relating to stock market.

Acquaint with the procedure of opening DEMAT account

To develop the skill to trading in stock market.

To make students to understand the procedures for the trading commodities and related investments.

To make students aware about online trading

Unit - I: Introduction

An overview of Indian securities market- Primary market - Secondary market – Listing of securities

Unit - II: DEMAT Account

Demat account: meaning– procedure - Benefits – Investor - Company and Broker

Unit – III: Stock Exchanges

Indian Stock Exchanges – Bombay Stock Exchange (BSE) – National Stock Exchange (NSE)

Unit – IV: Commodity Exchange

Commodity Exchange - Share Exchange (Timing, Options, and Procedures)

Unit – V: Online Trading

Online trading - offline/phone trading - Future trading - Bank balance - Stock in hand – Stop loss order

Text Book

How to make money trading derivatives: Ashwani Gujral Vision Books; Second Edition, 2015

Reference Books:

1. 15 easy steps to mastering technical charts: AshuDutt Vision Books, 2013
2. 22 stock market trading secrets: AshuDutt Vision Books 2012

Subject Code: **CC410 Entrepreneurship Development**

Course Objectives:

To understand the fundamental knowledge of Entrepreneurship.

To educate the students about MSME's

To familiarize the students about Lean Startup's.

To impart knowledge of government subsidies and incentives.

To know about social entrepreneurship.

Unit - I: Entrepreneurship

Meaning, Definition and characteristics of Entrepreneurship and Entrepreneur- Functions of Entrepreneur, Factors influencing Entrepreneurship - Advantages and Limitations, Qualities of an Entrepreneur, Types of Entrepreneurs and brief history about successful entrepreneurs - Role of artificial intelligence in developing Enterprises

Unit - II: Micro, Small and Medium Enterprises (MSME)

Meaning, Definition, investment limit, Ownership Patterns of Micro, Small and Medium enterprise. Products and services of MSME, Role played by MSME in the development of Indian Economy, Problems faced by MSME and the steps taken to solve the problems, Stages in setting up of MSME

Unit - III: Start-Ups

Meaning, definition features types, benefit and limitation of startups. Players in the promotion of startups, the role of incubation Centre's in grooming youngsters for startups - lean startups - preparation of business plan & Proposal - feasibility reports: Financial, technical, marketing, product service and legal. Causes for success and failure of start-ups in India, Start-ups India scheme, features eligibility, loan facilities matching grant, minimizing section imbalance through the promotion of startups in urban and rural India, Women entrepreneurs in start-ups

Unit - IV: Financial Institutions in the Promotion of Entrepreneurs'

Financial assistance by Commercial banks, co-operative banks, Government Assistance, through SFCs SIDBI, IFCI, Non-financial assistance from DIC, SISI, SHG, KVIC –Schemes: MUDRA, CGMSE - Financial incentives for MSMEs and Tax Concessions – other financing options: Venture capital, Crowd funding, Angel investors.

Unit - V: Social Entrepreneurship

Meaning – Definition – Characteristics of Social Entrepreneurship – Timmons Model of Entrepreneurship process – PCDO Framework (People, Context, Deal and Opportunities) – Sources of Social Entrepreneurship – Qualities and skills of social entrepreneurship – Successful social Entrepreneurship Initiatives in India.

Field Activities:

1. Preparation of a Project report to start a Start-ups Unit.
2. Preparing a letter to the concerned authority-seeking license for the proposed MSME
3. Visit an incubation centre and submit report on its activities
4. Chart showing financial assistance available to MSME along with rates of interest.
5. Bring out social and agricultural Entrepreneurship undertaking details

Text book:

E. Gordon K. Natarajan “Entrepreneurship Development”, Himalaya publishing house

Reference Books:

Gupta C B & Srinivasan N.P. Entrepreneurial Development Sultan Chand & Sons, New Delhi 2014

S.S Khanka, Entrepreneurial Development S Chand, New Delhi

S. Anilkumar, Entrepreneurial Development - New Age Publications (P) Ltd 2003

[Ranbir Singh](#), Entrepreneurial Development S.K. Kataria& Sons; Reprint 2013 edition

Semester –IV

Hours: 5 / Credit: 5

Subject Code: **CC411 Corporate Accounting – II**

Course Objectives:

To gain comprehensive understanding of calculation of goodwill and valuation of shares
Students able to learn about preparation of holding company accounts
To gain accounting knowledge in preparation of bank accounts
To know the procedures of preparation of life insurance company accounts
Students enable to prepare general insurance company accounts - fire and marine.

Unit – I: Goodwill and Shares

Goodwill - Meaning- Needs - Factors affecting the Valuation Goodwill - Methods – Average Profit, Super Profit, Annuity and Capitalization Methods. Share – Meaning - Factors affecting the Valuation of shares– Methods- Net Asset, Yield and Fair Value Methods.

Unit – II: Accounts of Holding Companies

Minority Interest - Cost of Control – Elimination of Common Transactions - Unrealized Profits - Revaluation of Assets and Liabilities - Bonus Shares - Consolidated Balance Sheet (Inter Company Investment Excluded). Balance Sheet (New Method)

Unit – III: Bank Accounts

Rebate on Bills Discounted - Non-Performing Assets (NPA) - Interest on Doubtful Debts - Preparation of Profit and Loss Account and Balance Sheet with Relevant Schedules (New Method)

Unit – IV: Insurance Company Accounts

Life Insurance - Revenue Account - Preparation of Profit and Loss Account and Balance Sheet (New Method)

Unit – V: General Insurance Company Accounts

General Insurance: Fire and Marine Revenue Account - Profit and Loss Appropriation Account and Balance Sheet (New Method).

Text Book:

Reddy T.S. & Murthy A. - Corporate Accounting - Margham Publications, Chennai 2016

Reference Books:

Shukla M.C.Grewal, T.S.Gupta S.C. - Advanced Accounts - S.Chand& Co. Ltd, New Delhi 2007
Gupta R.L. &Radhaswamy M. - Advanced Accountancy, Sultan Chand & Sons, New Delhi 2014
Jain &Narang - Advanced Accountancy - Kalyani Publishers 2016
Iyengar S.P. - Advanced Accounting - Sultan Chand & Sons, New Delhi, 2012

Semester –IV

Hours: 5 / Credit: 5

Subject Code: **CC412 Costing Methods and Techniques**

Course Objectives

To enlighten the students on the job, batch and contract costing.
To comprehend the methods of costing adopted in transport industries.
To enable the students to compute the process cost of manufacturing industries.
To acquire knowledge and practical skills for the application of Marginal Costing technique at various managerial decision-making condition.
To impart knowledge on standard costing, material and labour variances.

Unit- I: Job, Batch and Contract Costing

Job Costing – Definition – Features – Preparation of Job Cost Sheet - Batch Costing – Definition – EBQ - Contract Costing – Definition - Work certified and uncertified – Profit or loss on contract– Preparation of Contract Account

Unit -II: Operating Costing and Reconciliation

Operating Costing - Definition – Cost unit - Cost Classification - Cost Accumulation – Transport Costing - Preparation of Operating Cost Sheet - Reconciliation of Cost and Financial Accounts - Preparation of reconciliation statement

Unit – III Process Costing

Definition – Features - Job Vs Process Costing – Normal and Abnormal Process losses – Inter Process Profit– Equivalent Production - Basics of Joint Product Costing and By-Product Costing – Preparation of Process cost account

Unit – IV Marginal Costing

Definition –Features – Advantages – Limitations – Cost-Volume-Profit Analysis – Fixed Cost – Variable Cost – Contribution – Break Even Analysis – MOS – Make or Buy Decisions.

Unit - V: Standard Costing

Definition and features of standard costing – Steps involved in standard costing– Advantages of standard cost – Limitations of standard cost – Material variances – Labour variances.

Field Activities:

A case will be provided to every student on the concept of Make or Buy Decision. Student should analyze the case based on the concept of Marginal Costing and submit the report.

Two problems from CMA/CA courses will be provided to every student. They must work out the solution and submit it as report to the course teacher.

Every student should visit any production company and learn the concepts of process costing.

Text Book:

T.S. Reddy and Reddy, Cost Accounting, Margham Publications, Chennai.

Reference Books:

Jain, S.P. and K.L. Narang. Cost Accounting: Principles and Methods. Kalyani Publishers, New Delhi. 2007

R.S.N. Pillai and V. Bagavathi, Cost Accounting, S.Chand, Chennai 2004

Maheshwari, S.N. and S.N. Mittal. Cost Accounting: Theory and Problems. ShriMahabir Book Depot 2006

A.Murthy& S. Gurusamy, Cost Accounting, Vijay Nicolas, New Delhi.2008

Note: Latest edition of text book may be used.

Semester – IV

4 Hours/3 Credits

CC414 RELATIONAL DATABASE MANAGEMENT SYSTEM

Course Objectives

To understand the basic concepts of Database and Data Models.

To learn how to implement the query language in database.

To understand the advance features query language used to design an efficient database

To know database design models exist.

To understand the consequences of bad database design and how it can be overcome.

2. Course Outline

UNIT – I: BASIC CONCEPTS AND DATA MODELS

Basic Concepts: Data modelling for database - The three level architecture proposal for DBMS – Components of DBMS - Advantage and Disadvantage of a DBMS. Data Models: Data Models

Classification - Entity Relationship Model – Relational Data Model – Network Data Model - Hierarchical Model - Comparison.

UNIT – II: INTRODUCTION TO SQL

Overview of SQL Query Language – SQL Data Definition – Basic Structure of SQL Queries – Additional Basic Operations – Set Operators – Null Values – Aggregate Functions – Nested Sub queries – Modification of the Databases.

UNIT – III: ADVANCED SQL

Join Expressions - Views – Integrity Constraints – Authorization – Stored Procedures and Functions – Indexing: Basic Concepts.

UNIT – IV: DATABASE DESIGN AND E-R MODEL

Overview of the design process – The Entity-Relationship Model – Constraints – Entity – Relationship – Entity-Relationship Diagrams – Entity Relationship design issues – Extended E-R Features – Other aspects of Database Design.

UNIT – V: RELATIONAL DATABASE DESIGN

Features of Good Relational Designs – Atomic Domains and First Normal Form – Decomposition using Functional dependencies – Decomposition using Functional Dependencies – Decomposition using Multivalued Dependencies – More Normal Forms.

3. TEACHING RESOURCES

i) Text Books

Bipin C Desai, “An Introduction to Database System”, Galgotia Publications Pvt.Ltd, New Delhi 1999.

UNIT – I: Ch.1.1, 1.4 - 1.6, 2.3 - 2.4 & 2.6 - 2.9

Abraham Silberschatz , Henry F Korth, S Sudharshan , “Database System Concepts” , MC Graw Hill, 6th Edition 2013.

UNIT – 2: Ch. 3, 4

UNIT – 3: Ch. 4.1, 4.2, 4.4, 4.6 & 5

UNIT – 4: Ch. 7

UNIT – 5: Ch. 8

ii) References

Peter Rob, Carlos Coronel, “Database Systems – “Design, Implementation and Management”c, GalgotiaPublicaitons.

C.J. Date, “Introduction to Database System”, Vol 1, Narosa Publishing House,New Delhi.

S. K. Singh, “Database Systems”, Third Edition. 2009.

Ramakrishnan. Gehrke, “Database Management Systems”, International Edition, 2003.

RajeshkharSunderraman, “Oracle 8 Programming A Primer”, AdditionWesley Publication, New Delhi, 2000.

iii) Web References

Online Tutorial

<https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm>

<http://searchoracle.techtarget.com/tutorial/Learning-Guide-RDBMS-fundamentals>

Online Quiz

<https://www.quia.com/quiz/164512.html>

<https://www.wiziq.com/online-tests/22152-rdbms-concepts>

Online Compiler

https://www.tutorialspoint.com/execute_sql_online.php

<https://kripken.github.io/sql.js/GUI/>

SUPPLEMENT LEARNING

SQL Wild cards
Temporary Tables
Clone Tables
Using Sequences
Handling Duplicates

Semester – IV

2 Hours/1 Credit

PCC403 PRACTICAL – IV: RELATIONAL DATABASE MANAGEMENT SYSTEM

SQL

DDL (Create, Alter, Drop, Rename) and DML (Insert, Update, Delete)
Single row functions and Aggregate Functions using SELECT
TCL (Commit, SavePoint, RollBack) and DCL (Grant, Revoke)
Using Constraints, Subqueries and Views
Joins

PL/SQL – Stored Procedures and Functions

Create, Execute and Drop Procedure
Procedures with Variables and Constants
Procedures with Control Structures
Procedures with Exceptions
Functions

Semester – IV

Hours: - / Credit: 1

Subject Code: Certificate Course II: Tourism Marketing

Course Objectives

To provide a global and local perspective on tourism marketing
To build theoretical knowledge of the tourism marketing and related sectors
To understand about the behaviour of tourists.
To gain knowledge of tourism market segmentation.
To enable the students to be familiar with tourism planning process.

Unit – I: Introduction to Tourism:

Tourism: Concept, Tourist: Concept, Motives Behind Travel, Tourism: Typology, Tourism: An Industry, Effect of Tourism, Tourist Organizations, Market Potential of Tourism.

Unit- II: Tourism Marketing:

The Perception, Why Tourism Marketing? Purpose of Tourism Marketing, Significance of Tourism Marketing, Tourism Marketing in the Developed Countries, Tourism Marketing in Indian Environment

Unit – III: User’s Behavioural Profile:

Users: a General Description, Users’ Behaviour, Behavioural Influence, Users’ Behaviour and Life Style, Typology of Users’ Behaviour, Behaviour Determinants Model, Understanding the Behaviour of Tourism, Psycho-locomotion of Tourists

Unit – IV: Tourism Product Planning and Development:

Product - the Concept, A View of the Tourism Product, Tourism Product - The Salient Features, Tourism Product Planning, Why Product Planning? Planning Process, Environment and Planning, Regional Planning, Appraisal of Project and Tourism Planning, Tourism Product Planning in India.

Unit –V: Tourism Market Segmentation:

Concept of Tourism Market, Concept of Market Segmentation - Justification for Segmenting the Market, Importance of Market Segmentation, Bases of Market Segmentation, Life Style: An Importance Base, Effective Market Segmentation, Decision Processes for Segmentation.

Text Book:

Tappan K Panda and Sitikantha Mishra, Tourism Marketing – The ICFAI press Hyderabad 2006

Reference Books:

Biswanath Ghosh, Tourism and Travel Management – Vikas Publishing New Delhi 2003

Suddhendu Mishra, Basic of Tourism Management – Excel books, New Delhi 2008

Monika Prakash and Nimit Chowdhary, Starting a Tourism Company – Matrix publishers New Delhi 2010

Anil sharma, Tourism Management – Essential books, New Delhi 2006

B.Sc. PSYCHOLOGY

SEMESTER I

GENERAL PSYCHOLOGY – I (CORE THEORY)

SUBJECT CODE: SY101

COURSE OBJECTIVES: 5 Hours Per Week

To introduce students to the basic concepts of the field of psychology with an emphasis on applications of psychology in everyday life.

To understand the concepts of sensation, Perception and Attention.

To know the Structural features of Consciousness.

To gain knowledge on Learning and its related theories.

To learn the process of Memory.

UNIT I: INTRODUCTION AND METHODS

What is Psychology? Definition – Goals – What is not psychology? Pseudo psychology. The History of Psychology – Schools - Modern Perspectives – Psychology in India – Psychology: The Science – Methods: Introspection – Observation – Survey – Experiment – Case Study – Correlation Research – Scope of Psychology: Branches of basic Psychology – Branches of applied Psychology

UNIT II: SENSATION

Sensation: Meaning – Psychophysics -Thresholds – Weber’s Law – Adaptation – Basic sensation: Vision – Hearing – Touch and other Skin senses – Olfaction- Gestations - Proprioception: Kinesthetic sense – Vestibular sense

UNIT III: PERCEPTION AND ATTENTION

Perception: Meaning– Organizing principles of perception –Constancies-Pattern perception, Distance perception- Errors in Perception - Illusion – Types; Hallucinations – Types; Extra Sensory Perception. - Factors that influence perception – Depth perception Attention: Meaning – Types –Determinants.

UNIT IV: CONSCIOUSNESS

States of Consciousness: Consciousness – Definition – Two Major Types – Natural State of Consciousness: Biological Rhythms – Circadian Rhythms; Waking States of Consciousness – Sleep – Functions – Stages – Sleep Disorders – Dream – Theories. Altered States of Consciousness: meaning – Hypnosis – Use of Drugs – Meditation – Other Altered States. Sensory deprivation: Near death Experience- Lucid dreaming.

UNIT V: LEARNING

Learning: Definition – Nature- Association Learning: Classical Conditioning – Basic Principles; Operant Conditioning – Basic Principles – Reinforcement – Types – Punishment – Types. Schedules of Reinforcement – Shaping – Learned Helplessness; Similarities and Differences between Classical Conditioning and Operant Conditioning. Social and Cognitive Learning: Latent Learning – Insight Learning – Observational Learning.

Textbook:

Cicarelli, K. S., Meyer, E. G. & Misra, G. (2008). *General psychology*. New Delhi, India: Pearson India Education Services Pvt Ltd.

Reference:

Baron, R. A. (2010). *Psychology* (5th ed.). New Delhi, India: Pearson India Education Services Pvt Ltd.

BIOLOGICAL PSYCHOLOGY – I (CORE THEORY)

SUBJECT CODE: SY102

COURSE OBJECTIVES:

5 Hours Per Week

- To explore the biological basis of experience and behavior.
- To develop an understanding of the influence of behavior, cognition, and the environment on bodily system.
- To develop an appreciation of the neurobiological basis of psychological function and dysfunction.
- To understand the process of neural communication.
- To understand the influence of various hormones on behavior.

UNIT I: BIOLOGICAL FOUNDATIONS OF BEHAVIOR

Introduction: Meaning of Biological Psychology- Viewpoints to explore Biology of Behavior – Approaches that relate brain and behavior – Levels of analysis - Correlating brain anatomy with behavior - Recording brain activity - Effects of brain damage - Effects of brain stimulation

UNIT II: NEURONS- BASIC UNIT OF NERVOUS SYSTEM

Basic features of the Nervous System: An overview, Meninges, Ventricular system and production of cerebrospinal fluid. Cells of the Nervous System: Neurons, supporting cells, the blood-brain barrier – Neural Communication: An overview, measuring electrical potentials of axons. The Membrane Potential: Balance of two forces, The Action Potential, Conduction of the action potential.

UNIT III: COMMUNICATION BETWEEN NEURONS – SYNAPTIC TRANSMISSION

Communication between Neurons: Structure of synapses, Neurotransmitter: meaning- types, Release of the Neurotransmitter: Activation of receptors- Postsynaptic potentials- Termination of postsynaptic potentials.

UNIT IV: STRUCTURE & DIVISIONS OF THE NERVOUS SYSTEM

Nervous System: Development of the central nervous system, Brain: The forebrain, The hind brain, midbrain & forebrain, Division of Nervous System: Central Nervous System, The Peripheral Nervous System- Spinal nerves, Cranial nerves, The Autonomic Nervous system – Sympathetic and Parasympathetic.

UNIT V: HORMONES AND THE BRAIN

Hormonal actions- General principles of hormonal actions, Hormonal action on cellular mechanisms- Hormonal influence on growth and activity, Feedback control mechanisms in regulating secretion of hormones, Endocrine glands and its specific hormones: Pituitary- Pineal- Thyroid- Parathyroid- Pancreas- Adrenal- Gonads

Text books:

Carlson, N.R. (2007). *Foundations of physiological psychology* (6th ed.). New Delhi, India: Pearson India Education Services Pvt Ltd.

Kalat, J.W. (2011). *Biopsychology*. Delhi, India: Cengage Learning India Private Limited.

References:

Pinel, J. (2007). *Biopsychology* (6th ed.). New Delhi, India: Pearson India Education Services PvtLtd.

Purves, D., Brannon, E., Huettel, S.A., Labar, K.S., Platt, M.L., &Woldorff, G.M. (2008). *Principles of cognitive neurosciences*. Sunderland, MA: Sinauer Associates, Inc.Publishers.

PRINCIPLES OF MANAGEMENT – (ALLIED - I)

SUBJECT CODE: ABA101

COURSE OUTCOMES:

On completion of the course, the students will be able to;

Apply the concepts of management by the various management thinker.

Learn the concepts and competence of planning.

Acquire the knowledge of Organization and & staffing.

Understand the importance of effectiveness of Directing and Leadership.

Analyze the importance, process & types of controlling.

UNIT I: Introduction: Management: Meaning – Definition –Nature - Concept of Management and Administration – Levels of Management - Role of Managers –Functional Management - Modern Theories - Contribution of Fayol, Fallet, Elton Mayo and Drucker –Management as an Art, a Science, a Profession and a Discipline – Management as a social system.

UNIT II: Functions of Management: Functions of Management – Planning – Nature, Characteristics and Importance – Advantages and Limitations – Steps in Planning – Elements – Objectives – Concept of MBO – MBE - Policies – Procedures – Rules – Strategies – Programmes.

UNIT III: Organizing: Organizing: Formal and Informal Organization – Organizational Structure – Principles of Organization – Types of Organization - Authority and Responsibility – Delegation and Decentralization – Departmentation – Decision Making – Steps in Decision Making.

UNIT IV: Staffing: Directing – Leadership – Types of Leadership – Importance of Leadership – Types of Leadership Styles – Theories – Motivation – Definition - Motivational Theories (Maslow, Herzberg X,Y and Z theories only) – Types - Span of Management – Communication – Definition – Types

UNIT V: Controlling: Controlling – Meaning – Definition - Techniques and Importance – Requirements of Effective Control System – Coordination – Definition – Principles of Coordination – Techniques – Problems – Advantages – Steps for Effective Coordination.

Text Book:

Jayashankar, Principles of Management, Prassana Publications.

References:

Koontz & Weirich, “Essentials of Management: An International perspective”, 8thEdn. Tata McGraw-Hill, New Delhi.

Koontz H. “Essentials of Management”, Tata McGraw-Hill, New Delhi.

Stephen P. Robbins & David A. Decenzo, “ Fundamentals of Management”, Pearson Education, New Delhi.

L.M. Prasad, Principles of Management, Sultan Chand Publications.

Dinkar Pagare, Business Management, Sultan Chand Publications.

Web Resources

www.shrm.org

www.shrmindia.org

www.ipma-hr.org

www.ahrd.org

SEMESTER II

GENERAL PSYCHOLOGY - II (CORE THEORY)

SUBJECT CODE: SY201

COURSE OBJECTIVES: 5 Hours Per Week

- To know the basic aspects of thinking and behaviour
- To understand the process of motivation and frustration.
- To know underlying principles of physiological of emotion and stress
- To gain the knowledge about the various approaches of personality
- To understand the concepts of conflicts of frustration

UNIT I: MEMORY AND FORGETTING

Memory: Definition –Memory Process: Encoding – Storage – Retrieval – The information processing model – Sensory memory – Short term memory – Long term memory – Forgetting: Meaning – Forgetting curve-Theories of forgetting - Causes – Memory and Brain – Improvingmemory.

UNIT II: COGNITION

Meaning – Cognitive Psychology- Types of cognition: – Mental Imagery – Concept, Problem solving- Steps- Barriers to Effective problem solving- Strategies of problem solving: Algorithms, Heuristic, Decision making – Step, Reasoning – Inductive and Deductive reasoning, Language: Nature - Main Components of Language – Phonemes- Morphemes – Syntax - Semantics –Pragmatics.

UNIT III: MOTIVATION

Motivation: Definition – Needs – Biological Needs – Social Needs - Psychological Needs , Theories of Motivation: Instincts – Drive-reduction theory – Arousal – Incentive – Opponent-Process – Cognitive theories – Social cognitive theory – Need theories, Classification of Motives: Physiological motives – Psychological motives, Conflict: Meaning- Types. Frustration: Meaning- Causes.

UNIT IV: EMOTION AND STRESS

Emotion: Meaning – Basic emotions- Components - Physiology of emotion - Expression of emotion – Theories of Emotions, Stress: Definition – Four variations - Stressors – Effects – General Adaptation Syndrome – Individual differences - Coping mechanism.

UNIT V: INTELLIGENCE AND CREATIVITY

Intelligence: Definition - Concept of IQ - Individual differences in Intelligence –Mental retardation – Mentally gifted – Assessment of Intelligence, Emotional Intelligence: Meaning characteristics, Creativity: Definition – Nature – Steps - Characteristics of creative people Creativity tests.

Textbook:

Cicarelli, K. S., Meyer, E. G. & Misra.(2008) *General psychology*. New Delhi, India: Dorling Kingsley (India) Private Limited

Reference:

Baron, R. A. (2010) *Psychology* (5th ed.). New Delhi, India: Pearson India Education Services Pvt Ltd.

BIOLOGICAL PSYCHOLOGY - II (CORE THEORY)

SUBJECT CODE: SY202

COURSE OBJECTIVES: 5 Hours Per Week

To explore the biological basis of sleep and dream

To comprehend the brain mechanism involved in regulating thirst and hunger

To know the biological basis of emotions

To understand the biological basis of sleep & dream and various sleep disorders

To identify the brain areas associated with learning and memory

UNIT I: CIRCADIAN RHYTHMS, SLEEP AND DREAMING

Sleep: Stages of sleep, Brain activity during sleep; why do we sleep; Physiological mechanisms of sleep and waking: Neural control of sleep, arousal, wake transitions and neural control of transition to REM. Disorders of sleep: Insomnia, Narcolepsy, REM sleep behavior disorder, problems associated with slow-wave sleep. Biological clocks: Circadian rhythms and Zeitgebers, the suprachiasmatic nucleus, control of seasonal rhythms, the pineal gland and melatonin, changes in circadian rhythms: shift work and jet lag

UNIT II: BRAIN DEVELOPMENT AND PLASTICITY

Development of the brain- Maturation of the vertebrate brain, Growth and development of neurons -New neurons later in life- Path finding by axons, Determinants of neuronal survival, Neural plasticity: Meaning- Plasticity after brain damage.

UNIT III: BIOLOGICAL BASIS OF THIRST AND HUNGER

Thirst: Mechanisms of water regulation- Osmotic thirst- Hypovolemic thirst and sodium specific hunger, Hunger: Digestion and food selection-Short and long-term regulation of feeding-Brain mechanisms - Eating Disorders.

UNIT IV: BIOLOGICAL BASIS OF EMOTIONS

Emotions: Introduction, Emotions and Autonomic arousal: James-Lange theory, Brain areas associated with emotions- The functions of emotions. Attack and Escape Behaviors: Attack behavior - Escape - Fear and anxiety- Stress and Health

UNIT V: BIOLOGICAL BASIS OF LEARNING AND MEMORY

Memory: Localized representations of memory- Types of memory- The hippocampus- Theories on the function of the hippocampus- Other types of amnesia: Korsakoff's syndrome, Alzheimer's Disease- The role of the other brain areas.

Text books:

Carlson, N. R. (2007). *Foundations of physiological psychology* (6th ed.). New Delhi, India: Pearson India Education Services PvtLtd.

Kalat, J.W. (2011). *Biopsychology*. Delhi, India: Cengage Learning India Private Limited.

References:

Pinel, J. (2007). *Biopsychology* (6th ed.). New Delhi, India: Pearson India Education Services Pvt Ltd.

Purves, D., Brannon, E., Huettel, S.A., Labar, K.S., Platt, M.L., & Woldorff, G.M. (2008). *Principles of cognitive neurosciences*. Sunderland, MA: Sinauer Associates, Inc. Publishers.

MANAGING BEHAVIOR IN ORGANIZATION – (ALLIED - II)

SUBJECT CODE: ABA201

COURSE OUTCOMES:

On completion of the course, the students will be able to;

Get the current knowledge about Organization.

Identify and learn the fundamental concepts of Organization behavior.

Make the students learn the application of the organization concepts.

Acquire the cross-cultural management concepts.

Acquire the knowledge about organizational change and Development.

Learn the organizational behavior and the culture of the organization in the present scenario.

Acquire the knowledge about in the recent development of organizational behavior.

UNIT I: Introduction: Definition – Key elements of OB – Nature and Scope of OB – Need for studying OB – Contributing Disciplines to OB – Challenges faced by the Management – Organizational Behavior Process Models of OB – Personality - Concepts and determinants – Types and Theories – Influence of Personality on OB – Measurement of Personality.

UNIT II: Individuals: Perception – Perception Vs Sensation – Perceptual Process – Factors affecting Perception – Perception and its application in OB – Attitudes – Concept and formation of attitudes – Types of Attitudes – Measurement of Attitude and Change of Attitude – Value – concept and types of Values – Formation of Values – Values and Perception.

UNIT III: Group & Decision Making: Definition and Characteristics of Group – Reason for formation of Groups – Theories of Group Formation – Types of Groups – Stages of Group formation – Group Behavior – Group Decision Making – Quality Circle – Work Teams.

UNIT IV: Organizational Conflicts & Stress: Organizational Conflicts – Definition and Sources of Conflict – Types of Conflict – Aspects of Conflict – Conflict Process – Conflict Management – Stress – Symptoms of Stress – Measurement of Stress – Causes and Consequences of Stress – Coping with Stress.

UNIT V: Organization Climate and Culture: Organizational Climate – Organizational Culture – Definition, Types, Functions – Organizational Change – Organizational Development – Characteristics – Objectives – Organizational Effectiveness.

Text Book

Jayasankar, Organizational Behavior, Margham Publications.

References

S.S. Khanka, Organizational Behavior, S. Chand.

Stephen P. Robins, Organizational Behavior, PHI Learning / Pearson Education.

Fred Luthans, Organizational Behavior, McGraw Hill.

Schermerhon.Hunt and Osborn, Organizational Behavior, John wiley publications.

Web Resources:

www.obweb.org

www.obmnetwork.com

www.humanmetrics.com

SEMESTER-III

DEVELOPMENT PSYCHOLOGY - I (CORE THEORY)

SUBJECT CODE: SY316

COURSE OBJECTIVES: 5 Hours Per Week

To relate the developmental stages from conception till birth

To tell about human Physical growth through birth

To introduce the developmental stages of infancy and babyhood

To know about the developmental process in early and late childhood

To understand the stages of socialization, family relations and personality development

UNIT I: CONCEPTION THROUGH BIRTH

Meaning of developmental changes – Significant facts about development – Developmental stages – Developmental Issues–Conception of Age.

Characteristics of the Prenatal Period– How Life begins – Importance of Conception –Periods of Conception

Periods of Prenatal development – Stages of child Birth - Types of child birth – Attitudes of significant people

Prenatal hazards & complications of low birth weight.

UNIT II: INFANCY

Characteristics of Infancy, developmental tasks- Major adjustment of Infancy – Conditions influencing adjustment to postnatal life– Characteristics of the Infant– Hazards of Infancy.

UNIT III: BABY HOOD

Characteristics of Babyhood – Developmental tasks of babyhood – Physical development –Physiological development – Muscle Control – Speech development – Emotional behavior –Socialization – Interest in Play – Development of Understanding – Beginnings of Morality –Beginnings of Sex-Role typing – Family Relationships – Personality development – Hazards and Happiness.

UNIT IV: EARLY CHILDHOOD

Characteristics of Early Childhood–Developmental tasks–Physical development–Physiological habits – Skills of Early Childhood – Improvement in Speech – Emotions –Socialization – Play – Development of Understanding – Moral development– Common Interests – Sex-role Typing – Family Relationship – Personality development – Hazards and Happiness.

UNIT V: LATE CHILDHOOD

Characteristics of Late Childhood – Developmental tasks – Physical development – Skills –Speech improvement – Emotions and Emotional Expressions – Social groupings and Social behavior – Play interest and activities – Increase in Understanding – Moral attitudes and behavior – Interests – Sex-role Typing – Changes in Family relationships – Personality Changes –Hazards and Happiness.

Text Books:

- Hurlock,E.(1980). *Developmental psychology*. NewDelhi, India:Tata McGraw Hill Publishing Co.
Santrock, J.W.(1999).*Life span development (7thed.)*.NewYork,NY: McGraw Hill.

References:

- Berndt,T.J.(1997).*Child development (2nded.)*. Madison, WI:Brow &Benchmark Publishers.
Papalia,D.E.,&Olds,S.W.(1994).*Human development(5thed.)*.NewYork,NY: TataMcGraw Hill.
Berk, C. L. (1996).*Child development (3rd ed.)*. New Delhi, India: Prentice- Hall of India (Pvt)Ltd.

INTRODUCTION TO THEORIES OF PERSONALITIES (CORE THEORY)

SUBJECT CODE: SY317

COURSE OBJECTIVES: 5 Hours Per Week

- To relate the concepts, assessment, measurement and research methods pertaining to personality.
- To know the various psychoanalytic perspective of personality
- To understand the life span and trait perspective of personality

To gain knowledge about existential humanistic perspective of psychology

To gain about behavioral, cognitive and social perspective of personality

UNIT I: CONCEPT, ASSESSMENT, AND MEASUREMENT AND RESEARCH METHODS

Personality: Definition, Meaning & Nature - Individual Uniqueness – Gender – Culture – Formal Theories – Personal Theories – Subjectivity in Personality Theories - Self-Report Measure: Biological Measures – Behavioral Assessment – Projective Techniques – Clinical Interviews – Online and Social Media Analysis.

UNIT II: PSYCHOANALYTIC THEORIES

Sigmund Freud: Classical Psychoanalysis – Instincts – Structure of Mind – Psychosexual Development – Therapeutics Techniques – Free Association – Catharsis – Dream Analysis; Carl Jung: Analytical Psychology – Psychological Types – Collective Unconscious; Alfred Adler: Individual Psychology – Inferiority Feelings – Role of Birth Order.

UNIT III: LIFE-SPAN AND TRAIT PERSPECTIVES ON PERSONALITY

Erik Erikson: Identity Formation – Ego Crises – Approaches to Trait: Lexical – Statistical – Theoretical; Gordon Allport: Culture – Functional Equivalence – Personal Dispositions, Eysenck's: Hierarchical Model of Personality, Cattell's Taxonomy: The 16 Personality Factor System

UNIT IV: EXISTENTIAL- HUMANISTIC PERSPECTIVES ON PERSONALITY

Roots in Gestalt – Kurt Lewin's Field; Martin E. P. Seligman: Learned Helplessness and the Optimistic/Pessimistic Explanatory Style, Rotter: Locus of Control theory Maslow: Hierarchy of Needs – Self-Actualization, Rogers: Growth – Inner Control – Becoming One's Self.

UNIT V: BEHAVIORAL, COGNITIVE AND SOCIAL PERSPECTIVE ON PERSONALITY

Albert Bandura: Social-Cognitive Learning Theory - Self-System, Skinner: Operant Conditioning; Cognitive Style – Perceptual Mechanisms – Schema Theory – Kelly's Personal Construct Theory

Text Books:

Hall, C.S., Lindzey, G., & Campbell, J.B. (2007). *Theories of personality* (4th ed.). Bengaluru, India: Wiley India Private Limited.

Schultz, P. D., Schultz, S. E., & Schultz, S. (2012). *Theories of personality* (10th ed.). Delhi, India: Cengage Learning.

References:

Friedman, H. S., & Schustack, M. W. (2016). *Personality: Classic theories and modern research* (6th ed.). Boston, MA: Pearson/ Allyn and Bacon.

Larsen, R. J., & Buss, D. M. (2018). *Personality psychology: Domains of knowledge about human nature* (6th ed.). Boston, MA: McGraw-Hill.

Rao, K., Paranjpe, A. C., & Dalal, A. K. (2008). *Handbook of Indian psychology*. Chennai, India: Cambridge University Press India/Foundation Books.

STATISTICS IN PSYCHOLOGY (DEPT. MATHEMATICS) – (ALLIED - III)

SUBJECT CODE: AM310D

Hours/Week:6

UNIT I: INTRODUCTION TO THE STATISTICS

Meaning of statistics- Importance of Statistics in Psychology– Parameters and Estimates-Descriptive Statistics- Inferential Statistics-Variables and their types; Levels of measurement: Nominal Scale-Ordinal Scale- Interval Scale-Ratio Scale; Frequency tables: Making a Frequency Table-Frequency tables for Nominal Variables-Grouped Frequency Tables, Frequency Graphs: Histogram, Frequency Polygon.

UNIT II: CENTRAL TENDENCY AND VARIABILITY

Central Tendency: The Mean- from Frequency Distributions - Assumed Mean Method-Properties of Mean. Median- Calculation of Median from Ungrouped data- Calculation of Median from a Frequency Distribution. The Mode -Calculation of Mode in a Frequency Distribution. Comparison of Mean, Median and Mode- Guidelines for the Use of Central Tendencies. **Variability:** The Range- Calculation of Range- the Average Deviation- Calculation of the Average Deviation. The Semi-Inter-quartile Range – Calculation of Q1, Q3 and Quartile Deviation. The variance and the Standard Deviation Methods of Calculating the Variance and the Standard Deviation from Ungrouped data- Calculation of Standard Deviation from Grouped data- Calculation of Standard Deviation from Assumed Mean.

UNIT III: THE NORMAL DISTRIBUTION AND CORRELATION

The Normal Distribution: Properties of the Normal Curve- Areas under the Normal Curve- Importance of Normal Distribution-Skewness-Kurtosis-Importance of measures of Skewness and Kurtosis.

The Correlation: the Concept of Correlation- the Scatter Plot- the Product Moment Correlation- Calculation of Product Moment Correlation- Spearman's Rank-Difference Correlation Co-efficient- Properties of Correlation Co-efficient.

UNIT IV: THE Hypothesis Testing and the Inferential Statistics

Hypothesis Testing: the Core logic of Hypothesis Testing–the Hypothesis Testing Process- One Tailed and Two Tailed Hypothesis Tests. Decision Errors: Type I Error- Type II Error, **Inferential Statistics:** 't' Tests- the 't' test for a Single Sample-the 't' test for a Dependent Means-Assumptions of Single Sample and the 't' Test for a Dependent Means. The 't' test for Independent Means: the Distribution of Differences between Means- Hypothesis Testing with a 't' test for Independent Means.

UNIT V: NON-PARAMETRIC METHODS

The Chi-Square: Degrees of Freedom- Test of the Hypothesis of Normality-Calculation of the Chi-Square for 2x2 tables- Yates' Correction for Continuity- Assumptions of the Chi Square test, **The Non-**

parametric Methods: Sign test-Assumptions and Uses of Sign Test- the Median Test- Run Test- the Kolmogorov and Smirnov Two Sample test-Precautions of the use of the Non-parametric tests.

Text Books:

1. Howell, D. (2012). *Statistical method for psychology* (8th ed.). Delhi, India: Cengage Learning.

References:

Agresti, A., & Finlay, B. (2013). *Statistical methods for the social sciences*. Hoboken, NJ: Pearson Education

Aron, A., Aron, E. N., & Coups, E. J. (2006). *Statistics for psychology* (4th ed.). New Delhi, India: Pearson India Education Services Pvt Ltd.

Heiman, G. (2013). *Basic statistics for the behavioral sciences* (7th ed.). Belmont, CA: Cengage Learning.

Bear, G., King, B. M., & Minium, E. W. (2008). *Statistical reasoning in psychology and education*. Bengaluru, India: Wiley India Private Limited.

Gupta, S. P. (1999). *Statistical methods* (3rd ed.). New Delhi, India: Sultan Chand & Sons

Garrett, H. E. (2006). *Statistics in psychology and education*. New Delhi, India: Paragon International Publishers.

SEMESTER-IV

DEVELOPMENTAL PSYCHOLOGY - II (CORE THEORY)

SUBJECT CODE: SY416

COURSE OBJECTIVES: 5 Hours Per Week

To know the developmental process of puberty and adolescence.

To analyze various developmental process of young adulthood

To know the developmental tasks of middle age

To define the problem related to old age

To Gain knowledge about hazards and happiness in human life-span

UNIT I: PUBERTY

Meaning - Characteristics – Criteria – Causes – Age – Growth spurt– Body changes –Effects of puberty changes– Hazards & Happiness.

UNIT II: ADOLESCENCE

Characteristics– Developmental tasks–Physical change– Emotional changes– Social change– Interest–Morality– Sex interest and Behavior–Family relationships–Personality change–Hazards &Happiness.

UNIT III: YOUNG ADULTHOOD

Characteristics – Developmental tasks – Changes in interest – Social Mobility – Sex role adjustments – Vocational adjustments – Marital Adjustments – Adjustment to parenthood – Adjustment to singlehood - Hazards of vocational and Marital adjustments – Success of Adjustment to adulthood.

UNIT IV: MIDDLE AGE

Characteristics–Developmental tasks– Adjustment to physical changes and mental changes- Social Adjustment – Vocational Adjustment – Adjustment to changed family patterns –Being single – loss of a spouse – Adjustment to approaching retirement – Vocational and Marital Hazards-Adjustment to approaching old age.

UNIT V: OLD AGE

Characteristics – Developmental tasks – Adjustment to physical changes – Change in motor and mental abilities – Changes in interests – Vocational Adjustment – Retirement – Changes in family life–loss of a spouse–Living arrangement for elderly hazards.

TextBooks:

Hurlock,E.(1980).*Developmental Psychology*.NewDelhi: Tata McGraw Hill Publishing Co.

Santrock, J.W.(1999).*Life span Development (7thed.)*. McGraw Hill.

References:

Berndt,T.J.(1997).*Child development (2nded.)*.Madison,WI: Brow & Benchmark Pub.

Papalia, D.E.,Olds,S.W.(1994).*Child development(5th ed.)*.NewYork, NY:Tata McGraw Hill.

Berk, L.C.(1996).*Child development(3rded.)*.Delhi, India: Prentice-Hall of India (Pvt)Ltd.

SEMESTER-IV

ABNORMAL PSYCHOLOGY - I (CORE THEORY)

SUBJECT CODE: SY417

COURSE OBJECTIVES: 5 Hours Per Week

To know about abnormal behavior, DSM-V and ICD- 11

To relate between normal and abnormal behavior

To explain about the clinical features and causes of neuro developmental disorders

To know the clinical features and causal factors of anxiety related disorder

To understand clinicalfeaturesandcausalfactorsofsomaticanddissociativedisorder

UNIT I: INTRODUCTIONANDTHEORETICALPERSPECTIVE.

Defining Abnormal Behavior-Causes of Abnormal Behavior: Necessary, Predisposing, Precipitating and Reinforcing causes, Historical views of abnormal behavior- Brief note on DSMV and ICD 11classificationsystem

UNIT II: MODELS OF ABNORMALITY

Biological–Psychodynamic–Behavior–Cognitive–Humanistic - Existential, Interpersonal perspective – Bio-cultural.

UNIT III: NEURODEVELOPMENT DISORDERS

Intellectual disability: Definition, Clinical types and Causal factor, Autism Spectrum disorder: Clinical Picture and Causal Factors, Specific Learning disorder: Clinical Picture and Causal factors, Attention Deficit/Hyperactivity disorder, Conduct Disorder, Neuro cognitive Disorder.

UNIT IV: ANXIETY RELATED DISORDERS

Meaning- Types - Brief description with Causal factors and Treatment: Generalized Anxiety Disorders-Phobic Disorder–Post Traumatic Stress Disorder – Obsessive Compulsive Disorder – Panic Disorders

UNIT V: SOMATIC DISORDER AND DISSOCIATIVE DISORDER

Somatic Symptoms and related disorders (SSD): Complex Somatic Symptom Disorder-Illness Anxiety Disorder– Functional Neurological Disorder, Dissociative Disorders: Dissociative Amnesia, Dissociative Identity Disorder, Depersonalization and De-realization Disorder–Causal factors and Treatment.

Text Books:

Butcher, J.N., Hooley, J.M., Mineka, S., Dwivedi, C.B. (2017). *Abnormal psychology* (16th ed.). New Delhi, India: Pearson India Education Services Private Limited.

Barlow, D. (2017). *Abnormal psychology and casebook in abnormal psychology* (5th ed.). Belmont, CA: Wadsworth.

Comer, R. (2018). *Fundamentals of abnormal psychology*. New York, NY: Worth Publishers.

References:

Davison, G.C., Neale, J.M. & Kring, A.M. (2004). *Abnormal psychology*. (9th ed.). Marblehead, MA: John Wiley & Sons Inc.

Alloy, L.B., Riskind, J.H., & Manos, M.J. (2005). *Abnormal psychology*. New Delhi, India: Tata McGraw Hill publishing Co

Cutting, J. (1997). *Principles of psychopathology*. New York, NY: Oxford University Press

BUSINESS COMMUNICATION – (ALLIED - IV)

SUBJECT CODE: ABA401

COURSE OUTCOMES:

On completion of the course, the students will be able to;

Imbibe meaning of Business Communication and the general principles of communication.

Learn the mechanical structure of letters and drafting of others forms of communications.

Illustrate the mechanism of writing business reports.

Draft different kinds of business letters and communications.

Gain knowledge about Trade Letter, Export Letter, Letters of Application and Report Writing.

UNIT I: INTRODUCTION: Communication in Business – Meaning and Importance – Essentials of Effective Business, Types of Communication – Oral and Written Communication – Principles of effective communication – Types of Letter – Structure, Physical Appearance, Kinds of Business Letters.

UNIT II: TRADE LETTERS: Trade Letters – Enquires – Offers – Quotations – Orders – Confirmation – Execution – Refusal and Cancellation of an order, Acknowledging the Receipt of Goods and Payments – Claims – Complaints and Adjustments – Collection Letters – Circular Letters.

UNIT III: EXPORT AND IMPORT LETTERS: Letters relating to Export and Import – Agency Correspondence – Opening of an account, Payment of Insurance Premium, Request for a Loan and Overdraft – Dishonor of Cheque – Letter of Credit.

UNIT IV: LETTERS OF APPLICATION: Letters of Application – Application for a situation – Status Enquires and Recommendations, Appointment Letter.

UNIT V: REPORT WRITING: Report Writing: Meaning, Importance, Characteristics of a Good Reports by Individuals and committees, Drafting of Report for Press, E-Mail, Cell Phones, Pagers, Video Conferencing and Internet.

Text Book:

Radha Katherisan, Business Communication, Prassana Publications.

References:

L. Gartside, Modern Business Correspondence, Macdonald & Evans Ltd.

Ramesh and Pattenshetty, Business English and Correspondence, S. Chand & Co.

A.N. Kapoor, Business Communication, S. Chand & Co ltd.

R. Sandhanam, Business Communication, Margham Publications.

Locker & Stephen, Business communication, Building critical skills, Tata Mcgraw Hill.

AshaKaul, Business Communication, PHI Learning Private Limited.

Web Resources:

www.anebooks.com

www.ddpbooks.com

SUMMER INTERNSHIP (SI-2)

SUBJECT CODE: SY418

COURSE OBJECTIVES:

10 Days

On completion of course, the students will be able to

Foster capability in different fields of psychology by being in group environments.

Increment the involvement in multiculturalism and variety, creating information on moral practices in the different areas of brain science.

Improved your ability to maintain professional relationships and provide direct services like counseling, psychotherapy, and crisis intervention.

Aids in the beginning application of theoretical knowledge during the practical experience.

Look for a valuable educational opportunity that helps students choose their preferred psychology practice areas.

During the summer holidays the second-year students undergo for three weeks summer internship training programs. The students are placed in various sectors such as: clinical psychologist, recruitment assistant, educational psychologist in local councils, HR business development, and special educators for children, etc

During the placement the students are expected to learn about the vision, mission, philosophy, administration, strategies, program, activities, and achievements and also involve with the activities of the organization to whatever extent possible.

Students should get daily activity sheets signed by the concerned persons in the organizations. They have to write daily records of their learning and submit to the department once they complete their summer internship.

Successful completion is certified by the department and communicated to the Controller of Examination.

This is Course Completion Requirement and three credits are attached.

Record Work for Practicum – (summer of 4th Semester)

Cover Page

Certificate – A page with the name and the roll number and the details of the academic semester with the sign of the HOD.

Attendance Log - A page that details the whole month Reporting Time, Working Time and Checking out time with a signature from someone in the agency (Like an attendance) (Ref-1)

Table of content

Profile of Agency (Name, Address, objectives/motto/vision, Details of the target group and description of the Agency) (2-3 pages)

Activities carried out Daily (A short and general description of the activity – Like the attendance but you will describe the nature of work done on a daily basis) (Ref-2)

A self-evaluation of the three-week field placement (4-5 Pages)

Professional learning/Appraisal

Personal growth/Appraisal

Space – 1.5

Font Size – 12

No Colour

Ref.1

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Ref. 2

| Sl. No | Day | Activities Carried out |
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M. Sc COUNSELLING PSYCHOLOGY

SEMESTER – I

INTRODUCTION TO PSYCHOLOGY (FC-1)

B.A. POLITICAL SCIENCE (COUNSELLING PSYCHOLOGY)

CODE: MSY130T

Course Objectives: 6 Hours Per Week

- Explain the history of Psychology and the various psychological research methods.
- Understand the meaning and principles behind sensation, perception and attention
- Elaborate on the theories of Learning, Memory and Forgetting
- Comprehend the theories of Motivation and Emotion
- Compare the various theories of personality

UNIT I - Foundation to Psychology

Definition - Goals of psychology - Origins of psychology - **Philosophical origins:** Early Indian thoughts - the three Gunas, mind control and **Greek thoughts** - Major ideas of Descartes, Locke. **Biological origins:** Darwin, Genetics. **Brief history of modern scientific psychology:** Structuralism, Functionalism, Behaviorism, Gestalt psychology, Piaget, Psychoanalysis, Humanistic approach, Cognitive approach. **Methods:** Introspection - Observation - Survey - Experiment - Case Study - Correlation Research. Different areas (branches) of Psychology.

UNIT II - Sensation, Perception and Attention

Sensation: Meaning - Psychophysics - Thresholds - Weber's Law - Adaptation - **Basic sensation:** Vision - Hearing - Touch and other Skin senses - Olfaction - Gustation - **Proprioception:** Kinesthetic sense - Vestibular sense - **Perception:** Meaning - Organizing principles of perception - Constancies - Pattern perception, Distance perception - Errors in Perception - Illusion - Types; Hallucinations - Types; Extra Sensory Perception. - Factors that influence perception - Depth perception. **Attention:** Meaning - Types - Determinants.

UNIT III - Learning, Memory and Forgetting

Learning: Definition - Nature- **Association Learning:** Classical Conditioning - Operant Conditioning - Reinforcement - Types - Punishment - Types. Schedules of Reinforcement - Shaping - Learned Helplessness; Similarities and Differences between Classical Conditioning and Operant Conditioning. **Social and Cognitive Learning:** Latent Learning - Insight Learning - Observational Learning.

Memory: Definition - **Memory Process:** Encoding - Storage - Retrieval - The information processing model - Sensory memory - Short term memory - Long term memory - **Forgetting:** Meaning - Forgetting curve - Theories of forgetting - Causes - Memory and Brain - Improving memory.

UNIT IV - Motivation and Emotion

Motivation: Definition - Needs - Biological Needs - Social Needs - Psychological Needs, **Theories of Motivation:** Instincts - Drive-reduction theory - Arousal - Incentive - Opponent -Process - Cognitive theories - Social cognitive theory - Need theories, **Classification of Motives:** Physiological motives - Psychological motives, **Conflict:** Meaning- Types. **Frustration:** Meaning- Causes.

Emotion: Meaning – Basic emotions- Components - Physiology of emotion - Expression of emotion – Theories of Emotions.

UNIT V - Intelligence and Personality

Intelligence: Definition - Concept of IQ - Individual differences in Intelligence –Mental retardation – Mentally gifted – Assessment of Intelligence, **Emotional Intelligence:** Meaning – Characteristics.

Personality: Definition - Theories – Psychoanalytic - Neo Freudian: Jung –Adler - Karen Horney – Erikson - Behavioristic view – Social Cognitive view - Humanism and Personality: Roger’s theory – Maslow’s theory - Trait Theories Psychology – Allport – Cattell - The Big Five Factors.

Reference Book

- Cicarelli, K. S., Meyer, E. G. & Misra. (2008) *General psychology*. New Delhi, India: Dorling Kingsley (India) Private Limited
- Baron, R. A. (2010) *Psychology* (5th ed.). New Delhi, India: Pearson India Education Services Pvt Ltd.
- Singh, A.K. (2014). *Advanced General Psychology*. Delhi: Motilal Banarsidas.
- Morgan, C. T., King, R. A., Weisz, J. R., & Schopler, J. (1993). *Introduction to Psychology*. New Delhi: McGraw Hill Education.
- Passer, M. W., & Smith, R. E., (2011). *Psychology: The Science of Mind and Behaviour*. India: McGraw Hill

SEMESTER – I

BIOLOGICAL PSYCHOLOGY (FC-2)

BSC (COUNSELLING PSYCHOLOGY)

CODE: MSY131T

Course Objectives:

- Understand the core Premises of biological psychology.
- Comprehend the structure and functions of Neuron.
- Explain the structure and functions of nervous system.
- Summarize the influence of endocrinological factors on behavior.
- Understand the Physiological basis of Emotion, Learning and memory.

UNIT I - Introduction to biological Psychology:

Defining Biopsychology, Origins of Biopsychology, Nature and Scope of biopsychology, divisions of Biological Psychology, Scanning Methods- CT, MRI, PET; Electrophysiological recording- EMG, EEG AEP.

UNIT II - Neuron structure and function:

The neuron: Structure of the neuron, types of Neurons; Neural Impulse: Neural impulse Cycle: membrane potential, resting potential, action potential; conduction across the length of a neuron and conduction across the synapse; Neurotransmitters and the nervous system - acetylcholine, dopamine, norepinephrine & GABA

UNIT III - Structure and Functions of Nervous system:

Major Division of Nervous System: The Central Nervous System: Spinal cord - structure and function, The Brain - structure and function. The Peripheral Nervous system: Structure and function, The Somatic Nervous system - structure and function; The Autonomic Nervous System-Structure & function

UNIT IV - The Endocrine System:

Endocrine Glands: Structure, Location and Functions. Ingestive Behaviour: Neural Mechanisms of Hunger and Thirst. Physiological mechanisms of Sleep and Waking; Stages and Types of sleep; Sleep Disorders.

UNIT V - Biopsychology of Emotions, Learning and Amygdala:

Role of hippocampus, limbic system in emotions. Role of Hippocampus and cerebellum in learning. Amnesia; Definition, different forms of Amnesia.

REFERENCES BOOKS:

- Bannett, T.L. (1977). Brain and Behaviour. California: Brooks/Cole.
- Carlson, Neil R. (2005) Foundations of Physiological Psychology, 6th ed. Pearson Education and Dorling Kindersley (India): New Delhi.
- Levinthal, C.R. (1991) Introduction to Physiological Psychology. New Jersey: Prentice Hall.
- Morgan, T.H. and Stellar, A. (1965). Physiological Psychology. New York: McGraw Hill.
- Pinel, John P.J. (2006) Biopsychology 6th ed. Pearson Education Inc. and Dorling Kindersley (India): New Delhi.
- Gazzaniga, M.S. Ivry, R.B. and Mangun, G.R.(2002) Cognitive Neuroscience : The Biology of the mind 2nd Edition. New York :W.W. Norton & Company, Inc.
- Graham, R.B. (1990) Physiological Psychology. California: Wadsworth.
- Kalat, J.N. (2001) Biological Psychology. California: Wadsworth.
- Leukel, F. (1985). Introduction to Physiological Psychology. New Delhi: CBS Publishers.

SEMESTER – I

LIFE-SPAN PSYCHOLOGY (MC-1)

MSC (COUNSELLING PSYCHOLOGY)CODE: MSY132T

Course Objectives:

6 Hour Per Week

- Gain knowledge on human physical growth and development across life-span.
- Understand the human psychological changes from conception to old age.
- Know about the critical periods in human development for the occurrence of specific behavioral changes.
- Understand children and child rearing.
- Understand hereditary, environmental influences on development.

UNIT I

Growth and Development: Meaning of Development changes - The Life Span - Developmental stages - Happiness and Unhappiness during the life Span. **Prenatal Period:** Characteristics- How Life begins - Importance of Conception - Period of Prenatal development - Attitudes of Significant people - Hazard during the prenatal period. **Infancy:** Characteristics -Major Adjustments-Conditions Influencing Adjustment to Postnatal Life.

UNIT II

Babyhood: Characteristics - Developmental Tasks - Physical development - Physiological Functions – Muscle Control – Speech Development - Beginnings of Sex-role Typing - Family Relationships – Personality Development. **Early Childhood:** Characteristics - Developmental Tasks – Physical Development - Improvements in Speech –Socialization - Moral Development - Family Relationships – Personality Development. **Late Childhood:** Characteristics - Developmental Tasks – Physical Development - Speech Improvement - Moral Attitudes and Behavior – Interest - Changes in Family Relationships – Personality Changes.

UNIT III

Puberty: Characteristics - Body Changes at puberty - Effects of Puberty Changes – Effects of Deviant Maturing.
Adolescence: Characteristics - Developmental Tasks – Physical Changes - Social Interests and Morality Changes during Adolescence – Sex interest and Sex behavior - Family Relationships - Personality Changes.

UNIT IV

Early Adulthood: Characteristics - Development Tasks - Changes in interests - Vocational, Martial, Parenthood and Singlehood Adjustments. **Middle Age:** Characteristics, Developmental Tasks of Middle Age - Adjustments to Physical and Mental Changes - Adjustment to changed Interests - Adjustments to Vocational, Family Pattern, Singlehood, Loss of a Spouse – Adjustment to Approaching Retirement and Old Age.

UNIT V

Old Age: Characteristics - Development Tasks of Old Age - Adjustment to Physical Changes - Change in Motor and Mental abilities – Changes in Interest. Vocational Adjustments - Adjustments to Retirement and Changes in Family Life – Adjustments to Loss of a Spouse, Remarriage, Cohabitation, and Singlehood in Old Age - Living Arrangements for the Elderly.

Reference Books:

- Harlock. E.B (1980) Development Psychology: A Life Span Approach (fifth Ed) New Delhi: Tata McGraw - Hill Edition.
- Papalia, D. E., Olds, S.W. & Feldman, R.D. (2006). Human development (9th Ed.). New Delhi: McGraw Hill.
- Santrock. J.W (1997) Life-Span Development, Thirteenth Edition, Tata McGraw-Hill Edition, 2011.
- Berk, L. E. (2010). Child Development (9th Ed.). New Delhi: Prentice Hall.
- Berk, L.E. (2007) Development through the Life span, New Delhi, Pearson Edn.
- Gormly A.B. and Broadzinsky D.M., Life span Human Development, New York, Harcourt Brace College Publishing Co., 1993.
- Halen B. The Developing Child, New York, Harper Collins, 1989.
- Leland M. Stott, The Psychology of Human Development, New Delhi, Macmillan and company, 1978.
- Saraswathi, T.S. (2003). Cross-cultural perspectives in Human Development: Theory, Research and Applications. New Delhi: Sage Publications.
- Shiamberg L.B., Human Development, New York, Macmillan Publishing Co., 1985.
- Van der Zanden J.W., Human Development, New Delhi, Mcgarow Hill, 1999.

SEMESTER – I

INTRODUCTION TO COUNSELLING (MC-2)

B.A. HONOURS IN COUNSELLING PSYCHOLOGY)

CODE: MSY133T

Course Objectives:

6 Hours Per Week

- To introduce the students to counselling.
- To understand the helping relationship and process in counselling.
- To learn the skills and techniques in counselling.

To understand about counselling theories and therapies.
To instruct them about the basic ethics in counselling.

UNIT I

Meaning and Nature: Definition-Aims and Scope of Counselling - Characteristics of Effective Counselling - Application of Counselling in Various Areas - Diversity in Counselling - Attitude of a Professional Counsellor - Personality of Effective Counsellors- Values in Counselling - Characteristics of a Successful Counselee - Counselee Expectations. Ethical and Legal Issues in Counselling

UNIT II

Self Disclosing: Showing Involvement, Disclosing Personal Information - Managing Resistances, Making Referrals and Recommendations.

Helping Relationship and Process: Dimensions of Helping Relationship - Core Conditions of Helping Relationship: Empathy, Unconditional Positive Regard, Congruence- Relating-Understanding- Changing (RUC) - Helping Model: Stage 1 (the relating stage), Stage 2 (the understanding stage), Stage 3 (the changing stage).

UNIT III

Understanding the Internal Frame of Reference: Qualities of the Effective Listener: Positive & Negative Listening – Proximity in Listening – Using Silence – Head nodding – Facial Expressions – Active Listening – Distraction – Assessing your own Listening. Attitude of Respect and Acceptance. Showing Attention and Interest - Being Available, Relaxed and Open Body Posture, Leaning Slightly Forward, Appropriate Gaze and Eye Contact - Good Gestures, Use of Touch Sparingly, Sensitive to Personal Space and Height, Clothing and Grooming.

UNIT IV

Micro Skills of Counselling: Paraphrasing Skills, Reflecting Feelings Skills, Small Verbal Rewards, Open ended Questions- Permission to talk, Structuring Skills, Probing, Summarizing Skills.

Skills of Asking Questions: Questions about Feelings, Physical Reactions, Thinking, Communication and Actions - Monitoring Feelings, Physical Reactions, Thinking, Communication and Actions - Assisting Clients to Monitor - Offering Challenges and Feedback, Experiential Feedback - **Facilitating Problem Solving:** Clarifying Goals, Generating and Exploring Options, Assisting Planning.

UNIT V

Improving Clients Rules: Detecting demanding rules, Disputing demanding rules, Stating preferential rules

Improving Clients Perception's: Perceiving and Interpreting, Eliciting and Identifying Automatic Perception, Checking the Accuracy of Perceptions- **Negotiating Home Work-Terminating Helping:** When to Terminate, Formats for Terminating Helping, Assisting Maintaining Change.

Reference

- Brammer. L.M. and Shostrom E.L, Therapeutic Psychology, 1977, Englewood Cliffs, New Jersey.
D. John Antony, Skills of Counselling, 2003, Anugraha Publications.
Nelson - Jones, R. (1995). The Theory and Practice of Counselling, 6th Edition, London: Cassell.
Colin et al, Brief Counselling-A Practical Integrative Approach, 2010, 2nd Edition, Tata McGraw Hill, New Delhi.
Feltham. C & Horton. I, Handbook of Counselling and Psychotherapy, 2000, London: Sage Publication.

- George. L.R, and Crisiani.T. (1981) Theory, Methods of processes of Counseling and Psycho therapy. New Jersey: Prentice Hall Inc. Englewood and Cliffs.
- Kottler.J.A. and Brown.R.W.(2000). In introduction to therapeutic counseling (4th edition) California Brooks/Cole publishing Company.
- Lewis E. Patterson and Elizabeth Reynolds Welfel (2000). The Counselling Process, 5th edition, Wasworth Brooks / Cole, Thomson Learning.
- Patterson.E.L., and Welfel.E.R. (1999). The Counseling Process (5th edition) California: Brooks/ Cole Publishing Comapany
- Richard Nelson- Jones (2012). Basic Counselling Skills- a Helper's Manual, 5th Edition, Sage Publication India Pvt Ltd, New Delhi.

SEMESTER – I

PSYCHOLOGICAL TESTING (SK-1)

B.A. POLITICAL SCIENCE (COUNSELLING PSYCHOLOGY) CODE: MSY134S

6 Hours Per Week

Course Objectives:

- Offer training administer and interpret Psychological Tests
 - Comprehend the relevance and usefulness of various psychological tests
 - Offer training in planning for therapy sessions
 - Teach the application of tests in clinical and non clinical set up
 - Develop self awareness using the psychological tests
1. Bhatia's Battery of Performance Test of Intelligence
 2. Concept Formation
 3. Transfer of Learning
 4. Rorschach Test
 5. Test for Trial and Error Learning
 6. Span of Attention
 7. Muller-lyer Illusion
 8. Steadiness Test
 9. Habit Interference
 10. Problem Solving Ability Test (based on TOL test)

11. TAT (Thematic Apperception Test)
12. Level of Aspiration
13. Mental Health Battery
14. Mirror Drawing
15. Beck's Depression Inventory
16. Depression, Anxiety, stress scale (DASS)
17. Myers Briggs Types Indicator (MBTI)
18. Assertiveness Assessment
19. Emotions Maturity Scale
20. Study Skill Inventory
21. Rosenberg Self-Esteem Scale
22. Eysenck's Personality Inventory
23. Rotter's Sentence Completion Test
24. Standard Progressive Matrices
25. Internal-External Locus of Control

EVALUATION

| | INTERNAL | MARKS | EXTERNAL | MARKS |
|--------------------|-----------------|--------------|-----------------|--------------|
| Conduction | | 10 | Conduction | 10 |
| Interpretation | | 20 | Interpretation | 20 |
| Practical Notebook | | 20 | Viva Voce | 20 |
| Total | | 50 | Total | 50 |

Actual Conduction of Practical and reporting it in the practical note book in the prescribed format (internal assessment) carries 40 marks. The Term End Practical Examination including Viva Voce (External Assessment) carries 60 marks. Total marks for practical examination will be 100 marks (Internal 40 marks and External 60 marks).

Students will write down 10 practical experiments and its interpretation in the record note.

Reference

- A. Anastasi & Susana Urbina (2004) 7th Edition. Psychological Testing, Pearson Education Inc., New Delhi.
- Aiken, L. R. (1997). Psychological testing and assessment. Allyn & Bacon.
- Cohen, R. J., Swerdlik, M. E., & Phillips, S. M. (1996). Psychological testing and assessment: An introduction to tests

and measurement. Mayfield Publishing Co.
 Cronbach, L.J. Essentials of Psychological Testing.
 Fernandez-Ballestros, R. 1st edition (2003) Encyclopaedia of Psychological Assessment. Vol I and II. Sage Publication. New Delhi.
 Gregory, R.J. (2006). Psychological Testing: History, Principles, and Applications (4th Ed.). New Delhi: Pearson Education., Applications, and Issues. Australia: Thomson Wadsworth.
 Woodworth, R.S. and Scholesberg (1972) Experimental psychology. Holt, Rinehart & Winston.

SEMESTER – I

FIELD PRACTICUM- I (FP-1)

BSC (COUNSELLING PSYCHOLOGY)

CODE: MSY135F

Course Objectives:

- To help students develop counselling skills in applied settings.
- To acquire the skills in Ice-breaking and Team building training.
- To co-ordinate effectively with their supervisors at the counselling centre and the department.
- To conceptualize the client's concerns, demonstrate and apply counselling skills and write a report.
- To familiarize with basic psychological tests.

Field Practicum Components:

Counselling Skills training.

Observational Visits to counselling training centre for practice based learning.

- The students get ice-breaking and team building training. The students get training in counselling skills. The students will go to a counselling centre for observational visits and training for a week.
- After having these experiences the students write a report of their activities and submit to the concerned field practicum supervisor. The supervisor conducts individual and group evaluation.
- The CA marks are awarded by the supervisor out of 40 marks for the quality, regularity, initiatives, leadership participation and team worker.
- At the end of the semester Viva Voce is conducted by an external examiner and marks are awarded out of 60.

Field Practicum Outline

Field Practicum - 1 (Semester-1)

- Personal Growth Summary of Inner Child Program
- One's own Genogram & Genogram of two clients
- Appraisal of Counselling Format with special focus on the skills of the Counsellor
- 4 Verbatim Reports
- 5 Psychological Tests (ISAC, Firo B, Firo F, Keirseley temperament Sorter, How I act in Conflict)

SEMESTER-II

RESEARCH METHODOLOGY & STATISTICS (MC-3)

MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY230T

6 Hours Per Week

Course Objectives:

- Explain the basic concepts related to research methodology and statistical applications.
- Comprehend research design and formulating hypothesis in research
- Describe sampling techniques and report writing in the research
- Expose to the different scales of measurements and various statistical application
- Teach the usage quantitative techniques in SPSS

UNIT I

Foundations of Research: Meaning – objectives – Types – Research Approaches – Research Process. Research Problems: Defining a Research Problem - Sources – Criteria of a Good Problem. Review of Literature: Functions – Sources. Importance of theory, Conceptualization and Operationalization of research.

UNIT II

Hypothesis testing and Research Design: Hypothesis: Meaning – Types – Criteria – Formulating and Stating Hypothesis – Type-I & Type-II errors. Research Design: Types – Descriptive Research – Experimental Research – Variables and experimental control. Experimental designs: Pre-experimental designs – True experimental designs – Quasi experimental designs – Single subject experimental designs – Ex-post Facto Designs.

UNIT III

Methods: Sampling: Meaning – Types – Probability and Nonprobability sampling. Tools of research: Criteria for selection of tools – Factors related to construction of tools – Tools of different types: Observation – Interview – Questionnaire – checklist- Rating Scales. Reliability and Validity. Writing a research proposal – Interpretation and report writing.

UNIT IV

Fundamental Statistics: Scales of measurement - Frequency distributions - Measures of Central Tendency: The Mean, Median and Mode – Measures of Variability: The Range, Quartile Deviation, Average Deviation and Standard Deviation. Normal probability curve: Characteristics – Applications – Skewness and kurtosis.

UNIT V

Data Analysis: Quantitative Analysis - Correlation: Meaning, assumption and interpretation. T test – Meaning, Assumption and Interpretation. Analysis of Variance (ANOVA): Meaning, Assumption and Interpretation. Regression: Meaning, Assumption and Interpretation. Overview of Non-Parametric Statistics.

Reference

1. Aditham Bhajanaga Rao. 2006. Research Methodology. Excel books. New Delhi.
2. Debashis Chakraborty. 2009. Research Methodology. Saurabn Publishing House. New Delhi.

3. Foster, J.J. 1998. Data Analysis Using SPSS for Windows. Sage Publications Ltd. London.
4. Gaur, Ajai S and Sanjaya S Saur. 2009. Statistical Methods for Practice and Research. A guide to Data Analysis using SPSS. Sage Publications. New Delhi.
5. Gupta, S. P. 2009. Statistical Methods. New Delhi. Sultan Chand and Sons.
6. Kothari, C.R. 2004. Research Methodology – Methods and Techniques. New Delhi. New Age International Private Limited.
7. Kultar Singh. 2007. Quantitative Social Research Methods. Sage Publications India PVT LTD. New Delhi.
8. Padgett, D.L. 1998. Qualitative Methods in Social Work Research. Sage Publications. California.
9. Singh, A.K. (2006). Tests, Measurements and Research Methods in Behavioural Sciences. Patna: Bharati Bhavan Publishers.

SEMESTER – II

PSYCHOPATHOLOGY-I (MC-4)

I MSC (COUNSELLING PSYCHOLOGY) CODE: MSY231T

6 Hours Per Week

Course Objectives:

- To know the meaning and historical background of abnormal behavior.
- To learn to use DSM 5 and ICD 11 classificatory systems.
- To understand about the various mental disorder syndromes.
- To understanding the skills required to diagnose various mental disorders.
- To understand the etiological factors of various mental disorders.

UNIT I

Mental Disorder: Definition and meaning - Classification of DSM 5 and ICD -11 - Psychosis and Neurosis. Mental Status Examination - General Description, Thinking, Emotions and Cognition. **Neurodevelopmental Disorders:** Intellectual Disabilities - Communication Disorders - Autism Spectrum Disorder - Attention Deficit/Hyperactivity Disorder - Specific Learning Disorder.

UNIT II

Schizophrenia Spectrum and Other Psychotic Disorders: Schizotypal (Personality) Disorder - Delusional Disorder - Brief Psychotic Disorder - Schizophreniform Disorder - Schizophrenia - Schizoaffective Disorder - Substance/Medication-Induced Psychotic Disorder - Psychotic Disorder Due to Another Medical Condition.

UNIT III

Bipolar and Related Disorders: Bipolar I Disorder - Bipolar II Disorder - Cyclothymic Disorder. **Depressive Disorders:** Disruptive Mood Dysregulation Disorder - Major Depressive Disorder - Persistent Depressive Disorder

Disorder (Dysthymia) - Premenstrual Dysphoric Disorder - Substance/Medication-Induced Depressive Disorder - Depressive Disorder Due to Another Medical Condition.

UNIT IV

Anxiety Disorders: Separation Anxiety Disorder - Selective Mutism - Specific Phobia - Social Anxiety Disorder (Social Phobia) - Panic Disorder - Panic Attack (Specifier) - Agoraphobia - Generalized Anxiety Disorder. **Trauma-and Stressor-Related Disorders:** Reactive Attachment Disorder - Disinhibited Social Engagement Disorder - Posttraumatic Stress Disorder - Acute Stress Disorder - Adjustment Disorders.

UNIT V

Feeding and Eating Disorders: Pica - Rumination Disorder - Avoidant/Restrictive Food Intake Disorder - Anorexia Nervosa - Bulimia Nervosa - Binge-Eating Disorder. **Elimination Disorders:** Enuresis - Encopresis. **Sleep-Wake Disorders:** Insomnia Disorder - Hypersomnolence Disorder - Narcolepsy. Breathing-Related Sleep Disorders - Circadian Rhythm Sleep-Wake Disorders. Parasomnias: Sleepwalking - Sleep Terrors - Nightmare Disorder - Rapid Eye Movement Sleep Behavior Disorder - Restless Legs Syndrome.

Reference Books:

- Blaney, PH, Krueger RF & Million T. (2015). Oxford Textbook of Psychopathology, III Ed. London: Oxford University Press.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. Arlington, VA: American Psychiatric Publishing.
- Sarason, I.G., & Sarason, B.R., (2005) *Abnormal Psychology- The problem of Maladaptive behavior*. India: Dorling Kindersly.
- Casey p & Kelly B (2007). *Fish's Clinical Psychopathology- Signs and Symptoms in Psychiatry, III Ed.* Gaskell.
- Sadock, B.J., & Sadock, V.A. (2007) (2003). *Kaplan & Sadock's Synopsis of psychiatry: Behavioural sciences/clinical psychiatry (9th. Ed.)*. Philadelphia: Lippincott Williams & Wilkins.
- Ahuja, N. (2011). *A short Textbook of Psychiatry*. New Delhi: Jaypee Publishers.
- World Health Organization. (2018). *International classification of diseases for mortality and morbidity statistics (11th Revision)*.
- Adams, H.E., Sutker, P.B. (2001). *Comprehensive handbook of psychopathology (3rd Ed.)*. New York: Kluwer Academic publishers.
- Barlow, D. H., & Durand, V.M. (2015). *Abnormal Psychology. An Integrative Approach. 7th edition*. New Delhi. Cengage Learning India Private Ltd.
- Nolen-Hoeksema, S. (2017). *Abnormal Psychology. 7th Edition*. New York. McGraw Hill.
- Butcher, J.N., Hooley, J.M., & Mineka, S. (2013). *Abnormal Psychology. 16th Edition*. Upper Saddle River. Pearson Education Inc.
- Maddux, J.E. & Winstead, B.A. (2007). *Psychopathology: Foundations for a contemporary understanding*. NY: CRC press.

SEMESTER – II

THEORIES OF PERSONALITY (MC-5)

MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY232T

Course Objective:

- Acquire knowledge on personality theories.
- Provide theoretical foundation for counselling practice.
- Help the trainee counsellors to choose appropriate techniques for a particular case.
- Understand the concept of personality.
- Understand the people having different personalities.

UNIT I

Personality Theory: The Study of Personality - Definition of Personality- Definition of Theory- Personality Perspectives- Components of Personality – Philosophical Assumption - Ethnic and Gender Issues in Personality - Assessment in the Study of Personality.

UNIT II

Type and Trait Theories of Personality: Type Theories - Trait Theories, Raymond Cattell 16 Personality Factors, Hans Eysenck, Lewis Goldberg five-dimension personality model - Gordon Allport.

UNIT III

Dynamic Personality Theories: Freud's Psychoanalytic Theory- Defense Mechanisms in the Dynamic Theories - Adler's Individual Psychology - Jung's Analytical Psychology - Erik Erikson.

UNIT IV

Learning and Behavioural Theories of Personality: Theory of Classical Conditioning, Operant Conditioning - Social Learning Theory - Cognitive Learning theory, Kohlberg's Theory of Moral Behaviour. Rotter- Internal and external locus of control.

UNIT V

Cognitive and Humanistic Theories: Albert Ellis, Aaron T. Beck, Donald Meinchbaum. Rogers' Self Theory - Maslow's Self-Actualization Theory - Viktor Frankl. Need Theory (Henry Murray)ERG Theory (Alderfer), Theory of needs (McClelland); Personal construct (Kelly).

Reference

- Allen, B. P. (2015). *Personality theories: Development, growth, and diversity*. Psychology Press
- Schultz, D, & Schultz, S. (2016). *Theories of personality*. Cengage Learning.
- Cervone, D, & Pervin, L. A. (2015). *Personality*. John Wiley & Sons.
- Mischel, W. (2013). *Personality and assessment*. Psychology Press.
- R.B. Tripathi and R.N. Singh (2001). *Psychology of Personality*. Varanasi: Gangasaran and Grand Sons.
- R.M. Rckman (2000). *Theories of Personality*. USA: Thomson Wadsworth.
- Ryckman, R. (2012). *Theories of personality*. Cengage Learning.
- Sharf, R. (2015). *Theories of psychotherapy & counseling: Concepts and cases*. Cengage Learning.
- W. Mischel (1976). *Introduction to Personality*. New York: Holt Reinhart and Winston. York: Alfred A. Knopf.

SEMESTER – II**PSYCHOTHERAPIES (MC-6)**

Course Objectives:

- Describe various theoretical foundation for the practice of psychotherapy
- Comprehend the theory behind different schools of psychology.
- Give a bird's eye view of various therapies and their respective foundations.
- Offer clarity regarding the choice of specific techniques for a particular case
- Teach students the practice of psychotherapy in clinical and non-clinical population.

UNIT I (Psychodynamic Therapies)**Sigmund Freud – Carl Jung - Alfred Adler**

Theory and Therapeutic Interventions

UNIT II (Behavioural Therapies)**B. F. Skinner – Ivan Pavlov – Albert Bandura**

Theory and Therapeutic Interventions

UNIT III (Humanistic Therapies)**Carl Rogers – Abraham Maslow – Viktor Frankl – Eric Berne**

Theory and Therapeutic Interventions

UNIT IV (Existential Therapies)**Rollo May – Fritz Perls – Irvin Yalom**

Theory and Therapeutic Interventions

UNIT V (Cognitive Therapies)**Aaron Beck - Albert Ellis -Donald Meichenbaum**

Theory and Therapeutic Interventions

Reference

- Corey, G (2009), Theory and Practice of Counselling and Psychotherapy
- Nelson-Jones, R (2011), Theory and Practice of Counselling and Therapy, Sage Publication
- Seligman, L. & Reichenberg, L. W. (2016). Theories of Counselling and Psychotherapy: Systems, Strategies and skills. Pearson
- Antony, D. John (2003) *Psychotherapies in Counselling*, Nochiodaipatti, Dindigul, Anugraha Publications.
- Wolberg. L.R. (1989). The Technique of Psychotherapy. Vol. I & II London, Warburg and Heinmann.
- Bergin, A.E. & Garfield, S.L. (1994). Handbook of Psychotherapy and Behavioural Change. 4th ed. N.Y. Wiley.
- Stein, S.M. Hough, R. & Stein, J. (1999). Essentials of Psychotherapy. UK: Hodder Arnold Publishers
- Bellack, A.S., Herson, M & Kazdin, A.E. (1983). International Handbook of Behaviour Modification and Therapy; New York; Plenum Press.
- Watson, J. B. (1924). *Behaviourism*. New York: Norton.
- Gabbarel, G.O., Beck, J.S., & Holmes, J. (2007). Oxford Text Book of Psychotherapy. New York: Oxford

University Press.

SEMESTER – II

FIELD PRACTICUM – II (FP-2)

B.A. (COUNSELLING PSYCHOLOGY)

CODE: MSY234F

Course Objectives:

- Apply theoretical knowledge in the counselling field.
- Understand the functions and activities of field place organization.
- Teach students to administer psychological tests in counselling
- Offer a comprehensive view of various therapeutic practices.
- Educate the student to create intervention strategy

The first year students during the second semester go for practice based counselling for one day in a week and expected to spend a minimum of 7 hours per day in the field where they are placed.

The first year students are placed in schools or colleges or counselling centers or welfare organizations or service organization for their practice based counselling.

During the placement they have to practice all the primary skills of counselling. One has to help minimum of 3 clients, by having 3 sessions a day.

Every week the students write a report of their activities and submit to the concerned field practicum supervisor. The supervisor conducts individual and group evaluation regularly.

The CA marks are awarded by the supervisor out of 40 marks for the quality, regularity, initiatives, leadership, participation and team worker.

At the end of the semester Viva Voce is conducted by an external examiner and marks are awarded out of 60.

Field Practicum Outline

Field Practicum - II (Semester-2)

- 20 Counselling Progression Report
- 1 Case Study
- 3 Psychological Tests on two clients

SEMESTER – II

SUMMER INTERNSHIP (SI-1)

B.A. (COUNSELLING PSYCHOLOGY)

CODE: MSY235F

Course Objectives:

On completion of course, the students will be able to;

Develop competency in a various domains of psychology by being in a social settings.
Increase the experience with multiculturalism and diversity, developing knowledge of ethical practices in the various domains of psychology.
Learn to maintain professional relationship and became more competent in providing direct services, such as counseling, psychotherapy and crisis intervention.
Helps to start applying a theoretical knowledge in the practical exposure.
Find a meaningful educational opportunity that helps student to decide their preferred areas of practice in the psychology.

During the placement the students are expected to learn about the vision, mission, philosophy, administration, strategies, program, activities, and achievements and also involve with the activities of the organization to whatever extent possible.

Students should get daily activity sheets signed by the concerned persons in the organizations. They have to write daily records of their learning and submit to the department once they complete their summer internship. Successful completion is certified by the department and communicated to the Controller of Examination.

This is Course Completion Requirement and five credits are attached.

Record Work for Practicum – (summer of 2nd semester)

Cover Page

Certificate – A page with the name and the roll number and the details of the academic semester with the signature of the HOD.

Attendance Log - A page that details the whole month Reporting Time, Working Time and Checking out time with a signature from someone in the agency (Like an attendance) (Ref-1)

Table of content

Profile of Agency (Name, Address, objectives/motto/vision, Details of the target group and description of the Agency) (2-3 pages)

Activities carried out Daily (A short and general description of the activity – Like the attendance but you will describe the nature of work done on a daily basis) (Ref-2)

Client work (Counseling, working with mentally challenged persons or learning) (Do the following for One client every day even though you may meet many clients- 2 pages)

Demographical features

Presenting problem

History of the problem (Past treatment, if)

Counseling proper/Action Taken

Learning (Professional and Personal, if any)

Future plan

2 case conferences (5-7 pages) (one in the middle of the practicum and one at the end of the practicum)

A self-evaluation of the one month field placement (4-5 Pages)

Professional learning/Appraisal

Personal growth/Appraisal

Space – 1.5

Font Size – 12

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Ref.1

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Ref. 2

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SEMESTER -III

PSYCHOPATHOLOGY-II (MC-7)

B.A. MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY330T

Course Objectives:

6 Hours Per Week

To know the meaning and historical background of abnormal behavior.

To learn to use DSM 5 and ICD 11 classificatory systems.

To understand about the various mental disorder syndromes.

To understanding the skills required to diagnose various mental disorders.

To understand the etiological factors of various mental disorders.

UNIT I

Personality Disorders: Cluster A Personality Disorders: Paranoid Personality Disorder - Schizoid Personality Disorder - Schizotypal Personality Disorder. **Cluster B Personality Disorders:** Antisocial Personality Disorder - Borderline Personality Disorder - Histrionic Personality Disorder - Narcissistic Personality Disorder. **Cluster C Personality Disorders:** Avoidant Personality Disorder - Dependent Personality Disorder - Obsessive-Compulsive Personality Disorder

UNIT II

Obsessive-Compulsive and Related Disorders: Obsessive-Compulsive Disorder - Body Dysmorphic Disorder - Hoarding Disorder - Trichotillomania (Hair-Pulling Disorder) - Excoriation (Skin-Picking) Disorder. **Disruptive, Impulse-Control, and Conduct Disorders:** Oppositional Defiant Disorder - Intermittent Explosive Disorder - Conduct Disorder - Antisocial Personality Disorder - Pyromania - Kleptomania.

UNIT III

Dissociative Disorders: Dissociative Identity Disorder - Dissociative Amnesia - Depersonalization/Derealization Disorder. **Somatic Symptom and Related Disorders:** Somatic Symptom Disorder - Illness Anxiety Disorder - Conversion Disorder (Functional Neurological Symptom Disorder) - Factitious Disorder.

UNIT IV

Sexual Dysfunctions: Delayed Ejaculation - Erectile Disorder - Female Orgasmic Disorder - Female Sexual Interest/Arousal Disorder - Genito-Pelvic Pain/Penetration Disorder - Male Hypoactive Sexual Desire Disorder - Premature (Early) Ejaculation. **Paraphilic Disorders;** Voyeuristic Disorder - Exhibitionistic Disorder - Frotteuristic Disorder - Sexual Masochism Disorder - Sexual Sadism Disorder - Pedophilic Disorder - Fetishistic Disorder - Transvestic Disorder. Gender Dysphoria.

UNIT V

Substance-Related and Addictive Disorders: Substance-Related Disorders - Alcohol-Related Disorders - Caffeine-Related Disorders - Cannabis-Related Disorders - Hallucinogen-Related Disorders - Inhalant-Related Disorders - Opioid-Related Disorders - Sedative-, Hypnotic-, or Anxiolytic-Related Disorders - Stimulant-Related Disorders - Tobacco-Related Disorders. **Non-Substance-Related Disorders:** Gambling Disorder. **Neurocognitive Disorders:** Brief descriptions of Delirium - Alzheimer's disease - Parkinson's Disease.

Reference Books:

- Blaney, PH, Krueger RF & Million T. (2015). Oxford Textbook of Psychopathology, III Ed. London: Oxford University Press.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. Arlington, VA: American Psychiatric Publishing.
- Sarason, I.G., & Sarason, B.R., (2005) *Abnormal Psychology- The problem of Maladaptive behavior*. India: Dorling Kindersly.
- Casey p & Kelly B (2007). *Fish's Clinical Psychopathology- Signs and Symptoms in Psychiatry*, III Ed. Gaskell.
- Sadock, B.J., & Sadock, V.A. (2007) (2003). *Kaplan & Sadock's Synopsis of psychiatry: Behavioural sciences/clinical psychiatry (9th. Ed.)*. Philadelphia: Lippincott Williams & Wilkins.

- Ahuja, N. (2011). A short Textbook of Psychiatry. New Delhi: Jaypee Publishers.
- World Health Organization. (2018). *International classification of diseases for mortality and morbidity statistics* (11th Revision).
- Adams, H.E., Sutker, P.B. (2001). Comprehensive handbook of psychopathology (3rd Ed.). New York: Kluwer Academic publishers.
- Barlow, D. H., & Durand, V.M. (2015). Abnormal Psychology. An Integrative Approach. 7th edition. New Delhi. Cengage Learning India Private Ltd.
- Nolen-Hoeksema, S. (2017). Abnormal Psychology. 7th Edition. New York. McGraw Hill.
- Butcher, J.N., Hooley, J.M., & Mineka, S. (2013). Abnormal Psychology. 16th Edition. Upper Saddle River. Pearson Education Inc.
- Maddux, J.E. & Winstead, B.A. (2007). Psychopathology: Foundations for a contemporary understanding. NY: CRC press.

SEMESTER – III

SOCIAL PSYCHOLOGY (MC-8)

B.A. HONS (COUNSELLING PSYCHOLOGY)

CODE: MSY331T

6 Hours Per Week

Course Objectives:

- Offer basic knowledge in social psychology.
- Understand social perception, attitudes and stereotyping.
- Analyse the impact of attitude and its related concepts.
- Interpret the difference between stereotyping, prejudice and discrimination.
- Assess the role of the dimensions related to interpersonal relationship and social influence.

UNIT I

Introduction: Social Psychology – Definition, Nature and History.

Social Cognition: Schemas, Heuristics, Automatic and Controlled Processing, Potential Sources of Error in Social Cognition, Affect and Cognition.

UNIT II

Social Perception: Nonverbal Communication, Attribution, Impression Formation and Management.

The Self: Self-Presentation, Self-Knowledge, Self-Esteem, Personal versus Social Identity, Social Comparison.

UNIT III

Attitudes – Attitude Formation, Attitudes Influence Behaviour, Persuasion, Resisting Persuasion, Cognitive Dissonance.

Stereotyping, Prejudice and Discrimination Origins and its related concepts, Techniques for Countering.

UNIT IV

Interpersonal Attraction, Close Relationships: Internal and External Determinants of Attraction, Factors Based on Interacting with others, Close Relationships, Romantic Relationships.

Social Influence: Conformity, Compliance, Obedience to Authority.

UNIT V

Pro Social Behavior: Motives for Pro Social Behavior, Responding to an Emergency, Factors that increase or decrease the tendency to help and Long-Term Commitment to Pro social Acts. **Aggression:** Types, Perspective, Causes, Prevention and Control of Aggression.

Reference

- Baron, R.A & Byrne, D. Social Psychology. Delhi: Pearson Education Asia, 2000.
- Chadha, N.K. (2012). Social Psychology. MacMillan: New Delhi
- Charles Emerson Kimble (1990) Social Psychology - Studying Human Interaction, USA, WM.C.Brown Publishers.
- Elliot Aronson, Timothy D. Wilson and Robin M. Akert, (2010). Social Psychology, (7th Ed.), Pearson Publishing.
- Myers, D.G. (2008). Social psychology New Delhi: Tata McGraw-Hill.
- Robert A. Baron & Donn Byrne, Nyla. R Branscombe, GopaBhardwaj Social Psychology, 12th Edition, New Delhi, Pearson Education.
- Roy F. Baumeister and Eli J. Finkel, Advanced Social Psychology. The State of the Science.
- Sam, D L & Berry, J.W. (Ed.). Acculturation Psychology. NY: Cambridge University Press, 2006.
- Shelly E. Taylor, Letitia Anne Peplau & David O. Sears (2006) Social Psychology, 12th Edition, New Delhi, Pearson Education.
- Vangelisti, A.L & Perlman, D (Ed). The Cambridge Handbook of Personal Relationships. NY: Cambridge University Press, 2006.
- Worcel, S., Cooper, J., Goethals, G.R., & Olson, J.M. Social Psychology. CA: Wadsworth, 2000.

SEMESTER – III

SCHOOL COUNSELLING (MC-9)

MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY332T

Course Objectives: 6 Hours Per Week

- Equip students with basic concepts related to school counselling and guidance
- Comprehend the problems of children in educational settings.
- Educate the students with the knowledge regarding school counselling programs
- Offer information regarding adolescents and their problems
- Teach students to handle social and personal problems.

UNIT I

Introduction: Introduction to Guidance and Counselling: History, Nature, Scope and Needs of Guidance and Counselling in Schools, Individual differences, The Role of Student Advisor and Teacher in School Counselling - Important Features - School Counselling for the 21st Century.

UNIT II

Comprehensive School Counseling Programs And Services

The Purpose of School Counselling Programs- Educational Development, Career Development , Personal and Social Development

A. Comprehensive Program- The Comprehensive Guidance Program Model, Developmental Guidance and Counselling Approach

Facilities- Counselling Center, Materials and Equipments, Personnel

Responsive Services – Counselling, Consulting, Coordinating, Appraising

UNIT III

Counselling And Management Of Common Childhood Problems And School Counseling Program

Evaluation:

Educational - School refusal, Scholastic backwardness, Conduct and Emotional problems

Educational and Career Development – Educational planning for all students, Career Planning and Decision Making

Social - Abuse Counselling : Types of Abuse, Causal Theories of Abuse, Effects of Abuse on a child.

Evaluation of School Counselling Program- Types of Program Evaluation, School Counsellor Evaluation, Performance Appraisal Processes and Instruments

UNIT IV

Counselling Situations in Adolescence: Educational Counselling and Guidance, Acceptance of Changed Physical Self, Counselling Adolescents Regarding Sexuality and Substance Abuse, Counselling the Young Adult. Social relations and Personal Identity and work – D.E. Super's and J.L. Holland's Theories. Counselling situations – Physical Disorder, Career Planning, Financial Planning, Conjugal Relationship.

UNIT V

Guidance Strategies for Social and Personal Problems: Developing Self-Confidence, Assertive training, Improving Communication Skills, Mental and Physical Methods of Relaxation; Self-improving Programmes: Study Skills Training, Problem Solving Techniques, Managing Motivation, Time Management, Remedies for Procrastination, Decision Making. Organization of Guidance Programme in School.

Legal and Ethical Issues: Legal and Ethical Responsibilities in School Counselling: Legal Concepts - Ethical standards - Government regulations- Keeping Good Student Records.

Reference

S.K. Koctihar (1984): Guidance & Counselling in Colleges and University, Starling Publications Pvt. Ltd. (Text book)

S.K. Koctihar (1984) Educational and Vocational Guidance in Secondary Schools, Sterling Publication Pvt. Ltd.

John J. Schmidt (2008). Counselling in Schools: Comprehensive Programs of Responsive Services for all Students, Pearson Education Inc. (Text Book)

Stanley B. Baker & Edwin R. Gerler, Jr. (2004) School Counselling for the Twenty First Century. 4th Edition. New Jersey, Pearson Education.

Berki B.G. & Mukhopadhyay; Guidance & Counselling, Sterling Publication Pvt. Ltd., 1989.

K.P. Pandey (1985) Advanced Educational Psychology, Second Revised Edition, Konark Publication Ltd.

- Woolfolk, A. (2004). *Educational psychology Ninth Edition*, Pearson Education B.N. Dash, A Textbook of Educational Psychology, Dominant Publishers, 2014.
- Santrock, J. W. (2006) *Educational Psychology*, 2nd Edition, New Delhi, Tata McGraw Hill
- Carrol, Michael (1996) *Work Place Counselling*, New Delhi, Sage Publications.
- Mearns, Dave (1999) *Person centred Counselling Training*.
- Cooper, Carry L. (1997) *Managing Workplace Stress*.
- Wiilaims, Hank. (1996) *Managing groups and teams*.
- Allgood, Eleanor. *Implicit Theories about Practice become Explicit: Case Studies of School Counsellors' Experiences*. Toronto: University of Toronto, 1990.
- MuktaRathee, *Advanced Educational Psychology*, Rajat Publicatios, 2015.
- Robert J. Wright, *Introduction to School Counseling* 1st edition.
- S.K. Mangal, *Essentials of Educational Psychology*, PHI Learning Private Limited, 2015.

SEMESTER – III

HUMAN RIGHTS AND REHABILITATION (MC-10)

MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY333T

Course Objectives:

6 Hours Per Week

- To understand the nature and extent of problems faced by specific categories of people who badly require safe shelter and rehabilitation.
- To get knowledge about the government response toward rescue, intervention and rehabilitation for people who require immediate attention.
- To gain knowledge on human rights in India and understand the contemporary issues of human rights.
- To understand the role of psychologists in intervention and rehabilitation of street children.
- To gain knowledge about addressing psychological trauma and arrangement of safe shelter.

UNIT I

Human Rights: Meaning - UNO - Universal Declaration of Human Rights - International Covenant on Economic, Social and Cultural Rights - International Covenant on Civil and Political Rights - Human Rights in the Constitution of India - Fundamental Rights and Duties in the Indian Constitution - Roles and Powers of National Human Rights Commissions - Responsibilities of State Human Rights Commissioner.

UNIT II

Contemporary Issues: Rights of Children, Women, Dalit, Refugees, and Victims of HIV/AIDS - Capital Punishment - The Special Marriage Act 1954 - Adoption and Maintenance Act 1956 - Juvenile Justice Act 1986 - The Maintenance and Welfare of Parents and Senior Citizens Act 2007.

UNIT III

Street Children: Definition - Background of street children – Prevalence - Living condition of street children - Problems encountered by the street children - Reasons for leaving home and accepting street life – Prevention - Role of psychologists in intervention and rehabilitation of street children - Steps for effective implementation of

intervention programme.

UNIT IV

Child Trafficking and Prostitution: Definition - Genesis of trafficking in South East Asia - Factors responsible for trafficking and prostitution – Consequences – Prevention - Intervention and rehabilitation - Legal measures for prevention of human trafficking in India.

UNIT V

Counselling Special Groups: Suicide prevention and management - Drug addicts and alcoholics - Trauma and sexual abuse counselling - Physical, psychological, vocational and social rehabilitation of persons with disabilities and mental retardation.

Reference Books:

1. Deb, Sibnath (2006). Contemporary Social Problems in India. New Delhi, Anmol Pub.
2. Deb, Sibnath (2006). Children in Agony. New Delhi, Concept Pub.
3. Kundu.C.L., 2003. Status of Disability in India. Rehabilitation Council of India, New Delhi.
4. Deb Sibnath, MitraChirasree, MajumdarBishakha and Sun Jiandog (2011). Effect of '12 Day Induction Training for ART/CCC Counsellors' under GFATM Project in India: an In-depth Study, *Indian Journal of Health and Wellbeing*, Vol.2 (2), pp.5-11
5. Human rights education for beginners: prepared by Karnataka women's information and resource centre. For national human rights commission
6. Human Rights in India(2007)By Asish Kumar Das, Prasant Kumar Mohanty.Sarup& Sons Publications.
7. Velleman, R. (2001). Counselling for Alcoholic Problems. New Delhi:Sage Publications,.
8. Wolfe, R. Dryden, W. and Star bridge, S. (eds) (2003). Handbook of Counselling Psychology. Sage Publications.
9. Figgar, T.F. & Maki, D.R. (2004). Handbook of Rehabilitation Counselling (Eds). New York, NY: Springer Publishing Company.
10. Etherington, K. (2002). Rehabilitation Counselling in Physical and Mental Health. New York: Jessica Kingsley Publishers.

SEMESTER – III

BEHAVIOUR MODIFICATON (ME-1)

MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY334A

Course Objectives:

6 Hours Per Week

- To make the students aware of the basic concepts of behaviour modification
- To transmit knowledge and develop skills needed for applying behavior modification techniques.
- To pass on knowledge and develop skills towards self-development.
- To use the techniques to increase desirable behaviour and decrease undesirable behavior
- To apply behaviour therapy in clinical setup

UNIT 1 BASIC CONCEPTS

Definition and characteristics of behavior modification. Historical aspects. Areas of application. **Reinforcement** - positive and negative reinforcement, escape and avoidance behaviors, conditioned and unconditioned reinforcement, factors that influence the effectiveness of reinforcement, schedules of reinforcement.

Punishment - positive and negative punishment - Factors that influence the effectiveness of punishment.

Respondent conditioning, timing of neutral and unconditioned stimulus, higher order conditioning, conditioned emotional responses, extinction of conditioned responses, discrimination and generalization of respondent behavior, Influential factors of respondent conditioning.

UNIT II PROCEDURES TO ESTABLISH NEW BEHAVIOR

Stimulus control: discrimination and generalization. Defining stimulus control, stimulus discrimination training, the three-term contingency. Generalization .

Shaping and its applications - How to use shaping, shaping of problem behaviors.

Prompting and fading techniques. Types of prompts.. How to use prompting and transfer of stimulus control (for example in autism).

Chaining. Examples of behavioral chains, analyzing stimulus-response chains, task analysis, backward chaining, forward chaining, total task presentation. Components of behavioral skills training procedures. Modeling, instructions, rehearsal, feedback.

UNIT III PROCEDURES TO INCREASE DESIRABLE BEHAVIOR AND DECREASE UNDESIRABLE BEHAVIOR

Differential reinforcement of alternative behavior, differential reinforcement of other behavior - Differential reinforcement of low rates of responding Antecedent control procedures. Using antecedent control strategies. Using punishment. Time out, response cost.

UNIT IV OTHER BEHAVIOR CHANGE PROCEDURES

Token economy - practical considerations, implementing a token economy, applications of token economy, advantages and disadvantages of a token economy.

Behavioral contract - components of a behavioral contract.

Assertiveness training - Components of assertive behaviour, Method of assertiveness training, steps in assertive training.

Modelling - Basic functions of Modelling, Processes inherent in Modelling, Modelling procedures.

UNIT V CLINICAL APPLICATION OF BEHAVIOUR THERAPY

anxiety disorders, Psychoactive Substance Use Disorders- Sexual Disorders- Psychotic Disorders- Personality Disorders- Childhood Disorders- Biofeedback principles and clinical applications.

References

Miltenberger, R.G. (2012). Behaviour Modification: Principles and Procedures. 5th edition. Wadsworth Cengage Learning.

Masters, J. C., Burish, T. G., Hollon, S. D. & Rimm, D. C. (1987). Behaviour Therapy: Techniques and Empirical Findings. 3rd edition. Harcourt Brace Jovanovich College Publishers, New York.

Kenneth, R.G. Williams and Williams. Clinical Biofeedback. Baltimore.

Houten Ron Van (1993). Behavior Analysis and Treatment. Plenum Press New York

SEMESTER – III

TRAINING AND DEVELOPMENT (ME-1)

MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY334B

Course Objectives: 6 Hours Per Week

- Teach basic concepts related to training and development
- Equip students with tools to evaluate the needs of the employees
- Expose students to the various training methods
- Understand the issues related to training and assessment.
- Create their own training program

UNIT I

Definition, Nature and Meaning of Training and Development; The training process- Factors: to improve Effectiveness of Training, for success of training activity and management training in future - reasons for training skills – qualities of a trainer.

UNIT II

Training and Assessment of Needs: Training Need Analysis – reasons, method of data collection, criteria for data collection– training design- task analysis – basic learning styles of participants, factors influencing the learning process.

UNIT III

Training Methods: Approach, On-the-Job methods, Off-the-Job methods; Knowledge-based, Simulation method, Experiential Methods

UNIT IV

Training designs for specific areas- Training for Cultural Diversity – Web-based Training for Call Centers – Training: for Call Centers, Team-building, Interim Staff, and Apprenticeship. Transforming Anger – Learning to Build Self-Esteem, Identifying Training Needs of Small-Scale Enterprises and Techniques for Trainers to improve Voice

UNIT V

Evaluation of the training: Purpose of evaluation, Kirkpatrick’s four levels of evaluation, guidelines for measuring the four levels.

REFERENCE BOOKS

- Camp, R.R., Blanchard, N.P., & Huszycz, G.E. (1986). *Toward a more organizationally effective training strategy and practice*. New Jersey: Prentice Hall.
- Lynton, R. P., & Pareek, U. (2013). *Training for Development*. 3rd ed. New Delhi: India: Sage Publications.
- Nick, P. B., & James, T. W. (2008). *Effective training - systems, strategies and practices*. Prentice hall. Landale. A. (2006). *Advanced Techniques for Training and Development*. New Delhi: Infinity Books.

Bhatia, S.B. K. (2009). *Training and development: concepts and practice*. New Delhi: Deep and Deep publication private limited.

Pepper, A. D. (1984). *Managing the Training and Development Function*. Aldershot: Gower

Chadha, N. K. (2007). *Organizational Behaviour*. New Delhi: Galgotia. Lynton, T & P, U (1990). *Training for Development*, 2nd edition. New Delhi: Vistaar.

Goldstein, I., & Ford, K. (2001). *Training in organizations*. 4th ed. CA: Wadsworth Thomson.

Blanchard, N.P., & Thacker, J. W. (2009). *Effective training: systems, strategies and practices*. New Delhi, India: Pearson Education.

10. Biech, E. (2005). *Training for dummies*. Hoboken, NJ: Wiley Publishing Inc.

SEMESTER – III

HUMAN RESOURCE DEVELOPMENT (ME-1)

B.A. MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY334C

Course Objective: 6 Hours Per Week

Gain knowledge about human resource development.

Understand the approaches and activities of human resource development.

Acquire the skills of developing human resources in different sectors.

Introduce the students to training and development.

Gain knowledge and skills regarding relationship at work.

UNIT I

HRD: Concept, Objectives, Approaches & Principles – Systems & strategies in HRD -**HRD Interventions:** Organizational Goal setting process - Key Result Areas (KRA) and Key Performance Indicators (KPI) - Performance Measurement Systems – Feedback sessions - Coaching, Mentoring, Career planning, Career development, Reward system.

UNIT II

Approaches to Measuring Human Resources: Competitive Benchmarking - HR Accounting, HR Auditing - HR Effectiveness Index - HR Key Indicators - HR Management by Objectives.

UNIT III

Training Need Analysis at Individual and Organizational level: Designing and conducting Training programs - **Types of Training:** On the Job and Off the Job Training- Coaching Apprentices, Job Rotation.

UNIT IV

Training & Development: Importance of training and development - Methods - Programmed Instruction - Role Play - Structured and Unstructured Role Plays - In-basket Exercise – Simulation - Case Study and Sensitivity - **Training** - Evaluation of Training Program - Kirk Patricks Model- The Cost/Benefit Analysis of Training - Using the Results to Improve Training and Development Function - Improving Training Utility by Following up Training

Action Plans.

UNIT V

Employee Empowerment: Concept - Definition & Objectives of Employee Empowerment – Prerequisites – Types & Benefits – Strategies - Ways to Employee Empowerment – Employee Counselling - Role of Counsellor in Organization - Developing Positive Employee Relationship – Balance Score Card. Quality of work life. Employees' participation in Management.

References:

- Arun Kumar, 2000, International Encyclopaedia of Management Training and Development Anmol Publications Pvt.Ltd, New Delhi
- Bhatia S K, 2008, Emerging Human Resource Development (HRD), Deep & Deep Publications Pvt.Ltd, New Delhi.
- Dday Kumar Halder, 2010, Human Resource Development, Oxford University Press, New Delhi.
- Denisi, Griffin, 2008, Human Resource Management, Houghton Mifflin Company, New York.
- Rishipal, 2011, Training and Development Methods, S. Chand Competition, New Delhi
- Khanka S. S., 2003, Human Resource Management, S, Chand & Company Ltd, New Delhi.
- Jon M. Werner, Randy L. Desimone, 2009, Human Resource Development, Cengage Learning, New Delhi.
- Nair L G, Latha Nair, 1999, Personal Management and Industrial Relations, S. Chand & Company Ltd, New Delhi.
- Rao T V, 2009, Human Resource Development, SAGE Publications, New Delhi.
- Raymond A Noe, Amitabh Deo Kodwani, 2012, Employee Training and Development, Tata McGraw-Hill Edition, New Delhi.
- Tapomoy Deb, 2006, Human Resource Development (Theory and Practice), Ane Books India, New Delhi.
- Vinod N Patel, Girish K Rana, 2007, Personal Management, Oxford Book Company, Jaipur.

SEMESTER – III

FIELD PRACTICUM – III (FP-III)

B.A. MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY335F

Course Objectives:

- Apply theoretical knowledge in the counselling field.
- Understand the functions and activities of field place organization.
- Teach students to administer psychological tests in counselling
- Offer a comprehensive view of various therapeutic practices.
- Educate the student to create intervention strategy

During the third semester field practicum, the students are placed in different organization and they undergo the counselling training under the close supervision of the organizational personnel.

The students get a hand on experience of the day-to-day functioning of the organization. They assist the organization in their routine functions of the organization and participate in all the professional activities. It provides them an opportunity to link theory with practice.

The students are encouraged to undertake mini research studies, analyze case and present their findings. The students also undertake any assignments given to them by the organization.

The Field Practicum consists of one block (Total of 15 days). At the completion of the block the students are required to submit the record for valuation and guidance.

The CA marks are awarded by the supervisor out of 40 marks for the quality, regularity, initiatives, leadership, participation and team work.

At the end of the semester Viva Voce is conducted by an external examiner and marks are awarded out of 60.

Field Practicum Outline

Field Practicum - III (Semester-3)

15 Counselling Progression Report

2 Case Studies

4 Psychological Tests

Prepare 1 seminar on a psychological Theme (5-7 Pages)

SEMESTER –IV

POSITIVE PSYCHOLOGY (MC-11)

B.A. MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY430T

Course Objectives:

6 Hours Per Week

Introduce to nature, goals and history of Positive Psychology.

Understand the positive emotional states and process.

Offer knowledge of positive cognitive states and processes.

Develop a balanced conceptualizations of Mental Health and Behavior

Creation of a positive environment.

UNIT I

Introduction to Positive Psychology: Definition, Nature and Goals of Positive Psychology; Genesis of Positive Psychology as a separate Branch; Eastern and Western Perspectives of Positive Psychology.

UNIT II

Positive Emotional States and Process: The Principles of Pleasure: Understanding Positive Affect, Positive Emotions, Happiness, and Well-Being. Making the Most of Emotional Experience: emotional-focused coping, emotional intelligence, Socioemotional selectivity, and emotional storytelling.

UNIT III

Positive Cognitive States and Processes: Seeing Future through Self-Efficacy – Optimism and Hope. Two Universal Virtues – Wisdom and Courage. In Search of Optimal Experiences- Mindfulness, Flow, and Spirituality

UNIT IV

Prosocial behaviour and Changing Human Behavior: Empathy and Egotism-Portals to Altruism, Gratitude, and Forgiveness. Attachment, Love, and Flourishing Relationships. Changing Human Behavior: Balanced conceptualizations of Mental Health and Behavior. Interceding to prevent the Bad and Enhance the Good.

UNIT V

Positive Environment: Positive Schooling – Components of positive schooling – Teaching as a calling. Gainful Employment – Strength based approach to work – capital at work – Positive Organization.

Reference

- C.R.Snyder and Shane J Lopez, Positive Psychology – The Scientific and Practical Explorations of Human Strength, Sage South Asia Edition, 2007.
- Snyder, C. R., & Lopez, S. (Eds.). (2002). Handbook of positive psychology. New York: Oxford University Press.
- Carr, A. (2004). Positive Psychology: The science of happiness and human strength. UK: Routledge.
- Aspinwall, L. G., & Staudinger, U. M. (2003). A psychology of human strengths: Fundamental questions and future directions for a positive psychology. American Psychological Association.
- Baumgardner, S.R. Crothers M.K. (2010). Positive psychology. Upper Saddle River, N.J.: Prentice Hall.
- Boniwell, I. (2006). *Positive Psychology in a Nutshell*. PWBC (Personal Well-Being Centre)
- Lopez, S. J., & Snyder, C. R. (Eds.). (2009). The Oxford handbook of positive psychology. Oxford University Press.
- Peterson, C. (2006). A Primer in Positive Psychology. New York: Oxford University Press.
- Seligman, M. E., & Csikszentmihalyi, M. (2014). Positive psychology: An introduction (pp. 279-298). Springer Netherlands.
- Seligman, M.E.P. (2002). Authentic Happiness: Using the New Positive Psychology to Realize Your Potential for Lasting Fulfillment. New York: Free Press/Simon and Schuster.
- Steve, B.R. & Marie, C.K. (2009). *Positive Psychology*. Dorling Kindersley: India.

SEMESTER – IV

FAMILY AND COUPLE COUNSELLING (MC-12)

MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY431T

Course Objectives:

6 Hours per Week

- To understand the historical evolution of field of marriage and couple counselling.
- To understand the psychological theories and various therapies in family counselling.
- To understand the concept of adaptive and dysfunctional communication patterns.
- To analyze or evaluate the entire family counselling process.
- To analyze the effectiveness of various techniques of family and couple counselling.

UNIT I

Family, Marriage & Life Span: Definition - Changing trends in family structure - Types of families - Characteristics of families - Family strengths - Divorce and Remarriage – Cohabitation - Stages of marriage - Factors affecting spouse selection - Reasons for marrying, remaining single - Counselling the engaged - Attitudes towards marriage - Goals of premarital preparation - Premarital counselling.

UNIT II

Family Counselling: Evolution of the Concept of Family Counselling - Developments in Psychoanalysis - Growth of Child Guidance Movement - Emergence of Marriage Counselling Movement - Initiation of Group Counselling - Influence of General Systems Theory - Concepts of 'Family Life Cycle' and 'Communication Pattern within Families' - Approaches to Family Counselling - Types of Family Counseling - Family Counselling in Relation to Individual Counselling - Family Counselling Process - Indications and Contraindications for Family Counselling

UNIT III

Counselling in Family Areas: Introduction - Developmental Models of Family Life - The Family Life Cycle - The Family Life Spiral - The Family Genogram - Theoretical Antecedents of Family Counseling - Conjoint Theory - Strategic Theory - Structural Theory - Goals of Family Counselling - The Process of Change - First-Order Change - Second-Order Change - Intervention Strategies - Specific Vs. Nonspecific Factors - Family Interview - Techniques of Family Counselling - Evaluation of Family Counselling.

UNIT IV

Couple Counselling: Reasons for Seeking Couple Counselling - Approaches to Couple Counselling - Psychodynamic (or Insight-oriented) Couple Counselling - Systems Couple Counselling - Behavioural Couple Counselling - Cognitive Behavioural Couple Counselling - Emotionally Focused (EF) Couple Counselling - Factors that Contribute to Marital Distress - Twelve (12) Destructive Ways of Spoiling a Marital/ Spousal Relationship - Process of Family Counselling - Intervention Process and Techniques in Couple Counselling - Defining the Couple's Problem - Stages in Couples Counselling - Sexual Counselling - Couples and Domestic Violence, Mental Illness.

UNIT V

Schools of Family Therapy: Structural Family Therapy - Solution Focused and Strategic Family Therapy - Systemic Family Therapy - Cognitive Behavioural Family Therapy - Integrated Approach to Family Therapy.

Reference Books:

- Ackerman, N.W. (1958). *The Psychodynamics of Family Life*. New York: Basic Books.
- Ackerman, N.W. (1966 b). *Treating the Troubled Family*. New York: Basic Books.
- Goldenberg, I., & Goldenberg, H., (2004). *Family Therapy: An Overview*. (7th ed.). Pacific Grove, CA: Brooks/ Cole.
- Scharf, R. S. (2001). *Theories of Psychotherapy & Counseling: Concepts and Cases*. (3rd ed.). Thomson, Brooks/Cole.
- Coppersmith, E. (1980). The Family Floor Plan: A Tool of Training, Assessment, and Intervention in Family Therapy. *Journal of Marital & Family Therapy*, 6, 141-145.
- Duhl, F. S., Kantor, D., & Duhl, B. S. (1973). Learning Space and Action in Family Therapy: A Primer of Sculpting. In D. Bloch (Ed.), *Techniques of Family Psychotherapy: A Primer*. New York: Grune & Stratton.
- Minuchin, S., & Fishman, H. (1981). *Techniques of Family Therapy*. Cambridge, MA: Harvard University Press.
- Stuart, R.B. (1980). *Helping Couples Change: A Social Learning Approach to Marital Therapy*. Guilford press, New York. Jacobson, N.S. & Gurman, A.S. (ed.) (1986). *Clinical Handbook of Marital Therapy*. Guilford press, New York.

- Framo, J.L. (1970). Symptoms from a Family Transactional Viewpoint. In Family Therapy in Transition. Edited by Ackerman. NW. Boston, MA, Little, Brown, 1970, pp 125–171.
- Gabbard, G.O. Beck, J.S. Holmes. (2005). Psychodynamic Couple Therapy. Oxford University Press, New York.
- Sholevar, G. P. & Schworer, L.D. (2003). Textbook of Family and Couples Therapy: Clinical Applications. American Psychiatric Association. Washington, D.C.
- Nichols, P.M & Schwartz C.R (2006). *Family Therapy –concepts and methods*, 7th Edition, Allyn and Bacon, Boston, Pearson education, Inc.Press, Inc.
- Gladding, S.T. Family Therapy: History, Theory, and Practice (4th Edition).

SEMESTER – IV

HEALTH PSYCHOLOGY (MC-13)

HEALTH PSYCHOLOGY (MC-13)

CODE: MSY432T

Course Objectives:

- Understand the definition of health psychology and bio-psychosocial model.
- Acquire knowledge about health behavior and primary prevention of health issues.
- Understand stress and coping methods and management of pain and discomfort.
- Compare about chronic and terminal illness.
- Contrast manage pain, discomfort, chronic and terminal illness.

UNIT I

Introduction to Health Psychology: Definition of Health Psychology – Nature, Mind-Body Relationship – Models of Health Psychology: Biomedical Model, Bio-psychosocial Model. Need of Health Psychology. The Systems of the Body.

UNIT II

Health Behaviour and Primary Prevention: Introduction to Health Behaviour, Changing Health Habits. Specific Health-Related Behaviors: Health-Compromising Behaviours: Health Beliefs: Health belief model, Theory of reasoned action, Theory of planned behaviour, Cognitive-behavioural approaches to health change

UNIT III

Stress and Coping: Definition of Stress, Theoretical Contributions to the Study of Stress, Sources of Chronic Stress. Moderators of the Stress Experience: Coping with Stress, Coping and External Resource, Coping Outcomes, Social Support, Coping Interventions.

The Management of Pain and Discomfort: The Elusive Nature of Pain, Clinical Issues in Pain Management, Pain Control Techniques, Management of Chronic Pain.

UNIT IV

Management of Chronic and Terminal Illness: Quality of Life, Emotional Responses to Chronic Disease, Coping with Chronic Illness, Psychological Interventions and Chronic Illness. Psychological Issues in Advancing and Terminal Illness. Heart Disease, Hypertension, Stroke, and Diabetes. Psychoneuroimmunology, AIDS, Cancer, Arthritis.

UNIT V

Challenges for the Future: Health Promotion, Health Services, Management of Serious Illness, Trends in Health and Health Psychology, Becoming a Health Psychologist.

Reference

- Allen, F. (2011). Health psychology and behaviour. Tata McGraw Hill Edition.
- Shelley E. Taylor, Health Psychology, Seventh Edition, McGraw Hill Education (India) Edition, 2012.
- Singh, R., Yadava, A. & Sharma, N.R. (2015). Health Psychology. New Delhi: Global Vision Publishing House.
- D.F.Marks, M.Murray, B.Evans and E. VidaEstacio, Health Psychology, Third Edition, Sage, 2011.
- Dimatteo, M. R., & Martin L. R. (2011). Health psychology. India: Dorling Kindersley.
- Gordon, E. and Eric, G.(2010). Health and Wellness (10thEd.). Boston. Jones and Bartlett Publishers.
- Margaret, K. Snooks (2009). Health Psychology: Biological, Psychological, and Sociocultural Perspectives. Boston. Jones and Bartlett Publishers.
- Naima Khatoun, Health Psychology, Pearson, 2012.
- Ogden Jane (2000): Health Psychology: A guidebook (2nd edition). Open University Press. UK.
- Rajbir Singh (2005). Health Psychology. New Delhi: Global vision Publishing House.
- Sarafino, E.P. (2002). Health psychology: Bio psychosocial interactions (4th Ed.).NY: Wiley.
- Annabel Broome and Sue Lbwelyn. Health Psychology – Process & Application, New York, Chapman & Hall

SEMESTER – IV

COMMUNITY PSYCHOLOGY (ME-2)

MSC (COUNSELLING PSYCHOLOGY) CODE: MSY433A

Course Objectives: 3 Hours Per Week

- To learn the linkage between individuals, communities and societies and handle social issues more effectively with people's participation.
- To understand the role and the core values of community psychology.
- To understand various mental health issues among students.
- To understand various natural disasters and its consequences.
- To teach counselor's role in community development.

UNIT I

Meaning and Concept: Definition of community psychology - Types of communities - Locality based and relational - Models: Ecological level analysis of community, Conceptual level model.

UNIT II

Core Values in Community Psychology: Individual and family wellness - Sense of community - Respect for human diversity - Social justice - Empowerment and citizen participation - Collaboration and community strengths - Community functions - Learning, socialization, and supportive functions.

UNIT III

Communities as Setting for Health Promotion: Need and process of community organization and building for health promotion programming. Community programme for child and maternal health, for physical challenged and old age in the Indian context.

UNIT IV

Student Mental Health: Academic stress - Anxiety related to examination – Depression = adjustment of the students, motivating students for better academic performance.

UNIT V

Applied Community Psychology: Violence and aggression - Theories of aggression - management of aggression - Developing a community-centered approach to prevention of aggression and violence - Natural disasters - Impact of natural disasters - physical, psychosocial, economic consequences of natural disasters; Role of community psychologists in facilitating adaptation to natural disasters.

Reference Books:

- Desai, A.N. (1995). Helping the handicapped. Ashish Pub. House.
- Fetterman, D.M., Kaftarian, S.J. & Wandersman, A (Eds)(1996) Empowerment Evaluation, New Delhi: Sage Publication. (Chapter 8).
- Kloos B. Hill, J Thomas, Wandersman A, Elias M.J. & Dalton J.H. (2012). Community Psychology: Linking Individuals and Communities, Wadsworth Cengage Learning. Chapter 1 (page 02).
- McKenzie, J. F. Pinger, R. R. & Kotecki, J. E. (2005). An introduction to community health. United States: Jones and Bartlett Publishers. (Chapter 5, 7, 9)
- Misra, G. (Ed). (2010) Psychology in India. Indian Council of Social Science Research. Dorling Kindersley (India) Pvt Ltd. Pearson Education (Unit III Chapter 2).
- Poland, B. D., Green, L.W. & Rootman, I.(2000) Setting for Health Promotion: Linking Theory and Practice, Sage Publication, New Delhi
- Isoe, I. Block, B.L. & Spielberger, CD (Eds.) (1997). Community psychology: Perspectives in training and research. Appleton Century Crofts. NY.
- Mandelbawn, B. (1972). Society in India. Popular Prakashan. Bombay.
- Mann, P.A. (1978). Community Psychology: Concepts and Applications. The Free Press.
- Rajan, S.I. et al., (1999). Indian's elderly: Burden or challenge, Sage Pub.
- Korchin, S.J. (1976). Modern Clinical Psychology: Principles of Intervention in the Clinic and Community. Basic Books, New York
- Levine, M., Perkins, D.D., & Perkins, D.V. (2004). Principles of Community Psychology: Perspectives and Applications. Oxford University Press

SEMESTER – IV

PSYCHOMETRY (ME-2)

MSC (COUNSELLING PSYCHOLOGY) CODE: MSY433B

Course Objectives:

3 Hours Per Week

- Provide foundation on the basics of Psychological testing
- Explain Nature, meaning and use of psychological tests.
- Develop skills and competencies in test construction and standardization
- Teach the student to establish reliability and validity
- Train students to use psychological tests in various settings.

UNIT I

Introduction to Psychological Tests: Definition; Importance of Psychometrics and psychological testing, Ethical issues in Testing; The History of Psychological Testing;

UNIT II

Measurement: meaning, differences between psychological and physical properties of scales and measures, Levels of measurement, Likert scale; Uses of Scale: Nature, meaning and use of psychological tests. Characteristics of a good Psychological test.

UNIT III

Creating a Test—Test/Scale construction, standardization, adaptation and translation, item analysis and item response theory.

UNIT IV

Standardizing a Test— Reliability, validity, norms—issues and challenges

UNIT-V

Application of Testing—Applications of psychological testing in various settings-educational testing, Occupational testing, Test use in clinical and counselling and guidance.

REFERENCES BOOKS:

Chadha, N. K. (2009). Applied Psychometry. New Delhi: Sage.

Guilford, J. P. (1989) Psychometric methods. NJ: John Wiley.

Murphy, K. R., & Davidshofer, C. O. (1994). Psychological testing - Principles and applications. New Jersey: Prentice Hall.

Jackson, C. (2003) Understanding Psychological Testing. Mumbai: Jaico Pub. House

Kaplan. R. M. & Saccuzzo. D. P. (2005) Psychological testing: principles, applications and issues (6th ed).

Anastasi A & Urbina S (2005). Psychological testing. (7th ed)

Cohen. R. J., Swerdlik. M. E., Phillips. S. M. (1996) Psychological testing and assessment: an introduction to tests and measurements (3rd ed)

Cozby. P. C. (1997) Methods in behavioural research (6th ed)

Cronbach. L. J. (1990) Essentials of psychological testing (5th ed)

Heiman. G. W. (1999) Research Methods in Psychology 2nd ed)

Kline, T. J. B. (2005). Psychological Testing. New Delhi: Vistaar Publication

SEMESTER – IV

ORGANIZATIONAL PSYCHOLOGY (ME-2)

B.A. MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY433C

Course Objective: 3 Hours Per Week

Obtain knowledge about organizational psychology.

Understand the functions and activities of organization.

Acquire the skills of working with organized sectors and human resources.

Explain managing self-competency and communication competency.

Explain how job satisfaction and organizational commitment affect performance.

UNIT I

Introduction to Organizational Psychology: Definition, Goals, Key forces, and fundamental concepts. Nature of people and nature of organization. History of industrial psychology. Major Fields of I/O Psychology and IC Psychology as a career: Training & Employment.

UNIT II

Job Analysis and Selection: Job Analysis: Definition and methods –Questionnaire method, Checklist method, Individual interview method, Observation, Group interview method, Technical conference method, Diary method, Work participation method and Critical incident method. **Interview**–guided interview, unguided interview, stress interview, online interview and group interview.

UNIT III

Individual Behaviour in Work Place: Attitudes– Components of attitude, Major Job attitudes, sources of attitudes and its application, sources of emotions and moods, Emotional Intelligence, Organizational behavior application of emotions and moods. **Perception and individual decision making**- Interpersonal Perception, Factors influencing perception, Link between perception and decision making.

UNIT IV

Job Satisfaction and Incentives: Job Satisfaction: Measuring job satisfaction, Causes of job satisfaction, Impact of satisfied and dissatisfied employees in work place, Methods to improve Job Satisfaction. **Content Theories:** Maslow, Herzberg, Alderfer, McGregor, McClelland, **Process Theories:** Vroom, Porter and Lawler's Expectancy Model, Adams Equity Model, Skinners Reinforcement Model, Goal Setting Theory. Motivating by job design- Employee involvement –Employee recognition.

UNIT V

Leadership:Personal Characteristics Associated with Leadership,Kendra Cherry's "Eight Leadership Theories",Kurt Lewin's Three Leadership Styles,Person Orientation of Leadership,Team Leaders v. Impoverished Leaders,Theory X and Theory Y, Six emotional leadership styles.

Reference

- Aaker, D. A., & Joachimsthaler, E. (2012). *Brand leadership*. Simon and Schuster
- Girishbala Mohanty - Industrial Psychology and Organisational Behaviour, Kalyani Publishers, Ludhiana
- Jex, S. M., & Britt, T. W. (2014). *Organizational psychology: A scientist-practitioner approach*. John Wiley & Sons.
- John W Newstrom –Organizational Behaviour-Human Behaviour at Work. Twelfth Edition Tata McGraw-Hill Publishing Company Limited.New Delhi.
- Landy, F. J., & Conte, J. M. (2009). *Work in the 21st century: An introduction to industrial and organizational psychology*. John Wiley & Sons.
- Miner, J. B. (1992). *Industrial-organizational psychology*. McGraw-Hill Book Company.
- Schein, E. H. (2010). *Organizational culture and leadership* (Vol. 2). John Wiley & Sons.
- Schultz D.P. and Schultz E.S–Psychology & Work Today Eighth Edition ,Pearson Education,Inc.and Dorling Kinderssley Publishing Inc.

SEMESTER – IV

EMPLOYABILITY SKILLS (SK-2)

MSC (COUNSELLING PSYCHOLOGY)

CODE: MSY434S

Course Objective: 3 Hours Per Week

Understand the career planning skills in their interest field.
Acquire knowledge about the recruitment channels and analyzing the job advertisements.
Obtain the skill of resume writing.
Develop their teamwork, planning and organizational skills.
Create wider outlook on career decision making process.

UNIT I

Career Planning Skill: Multiple Intelligence theory and career choice. Good understanding of careers in the Development sector and the Industry and job opportunities and roles available within it - Career Analysis Survey - Career Exploration activities - Skills and qualifications required for a range of occupations relating to Psychology

Skill Practice

Completing Career Planning Survey
Self-Analysis of skills required for a specific occupation of choice
Undergoing a Psychometric Testing on Career aspiration and submitting a report

UNIT II

Job Hunting skill: Role of one's life history in Job hunting - Role of Qualification (education, training, work experience, positions held) in job hunting - Importance of job search based on one's Values and Strengths - Developing expectations regarding work- Understanding employer's expectations.

Skills Practice

Identifying one's career choices after preparing one's Skills check list, Strengths check list and Values Check list
Identifying Recruitment channels & networks (e.g. naukri, monster, deventindia) and registering oneself
Analyzing job advertisements and preparing an Action Plan to market oneself for a job

UNIT III

Resume Writing & Interview Skills: Components of an effective resume- Preparing for an interview.

Skill Practice

Preparing a CVs for a job and writing a job application letter
Participating in a Group Discussion
Attending a Mock Interview

UNIT IV

Team Work Skill: Participation in group activities - Listening to other's ideas with an open mind - Negotiating time lines, roles and responsibilities on a project - Maintaining productive and harmonious working relationship with colleagues.

Skill Practice

Organizing a group activity in the college as a team and writing a report on how time deadlines, roles and responsibilities of different team members were negotiated
SWOT Analysis on Sustaining Relationship with classmates

Demonstrating workplace telephone conversation

UNIT V

Planning & Organizing Skill: Identifying priorities and reorganizing schedules - Identifying time wasters that are blocks to task completion- identifying tasks to be delegated to subordinates or shared with equals - Adapting to job rotations within or outside the department.

Skill Practice

Preparing Competency Matrix for two different jobs related to MSW setting

Preparing Skill Portfolio

Activity on Exploring careers

Knowledge Dimension of Employability Skills: Workplace health and safety- types of workplace injury hazards and safety signs- Appropriate workplace behaviour and conduct - Anti-discrimination Harassment/Sexual harassment.

SEMESTER – IV

RESEARCH PROJECT (RP)

B.A. (MSC (COUNSELLING PSYCHOLOGY))

CODE: MSY434J

Course Objective: 6 Hours Per Week

Understand research methodology by undertaking a research project.

Plan the steps of research by its application.

Acquire the skills of undertaking a research project.

Recognize the scope of statistics.

Interpret diagrammatic and graphic representation of data.

Each student is assigned with a research supervisor. The students have to get the guidance and carryout the following steps and complete the research project within a semester.

Selection of Topic, Defining terms, Finalization of Objectives of Study.

Feasibility Study, Pilot Visit to the Field of Study

Detailed Research Proposal

Finalization of Research tool

Review of Literature and Bibliography

Finalization of Methodology Chapter.

Analysis and Interpretation of Data using SPSS

Main Findings and Suggestions

Summary and Conclusion

Submission of Bound Copy

The supervisor evaluates the work of the student out of 40 marks for above components also considering the quality, punctuality and regularity of consultation and correction.

The student submits the approved chapters as a bound volume. The Public Viva Voce is conducted by an external examiner and the marks are awarded out of 60.

SEMESTER – IV

SUMMER INTERNSHIP (SI-2) OPTIONAL

B.A. (COUNSELLING PSYCHOLOGY)

CODE:

Course Objective:

- Value experience in a counselling field by being in an open or closed setting.
- Understand the Skills, techniques and approaches adopted by the organization.
- Apply the knowledge gained, in the field of counselling.
- Understand the structure and functions of the organization.
- Prioritize to get placed in an institution.

This second internship programme is purely non-compulsory.

During the summer holidays the second year students go for one month summer internship training. The students are placed in hospitals or counseling centers or welfare organizations or service organization during the summer holidays.

During the placement the students are expected to learn about the vision, mission, philosophy, administration, strategies, program, activities, and achievements and also involve with the activities of the organization to whatever extent possible.

Students should get daily activity sheets signed by the concerned persons in the organizations. They have to write daily records of their learning and submit to the department once they complete their summer internship. Successful completion is certified by the department and communicated to the Controller of Examination.

This is optional programme and no marks are attached. The students get extra credits.

Record Work for Practicum – 2 (summer of 4th semester)

Cover Page

Certificate – A page with the name and the roll number and the details of the academic semester with the sign of the HOD and Principal.

Attendance Log - A page that details the whole month Reporting Time, Working Time and Checking out time with a signature from someone in the agency (Like an attendance) (Ref-1)

Table of content

Profile of Agency (Name, Address, objectives/motto/vision, Details of the target group and description of the Agency) (2-3 pages)

Activities carried out Daily (A short and general description of the activity – Like the attendance but you will describe the nature of work done on a daily basis) (Ref-2)

Client work (Counseling, working with mentally challenged persons or learning) (Do the following for One client every day even though you may meet many clients- 2 pages)

Demographical features

Presenting problem

History of the problem (Past treatment, if)

Psycho-social development

Counseling proper/Action Taken

Learning (Professional and Personal, if any)

Future plan

2 case conferences (5-7 pages) (one in the middle of the practicum and one at the end of the practicum)

A self-evaluation of the one-month field placement (4-5 Pages)

Professional learning/Appraisal

Personal growth/Appraisal

B. Sc MICROBIOLOGY

Semester – I
4 Hours
4 Credits

MB 103: FUNDAMENTALS OF MICROBIOLOGY

Objectives

- To make students to understand the Fundamentals in Microbiology.
- To know the basic principles and types of Light microscope and Electron microscope.
- To familiarize with detailed structure of Prokaryotes.
- To acquire knowledge on various Sterilization techniques.
- To learn the Microbial cultivation techniques and methods for isolation of microorganisms.

Unit – I

Members of Microbial world; History and recent developments of Microbiology – Spontaneous generation and Biogenesis; Contributions of Anton van Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Ignaz Semmelweis, Dmitri Ivanoski, Martinus Beijerinck, Sergei Winogradsky, Alexander Fleming and Selman Waksman; Cell - Prokaryotes and Eukaryotes; Golden age of Microbiology; Branches and Scope of Microbiology

Unit – II

History of Microscopy; Principles of Microscopy; Difference between Simple microscope and Compound microscope; Principle, Instrumentation and Applications - Bright field microscope, Dark field microscope, Phase contrast microscope, Fluorescence microscope and Electron Microscopy – SEM & TEM; Difference between SEM and TEM.

Unit – III

Bacteria – Ultrastructure; Morphological Classification (Gram positive and Gram negative), Shape and arrangement; Cell wall; Cell membrane; Cell inclusions; Ribosomes; Capsules and Slime layer; Gas vesicles; Endospore; Surface appendages – Flagella (Arrangement and Types of Motility), Fimbriae and Pili.

Unit – IV

Microbial control terminologies; Sterilization; Physical method – Drying, Dry heat, Moist heat, Filtration, Radiation; Quality control and sterility checking; Chemical method – Disinfection and Disinfectants; Chemotherapy terminologies; Antibiotics – Classification, Antimicrobial resistance and Antibiotic sensitivity test

Unit – V

Stains and its types; Staining techniques – Simple staining, Differential staining (Gram staining & Acid fast staining), Special staining (Capsule staining, Metachromatic granule staining, Endospore staining & Flagella staining); Motility test; Culture techniques - Culture medium and its types; Biochemical Tests for bacterial identification.

Text Books

- 1) Gerard J. Tortora, Berdell R. Funke and Christine L. Case. 2015. Microbiology – An Introduction, 12th Edition, Pearson Publishers, San Francisco.
- 2) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 3) Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.

4) Saranraj, P. 2020. Basic Techniques in Microbiology. JPS Scientific Publications, India.

References

- 1) Dubey, R.C. and D. K. Maheswari. 2010. A Text book of Microbiology. 3rd Edition, S. Chand and Company, New Delhi.
- 2) Chakraborty. 2003. A Text book of Microbiology. 2nd Edition, Published by New Central Book Agency (P) Ltd., Kolkata.
- 3) Pelczar Jr. M. J., Chan, E. C. S and Kreig, N. R. 2006. Microbiology. 5th Edition Mc Graw Hill Inc. New York.
- 4) Powar, C. B and H. F. Daginawala. 2008. General Microbiology. Volume – II, Himalaya Publishing House, Mumbai.

Semester – I
3 Hours
3 Credits

MB104 - MICROBIAL DIVERSITY AND CLASSIFICATION

Objectives

- To learn the Taxonomy of microorganisms.
- To analyze the Ultrastructure of Fungi, Algae and Protozoa.
- To understand the Classification of microorganisms.
- To recognize the fundamentals on Economic importance of microorganisms.
- To impart knowledge on Molecular identification of microorganisms.

Unit – I

Phylogenetic Hierarchy; Nomenclature of Microorganisms; Taxonomy and Taxonomic Hierarchy; Kingdom concept of Organisms classification – Linnaeus Two Kingdom concept, Haeckel Three Kingdom concept, Copeland's Four Kingdom concept, Whittaker's Five Kingdom concept, Grey & Doolittle's Six Kingdom concept and Cavalier-Smith's Eight Kingdom concept; Wose – Fox's Three Domains of Life; Genetic and Intraspecific Classification; Classification of Bacteria - Bergey's manual and its importance; Economical importance of Bacteria.

Unit – II

Fungi – Ultrastructure, Nutrition and Reproduction; Characteristics of Molds & Yeasts; Classification of Fungi; Budding in Yeast; Fungal identification (Microscopic examination) and Cultivation in Culture medium; Water molds; Economical importance of Fungi.

Unit – III

Algae – Ultrastructure and Nutrition; Role of Algae in Nature; Classification of Algae; Diatoms and Dinoflagellates; Lichens; Algal diseases of humans; Algal identification (Microscopic examination) and Cultivation in Culture medium; Economical importance of Algae.

Unit – IV

Protozoa - Ultrastructure, Classification and Nutrition; Microscopic examination of Protozoa; Slime Molds – Cellular Slime Molds & Plasmodial Slime Molds; Economic importance of Protozoa; Virus – Structure and Classification; Animal and Plant Viruses; Viroids and Prions.

Unit – V

Molecular Identification of Microorganisms – Fatty acid profiles, DNA Base composition (G + C Content), DNA Fingerprinting, Polymerase Chain Reaction (PCR), CRISPR and Nucleic acid Hybridization (Southern Blotting, DNA Chips, FISH and rRNA Sequencing).

Text Books

- 1) Gerard J. Tortora, Berdell R. Funke and Christine L. Case. 2015. Microbiology – An Introduction, 12th Edition, Pearson Publishers, San Francisco.
- 2) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 3) Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.

References

- 1) Chakraborty. 2003. A Text book of Microbiology. 2nd Edition, Published by New Central Book Agency (P) Ltd., Kolkata.
- 2) Dubey, R.C. and D. K. Maheswari. 2010. A Text book of Microbiology. 3rd Edition, S. Chand and Company, New Delhi.
- 3) Pelczar Jr. M. J., Chan, E. C. S and Kreig, N. R. 2006. Microbiology. 5th Edition Mc Graw Hill Inc. New York.
- 4) Powar, C. B and H. F. Daginawala. 2008. General Microbiology. Volume – II, Himalaya Publishing House, Mumbai.

Semester – I
3 Hours
3 Credits

PMB102 - MAIN PRACTICAL - I

- 1) Orientation to the Microbiology Laboratory
- 2) Cleaning and Sterilization of Glasswares
- 3) Preparation of Hand Sanitizer
- 4) Handling of Microscope
- 5) Preparation of Broth and Agar medium for Bacteria and Fungi
- 6) Simple Staining
- 7) Gram Staining
- 8) Capsule Staining – Negative Staining
- 9) Endospore Staining
- 10) Metachromatic Granule Staining (Demo only)
- 11) Acid Fast Staining (Demo only)
- 12) Motility Test – Hanging Drop Method
- 13) Lactophenol Cotton Blue (LPCB) Staining
- 14) KOH Wet mount

Semester – I
4 Hours
4 Credits

MB203 - MICROBIAL PHYSIOLOGY AND METABOLISM

Objectives

- To analyze the Nutrient requirements and Nutrition types of microorganisms.

- To observe the Transport of Nutrients in Microorganisms.
- To study the Microbial growth and its measurement.
- To learn the Microbial metabolism and respiration.
- To understand the Photosynthesis reaction in microorganisms.

Unit – I

Microbial Nutrition – Chemical nutrient requirements and Growth factors, Nutritional groups of microorganism; Uptake of nutrients by cells: Passive transport - Simple diffusion, Facilitated diffusion and Osmosis; Active transport – ABC Transporters, Group translocation, Exocytosis and Endocytosis (Phagocytosis and Pinocytosis); Ion uptake by microorganisms.

Unit – II

Cell division in Bacteria (Binary fission); Microbial Growth – Generation time and Growth Curve; Influence of environmental factors on growth; Measurement of microbial growth – Direct and Indirect methods; Continuous culture of microorganisms - Chemostat; Diauxic growth and Synchronous growth; Preservation of microbial cultures.

Unit – III

Microbial Metabolism – Difference between Catabolism and Anabolism; Fermentation and its types; Generation of ATP - Substrate level Phosphorylation, Oxidative Phosphorylation and Electron transport chain; Carbohydrate catabolism – Glycolysis, Phosphoketolase pathway and Entner Doudoroff pathway.

Unit – IV

Microbial Respiration - Aerobic and Anaerobic respiration by microorganisms; Aerobic Respiration – Krebs cycle; Biosynthesis of Bacterial cell wall polysaccharides, Purines, Pyrimidines, Amino acids and Fatty acids; Anaerobic Respiration – Acetogenesis and Methanogenesis.

Unit – V

Photosynthesis; Diversity of photosynthetic organisms; Difference between plant, algal and bacterial photosynthesis; Photosynthetic pigments; Light reaction (Photophosphorylation) and Dark reaction (Calvin cycle)

Text Books

- 1) Gerard J. Tortora, Berdell R. Funke and Christine L. Case. 2015. Microbiology – An Introduction, 12th Edition, Peareson Publishers, San Francisco.
- 2) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott’s Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 3) Reba Kanungo. 2017. Ananthanarayan and Paniker’s Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.

References

- 1) Caldwell, D.R., 2008. Microbial Physiology and Metabolism. Wm C Brown Publishers, England.
- 2) Chatterjee, N and Rana Shinde. 2012. Textbook of Medical Biochemistry, 8th edition, Jaypee publication, New Delhi.
- 3) Dubey, R.C. and D. K. Maheswari. 2010. A Text book of Microbiology. 3rd Edition, S. Chand and Company, New Delhi.
- 4) Pelczar Jr. M. J., Chan, E. C. S and Kreig, N. R. 2006. Microbiology. 5th Edition Mc Graw Hill Inc. New York.

Semester – III
3 Hours
3 Credits

MB204 - BIOINSTRUMENTATION

Objectives

- To provide knowledge about Safety measures in Microbiology laboratory and First aid methods.
- To understand the principles and applications of various instruments used in Life science.
- To learn the techniques for operating the Microbiological instruments.
- To explain the principles and applications of types of Chromatography techniques.
- To learn principles, types and applications of Calorimeter and Spectrophotometer.

Unit – I

Safety in Microbiology Laboratory – Electrical equipment, Heating devices, Cryogenic liquids and Radiation exposure; Personal Protection in Laboratory – Safety Spectacles, Gloves and Face masks; Hazards in the Laboratory; Radiation hazard – Sources, effects and safety measures; Biological Hazards and its disposal; Laboratory acquired infections and safety measures; First aid methods for Laboratory accidents.

Unit – II

Bioinstruments: Principle, Instrumentation, Applications and Safety aspects of pH Meter, Bacterial Incubator, Hot air oven, Autoclave, Colony counter and Laminar flow cabinet.

Unit – III

Chromatographic techniques: Principle and Applications of Paper Chromatography, Thin layer chromatography (TLC), Gel Filtration Chromatography, Adsorption Column chromatography, Gas Chromatography, High Performance Liquid Chromatography (HPLC) and HPTLC.

Unit – IV

Centrifugation techniques: Basic principles of Centrifuge; Types of Centrifuges – Small Bench Centrifuges, Large Capacity Refrigerated Centrifuges, High Speed Refrigerated Centrifuges and Ultracentrifuges; Different types of Motors; Types of Centrifugation - Differential centrifugation, Density gradient centrifugation and Centrifugal elutriation; Safety aspects of Centrifuges.

Unit – V

Electrophoretic techniques: Principle, Instrumentation and Applications of Paper Electrophoresis, Gel Electrophoresis, Capillary Electrophoresis and SDS-PAGE; Gel Documentation System; Principle, Instrumentation and Applications of Colorimeter and Spectrophotometer.

Text Books

- 1) Arumugam, S. 2002. Biomedical Instrumentation, Anuratha Agencies Publishers, 2nd edition, India.
- 2) Asokan, P. 2001. Analytical Biochemistry, Chinnaa Publications, India.
- 3) Gurumani, N. 2014. Research Methodology for Biological Sciences, MJP Publisher, India.
- 4) Veerakumari, L. 2019. Bioinstrumentation, MJP Publisher, India.

References

- 1) Chatwal, G. R and S. K. Anand. 2003. Instrumental Methods of Chemical Analysis. 5th Edition, Himalaya Publishing House, Mumbai
- 2) Mandeep Singh. 2014. Introduction to Biomedical Instrumentation, Paperback publishers, India.
- 3) Sharma, B. K. 2007. Instrumental Methods of Chemical Analysis, Krishna Prakashan Media (P) Ltd, India
- 4) Wilson, K. and J. Walker. 2010. Principles and Techniques of Biochemistry and Molecular Biology. 7th Edition, Cambridge University Press, UK.

Semester – I

3 Hours
3 Credits

PMB202 - MAIN PRACTICAL – II

- 1) Serial Dilution Technique – Pour plate method and Spread plate method.
- 2) Pure Culture Technique – Streak plate method.
- 3) Bacterial Growth Curve.
- 4) Effect of pH on Bacterial growth.
- 5) Effect of NaCl on Bacterial growth.
- 6) Biochemical Tests – Carbohydrate fermentation, Indole, Citrate utilization, MR, VP, Urease, Catalase, Oxidase, TSI, Casein hydrolysis, Starch hydrolysis and Gelatin Liquefaction Test.

Semester – II
4 Hours
4 Credits

MB303 - IMMUNOLOGY

Objectives

- To make the students to understand the Immune system.
- To provide insights to the Human Defense Mechanisms and Vaccines.
- To strengthen the knowledge of students through a detailed study on Antigens, Antibodies and Antigen – Antibody interactions
- To gain knowledge on ABO Blood grouping, Blood transfusion and Rh incompatibilities.
- To learn about various Hypersensitivity reactions and Autoimmune disorders.

Unit – I

History of Immunology – Contributions of Louis Pasteur, Edward Jenner, Elie Metchnikoff and Karl Landsteiner; Normal microbial flora of human body; Microbial Infection – Types, Source, Transmission and Factors predisposing to Microbial Pathogenicity; Immunity – Innate and Acquired immunity; Vaccines and Vaccination; Toxoids and Antitoxins.

Unit – II

Lymphoid System – Primary and Secondary lymphoid organs; Hematopoiesis; Cells of the immune system; Lymphoid cells – B - Lymphocytes, T - Lymphocytes and NK cells; Mononuclear Phagocytes – Monocytes and Macrophages; Granulocytic cells – Neutrophils, Eosinophils, Basophils and Mast cells; Antigen presenting cells – Dendritic cells; Platelets; Erythrocytes; Cytokines - Properties and functions of Interleukins and Interferon; Cytokine storm.

Unit – III

Antigens – Types of Antigens, Antigenicity, Determinants of Antigenicity, Epitopes, Haptens and Adjuvants; Immunoglobulins – Structure and types (IgG, IgA, IgM, IgD & IgE); Monoclonal antibodies and its production; Complement system – Properties, Components and Functions.

Unit – IV

Laboratory Techniques in Immunology – Precipitation test (Mancini Radial Immunodiffusion, Ouchterlony Double Immunodiffusion, Immunoelectrophoresis and Rocket electrophoresis), Agglutination test (Hemagglutination, Bacterial Agglutination, Passive Agglutination & Agglutination Inhibition), Complement fixation test, Immunofluorescence test, Flow Cytometry, RIA, ELISA and Western Blot; Immunohematology – Blood groups, Blood transfusion and Rh incompatibilities.

Unit – V

Immunodeficiency diseases; Autoimmune diseases; Hypersensitivity reactions – IgE Mediated Hypersensitivity (Type – I), Antibody Mediated Cytotoxic Hypersensitivity (Type – II), Immune Complex Mediated Hypersensitivity (Type – III) and Delayed Type Hypersensitivity (Type – IV); Major Histocompatibility Complex (MHC) – Structure and functions of Class – I and II MHC molecules; Current Research Thoughts in Immunology

Text Books

- Judith A. Owen, Jenni Punt, Sharon A. Stanford and Patricia P. Jones. 2009. Kuby's Immunology, 4th Edition, W. H. Freeman and Company, New York.
- Jeffrey K. Actor. 2012. Elsevier's Integrated Review – Immunology and Microbiology, 2nd Edition, Sabre Foundation, China.

References

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Chakraborty, P. 2013. A Text book of Microbiology, Published by New Central Book Agency (P) Ltd, Kolkata, India.
- Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- Roitt, I. M. 2011. Roitt's Essential Immunology, 12th Edition, Wiley - Blackwell Scientific publishers, London, United Kingdom.

Semester – II

3 Hours

3 Credits

MB304 - MUSHROOM TECHNOLOGY

Objectives

- To encode the nutritional and medicinal importance of the Mushrooms.
- To differentiate edible and poisonous mushrooms and their effects.
- To gain a good understanding on Substrates and Spawn production for Mushroom cultivation.
- To obtain knowledge on Post-harvest Technology of Mushrooms.
- To understand various Mushroom diseases and its control measures.

Unit - I

Mushroom – Historical development, Origin, Characteristics, Importance, Morphology and Life cycle; Classification of Mushroom; Nutritional value of Mushroom; Medicinal value of Mushroom; Edible mushrooms and Non - edible mushroom; Medicinal and Environmental uses of Mushrooms.

Unit - II

Mushroom farms – Farm layout and Farm hygiene; Substrates used for Mushroom cultivation; Spawn production for Mushroom cultivation – Starter culture, Sterilization process, Clean Environmental Condition, Culture, Preparation of Media & Slants, Spawn containers, Mother Spawn, Preparation of Final Spawn, Precautions and Storage of Spawn.

Unit - III

Growth factors for Mushroom cultivation; Cultivation of Button mushroom (*Agaricus bisporus*), Oyster mushroom (*Pleurotus sajor – caju*), Milky mushroom (*Calocybe indica*), Reizhi mushroom (*Ganoderma lucidum*) and Paddy straw mushroom (*Volvariella volvacea*); Insect pests and its management during Mushroom cultivation.

Unit - IV

Diseases of Mushrooms – Bacterial disease (Bacterial blotch, Mummy disease & Drippy gill), Viral disease (Die back disease); Fungal diseases (Dry bubble disease, Wet bubble disease, Cobweb disease, *Trichoderma* Blotch and

Mildew caused by *Cladobotrym* sp. and *Aphanocladium* disease); Fungal competitors during Mushroom cultivation - Green mould, Olive Green mould, Brown plaster mould, White plaster mould, Inkcaps, Yellow mould, Sepedonium Yellow mould, Lipstick mould, Oedocephalum mold, False truffle and Cinnamon mould.

Unit - V

Post-harvest Technology of Mushroom – Harvesting, Grading, Packaging & Storage, Transportation, Preservation and Marketing (Fresh market and Drying); Environmental impact of Mushroom cultivation; Mushroom food recipes; Challenges in Mushroom cultivation; Mushroom Research Centers in India; Current Research Thoughts in Mushroom Technology.

Text Books

- Kannaiyan. 2001. Handbook of Edible Mushrooms, TNAU Publication, Coimbatore, India.
Alice, D., K. Muthusamy and M. Yesuraja. 1999. Mushroom Culture, Agricultural College, Research Institute Publications, Madurai, Tamil Nadu, India.

References

- Marimuthu, T. 1991. Oster Mushroom, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
Nita Bhal. 2000. Handbook on Mushrooms, 2nd Edition, Volume - I and II, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.
Tripathi, D. P. 2005. Mushroom Cultivation, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, India.

Semester – III
3 Hours
3 Credits

PMB302 - MAIN PRACTICAL – III

Blood Grouping and Rh Typing.

Blood collection and Plasma/Serum separation.

Staining and Microscopic examination of Blood cells.

Agglutination reaction – WIDAL Test, RPR Card Test, TPHA Test, ASO Test, RA Test, CRP Test and Pregnancy Test.

Precipitation reaction – Mancini Radial Immunodiffusion, Ouchterlony Double Immunodiffusion, Immunoelectrophoresis and Rocket electrophoresis.

ELISA Test (Demonstration) only.

MB404 - BIOINOCULANT TECHNOLOGY

Objectives

- To study about the Production, Formulation, Method of application and Quality control of Bioinoculants.
- To understand the role of Nitrogen fixers and Phosphate solubilizers in Agriculture.
- AM fungi and Algal biofertilizers.
- To learn the ability of Biocontrol agents to control the Plant pathogens.
- To gain the knowledge of Entomopathogens for the control of Insect pests.

Unit – I

Bioinoculants – Definition, Types and Importance; Advantages of Biofertilizers over Chemical fertilizers; Formulations of Bioinoculants; Methods and application of Bioinoculants in different crops; Quality control of different Bioinoculants; Plant – Microbe Interaction.

Unit – II

Biological Nitrogen Fixation (BNF) and its role in agriculture – Direct mechanism and Indirect mechanism; Nitrogen fixation by bacteria; Isolation, Characterization (Microscopic, Cultural and Biochemical), Mass multiplication and Field application of Nitrogen fixing bacteria (*Rhizobium* sp., *Frankia* sp., *Azotobacter* sp., *Azospirillum* sp. and *Gluconacetobacter* sp.).

Unit – III

Phosphate solubilization – Phosphate solubilizing microorganisms, Mechanism of Phosphate solubilization and Screening of Phosphate solubilizing efficiency; Algal Biofertilizers – Isolation and Mass multiplication of Blue Green Algae, Mass multiplication of *Azolla*, *Azolla* – *Anabaena* symbiosis, Heterocyst and its importance in N_2 fixation.

Unit – IV

Mycorrhizal Bioinoculants – Significance, Types and Benefits; Arbuscular Mycorrhiza (AM) fungi – Taxonomy of AM fungi, Isolation of AM fungi, Assessment of AM colonization in roots, Culturing of AM fungi, Mass inoculum production, Field applications; Role of AM fungi in agriculture.

Unit – V

Host-parasite relationship in plants; Plant disease control agents (*Bacillus subtilis*, *Pseudomonas fluorescens* & *Trichoderma* sp.); Biopesticides – Entomopathogenic bacteria (*Bacillus thuringiensis*); Entomopathogenic fungi (*Beauveria bassiana*, *Isaria fumosorosea*, *Lecanicillium* sp. & *Metarhizium anisopliae*); Entomopathogenic virus (*Cydia pomonella* granulosis virus - CpGv); Current Research Thoughts in Bioinoculant Technology.

Text Books

- Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
- Subba Rao N.S. 1999. Soil Microbiology, 4th Edition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.
- Saranraj, P and P. Sivasakthivelan. 2020. Textbook of Microbial Inoculants Technology. JPS Scientific Publications, India.

References

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Atlas, R.M and R. Bartha. 1998. Microbial Ecology. Fundamentals and Applications, 4th Edition, Red Wood City. C.A. Benjamin.
- Bagyaraj, D. J and G. Rangasamy. 2002. Agricultural Microbiology, 2nd Edition, Prentice Hall, India.

Mahendra K. Rai. 2005. Hand book of Microbial Biofertilizers, The Haworth Press, Inc. New York.

Semester – I

3 Hours

3 Credits

MB405 - MICROBIAL GENETICS

Objectives

- To make the students to understand the Genetics of microorganisms.
- To focus on the basic principles of Cloning vectors.
- To gain knowledge on Gene transfer mechanism.
- To explain the Mutation and its types.
- To study the recent advances in microbial genetic principles for strong foundation in Microbiology.

Unit – I

Genetics – History and Scope; Genotype and Phenotype; DNA – Structure and forms; DNA & RNA as a genetic material; Organization of Gene; Chromosomes – Structure, Types and Functions; Chromosome theory of inheritance; Chromosomal aberrations.

Unit – II

Transposons - IS elements, Composite transposons, Simple transposition, Replicative transposition, Conjugative transposons; Mechanism of Transposition; Bacteriophages – Structure, Lytic and Lysogenic cycle; Application of Bacteriophages in Genetics.

Unit – III

Plasmids – Structure, Characteristics, Types, Replication, Plasmid copy number, Partitioning and Segregative stability of Plasmids, Incompatibility of Plasmids, Isolation of Plasmids, Purification of Plasmid DNA and Desirable properties of Plasmid vector; Application of Plasmids in Genetics.

Unit – IV

Genetic recombination in Bacteria – Conjugation, Transformation and Transduction; Conjugation in Archaea; Mapping the Genome – *Escherichia coli* and Bacteriophages.

Unit – V

Genetic code; Mutation - Mutagens and Mutagenesis; Spontaneous Mutation; Induced Mutation and Point Mutation – Silent Mutation, Missense Mutation, Non-sense Mutation and Frameshift Mutation; Mutant detection, Mutant selection and Carcinogenicity testing; Current Research Thoughts in Microbial Genetics.

Text Books

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Freifelder, D. 2008. Molecular Biology, 2nd Edition, Narose Book Distributors Pvt. Ltd., New Delhi, India.
- Maloy, S. R., J. E. Cronan and D. Freifelder. 2001. Microbial Genetics, 2nd Edition, Narose Book Distributors Pvt. Ltd., New Delhi, India.

References

- Gardner, E. J., M. J. Simmons and D. P. Snustad. 2005. Principles of Genetics, 8th Edition, John Wiley and Sons, New York.
- Klug, W. S and M. R. Cummings. 2001. Essentials of Genetics, 4th Edition, Prentice Hall, New Jersey.
- Chatterjee, N and Rana Shinde. 2012. Textbook of Medical Biochemistry, 8th Edition, Jaypee publication, New Delhi, India.
- Weaver, R. F. 2008. Molecular Biology, 5th Edition, McGraw Hill, New York.

Semester – I
3 Hours
3 Credits

PMB402 - MAIN PRACTICAL – IV

Isolation and purification of Nitrogen fixing bacteria – *Rhizobium* sp., *Azotobacter* sp. and *Azospirillum* sp.
Mass production of Biocontrol agents – *Bacillus subtilis* and *Pseudomonas fluorescens*, *Trichoderma viride*
and *Beauveria bassiana*.
Mass cultivation of *Azolla*.
Assessment of AM colonization in roots.
Different formulations of Bioinoculants.
Method of application and Quality control.

M.Sc APPLIED MICROBIOLOGY

Semester – I

4 Hours/4Credits

MB 701: GENERAL MICROBIOLOGY AND MICROBIAL DIVERSITY

Objectives

- To impart basic knowledge about the History and classification of Microbiology.
- To make students to understand the fundamentals and diversity of Microbiology.
- To learn the Taxonomy, Ultrastructure, Classification of microorganisms.
- To provide insights on cultivation techniques and antibiotics.
- To recognize the fundamentals on Economic importance of microorganisms.

Unit – I

Members of Microbial world; Conflict over Spontaneous generation; The Discovery of Microorganism; Contributions of Anton van Leeuwenhoek, Louis Pasteur, Edward Buchner, Robert Koch, Ignaz Semmelweis, Joseph Lister, Paul Ehrlich, Martinus Beijerinck, Sergi Winogradsky, Alexander Fleming and Selman Waksman; Golden age of Microbiology; Branches of Microbiology; Phylogenetic Hierarchy; Nomenclature of Microorganisms; Taxonomy and Taxonomic Hierarchy; Numerical Taxonomy; Kingdom concept of Organisms classification – Lennaeus Two Kingdom concept, Haeckel Three Kingdom concept, Copeland's Four Kingdom concept, Whittaker's Five Kingdom concept, Grey & Doolittle's Six Kingdom concept and Cavalier-Smith's Eight Kingdom concept; Cell and Cell theory; Wose – Fox's Three Domains of Life; Genetic and Intraspecific Classification.

Unit – II

Bacteria – Ultrastructure; Morphological Classification (Gram positive & Gram negative), Shape and Arrangement; Cell wall; Difference between Bacterial and Archaeal Cell wall; *Mycoplasma* and L - forms; Cell membrane; Bacterial Nucleoids; Cell inclusions; Ribosomes; Capsules and Slime layer; Gas vesicles; Bacterial Cytoskeleton; Endospore and Sporulation cycle; Surface appendages – Flagella, Fimbriae and Pili; Chemotaxis and Phototaxis; Bergey's manual of Systemic Bacteriology; Economical importance of Bacteria.

Unit – III

Stains and its types; Staining techniques – Simple staining, Differential staining (Gram staining & Acid fast staining), Special staining (Capsule staining, Metachromatic granule staining, Endospore staining & Flagella staining); Motility test; Culture medium and its classification; Biochemical Tests for bacterial identification; Sterilization - Physical method and Chemical method; Quality control and Sterility checking; Required Concentrations and Times for Chemical Destruction of Microorganisms; Evaluation of Disinfectants – Phenol coefficient test, Filter paper method, Use - Dilution test, In-Use Test and Kelsey-Sykes Capacity Test; Antibiotics – Classification, Antimicrobial resistance and Antibiotic sensitivity test.

Unit – IV

Organelles of Eukaryotic cells – Plasma membrane, Nucleus, Endoplasmic reticulum, Golgi complex, Ribosome, Lysosomes, Gas vacuoles, Mitochondria, Hydrogenosomes, Peroxisomes, Centrosome, Cytoskeleton, Chloroplast; Organs for Locomotion – Flagella, Cilia and Pseudopodia; Fungi – Ultrastructure; Classification; Characteristics of Molds & Yeast; Budding in Yeast; Nutrition and Reproduction; Fungal cell wall and its composition; Identification and Cultivation of Fungi; Water molds; Economical importance of Fungi.

Unit – V

Algae – Ultrastructure and Nutrition; Classification of Algae; Algal Chloroplast; Diatoms and Dinoflagellate; Identification and Cultivation of Algae; Economical importance of Algae; Lichens; Protozoa - Ultrastructure,

Classification, Nutrition and Locomotion; Identification and Protozoa; Slime Molds – Cellular Slime Molds & Plasmodial Slime Molds; Economic importance of Protozoa; Virus – Structure and Classification; Animal Viruses and Plant Viruses; Viruses of Archaea; Viroids and Prions; Current Research Thoughts in Microbiology.

Text Books

- Gerard J. Tortora, Berdell R. Funke and Christine L. Case. 2015. Microbiology – An Introduction, 12th Edition, Peareson Publishers, San Francisco.
- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott’s Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Reba Kanungo. 2017. Ananthanarayan and Paniker’s Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- Madigan, M. T., Martinko, J. M., Dunlap, P. V and Clark, D. P. 2017. Brock Biology of Microorganisms, 14th edition, Prentice Hall, USA.
- Robert W. Bauman. 2015. Microbiology with Body Diseases by Body System, 4th Edition, Pearson Education, UK.
- Saranraj, P. 2020. Basic Techniques in Microbiology. 1st Edition, JPS Scientific Publications, India.

References

- Jeffrey C. Pommerville. 2006. Alcamo’s Fundamentals of Microbiology. 4th Edition, Jones and Bartlett Publishers, Canada.
- Dubey, R.C. and D. K. Maheswari. 2010. A Text book of Microbiology. 3rd Edition, S. Chand and Company, New Delhi.
- Kathleen Park Talaro and Bary Chess. 2015. Foundations in Microbiology. 9th Edition, McGraw Hill Publication, New York.
- Pelczar Jr. M. J., Chan, E. C. S and Kreig, N. R. 2006. Microbiology. 5th Edition, Mc Graw Hill Inc. New York.
- Marjorie Kelly Cowan. 2012. Microbiology – A System Approach. 3rd Edition, MacGraw Hill Publication, United States.
- Jacquelyn G. Black. 2012. Microbiology – Principles and Explorations. 8th Edition, John Wiley and Sons, United States.

Semester – I

4 Hours/4Credits

MB702 - MICROBIAL PHYSIOLOGY AND METABOLISM

Objectives

- To illustrate Bacterial nutrition and their utilization.
- To discuss cultivation methods and factors related to microbial growth.
- To study the Microbial growth, nutrition and its uptake.
- To demonstrate the concepts of Microbial metabolism and Respiration.
- To understand the Photosynthesis reaction in microorganisms.

Unit – I

Microbial Nutrition – Chemical nutrient requirements and Growth factors, Nutritional groups of microorganism; Adaptation of microorganisms towards Limited nutrients; Uptake of nutrients by cells: Passive transport - Simple diffusion, Facilitated diffusion and Osmosis; Active transport – ABC Transporters, Group translocation, Endocytosis (Phagocytosis & Pinocytosis) and Exocytosis; Difference between Passive transport and Active transport; Iron uptake by microorganisms.

Unit – II

Cell division in Prokaryotes and Eukaryotes; Microbial Growth – Generation time and Growth Curve; Influence of environmental factors on growth; Microbial life in Cold environment and High temperature; Measurement of

microbial growth – Direct methods (Plate counts, Filtration, Most Probable Number [MPN] Method & Direct Microscopic Count) and Indirect methods (Turbidity, Metabolic activity and Dry weight); Continuous culture of microorganisms – Chemostat & Turbidostat; Diauxic growth and Synchronous growth; Preservation of Bacterial cultures.

Unit – III

Microbial Metabolism; Fermentation and its types; Generation of ATP - Substrate level Phosphorylation, Oxidative Phosphorylation and Electron transport chain; Carbohydrate catabolism – Glycolysis, Pentose phosphate pathway, Phosphoketolase pathway; Entner - Doudoroff pathway; Mixed acid fermentation pathway; Propionic acid fermentation pathway; Degradation of Amino acids, Proteins, Lipids, Purines and Pyrimidines.

Unit – IV

Microbial Respiration - Aerobic and Anaerobic respiration by microorganisms; Aerobic Respiration – Krebs cycle; Biosynthesis of Polysaccharides, Peptidoglycan, Amino acids, Purines and Pyrimidines; Lipogenesis; Biosynthesis of Fatty acid, Triglycerides, Phospholipids, Sterols and Cholesterol; Anaerobic Respiration – Acetogenesis and Methanogenesis; Biosurfactant production by microorganisms.

Unit – V

Photosynthesis; Diversity of photosynthetic organisms; Phototrophic bacteria – Cyanobacteria, Purple Sulfur Bacteria, Purple Non-sulfur Bacteria, Aerobic Anoxygenic Phototrophs, Green Sulfur Bacteria, Green Non-sulfur Bacteria and Heliobacteria; Difference between plant, algal and bacterial photosynthesis; Photosynthetic pigment; Light reaction (Photophosphorylation) and Dark reaction (Calvin cycle); Biosynthesis of Chlorophyll; Quorum sensing – Mechanism of Quorum sensing, Virulence factors and Biofilm formation; Current Research Thoughts in Microbial metabolism.

Text Books

- Gerard J. Tortora, Berdell R. Funke and Christine L. Case. 2015. Microbiology – An Introduction, 12th Edition, Peareson Publishers, San Francisco.
- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Stanier, R. Y., Ingraham, J. L., Wheelis, M. L and Painter, P. R. 2010. General Microbiology. 5th Ednition, Macmilan Education Ltd. London.
- Madigan, M. T., Martinko, J. M., Dunlap, P. V and Clark, D. P. 2017. Brock Biology of Microorganisms, 14th edition, Prentice Hall, USA.
- Kathleen Park Talaro and Bary Chess. 2015. Foundations in Microbiology. 9th Edition, McGraw Hill Publication, New York.
- Jacquelyn G. Black. 2012. Microbiology – Principles and Explorations. 8th Edition, John Wiley and Son, United States.

References

- Caldwell, D.R., 2008. Microbial Physiology and Metabolism. Wm C Brown Publishers, England.
- Chatterjee, N and Rana Shinde. 2012. Textbook of Medical Biochemistry, 8th edition, Jaypee publication, New Delhi.
- Marjorie Kelly Cowan. 2012. Microbiology – A System Approach. 3rd Edition, MacGraw Hill Publication, United States.
- Albert G. Moat, John W. Foster and Michael P. Spector. 2003. Microbial Physiology. 4th Edition, John Wiley and Sons, New York.
- Jeffrey C. Pommerville. 2006. Alcamo's Fundamentals of Microbiology. 4th Edition, Jones and Bartele Publishers, Canada.

Semester – I

4 Hours/3 Credits

MB703 - IMMUNOLOGY

Objectives

To provide overview of immune system, antigen antibody structure and interactions.

To inculcate the principles of vaccine development.

To provide insights to the Human Defense Mechanisms against Infections.

To strengthen the knowledge of students through a detailed study on Antigens, Antibodies and Immunoassays

To integrate immunology with health and enrich the knowledge for autoimmune disorders, hypersensitivity reaction.

Unit – I

History of Immunology – Contributions of Louis Pasteur, Edward Jenner, Elie Metchnikoff, Paul Ehrlich and Karl Landsteiner; Immunity – Innate and Acquired immunity; Humoral immunity and Cell mediated immunity; Vaccines - Attenuated Live vaccine, Inactivated or Killed vaccine, Sub-unit vaccine, DNA vaccine, Synthetic peptide vaccine and Anti-idiotypic vaccine; Toxoids - Antitoxins.

Unit – II

Lymphoid System – Primary and Secondary lymphoid organs; Hematopoiesis; Maturation of B – cells and T – cells; T - cell and B - cell receptors; Cells of the immune system: Lymphoid cells – B - Lymphocytes, T - Lymphocytes and NK cells; Mononuclear Phagocytes – Monocytes and Macrophages; Granulocytic cells – Neutrophils, Eosinophils, Basophils and Mast cells; Antigen presenting cells - Dendritic cells; Platelets; Erythrocytes; Cluster of Differentiation (CD); Cytokines - Properties and functions of Interleukins and Interferon; Cytokine storm.

Unit – III

Antigens – Types of Antigens, Antigenicity, Determinants of Antigenicity, Epitopes, Haptens and Adjuvants; Immunoglobulins – Structure and types (IgG, IgA, IgM, IgD & IgE); Theories of Antibody production; Isotype, Allotypes and Idiotypes; Monoclonal antibodies and Polyclonal antibodies – Production and its application; Complement system – Properties, Components and Functions.

Unit – IV

Laboratory Techniques in Immunology – Precipitation test (Mancini Radial Immunodiffusion, Ouchterlony Double Immunodiffusion, Immunoelectrophoresis and Rocket electrophoresis), Agglutination test (Hemagglutination, Bacterial Agglutination, Passive Agglutination & Agglutination Inhibition), Complement fixation test, Immunofluorescence test, Flow Cytometry, Immunohistochemistry, Immunoprecipitation, Avidin – Biotin Mediated Assay, Nephelometry, Hemocytometer, ELISPOT assay, RIA, ELISA and Western Blot; Immunohematology - Blood groups, Blood transfusion and Rh incompatibilities.

Unit – V

Immunodeficiency diseases; Autoimmune diseases; Hypersensitivity reactions – IgE Mediated Hypersensitivity (Type – I), Antibody Mediated Cytotoxic Hypersensitivity (Type – II), Immune Complex Mediated Hypersensitivity (Type – III) and Delayed Type Hypersensitivity (Type – IV); Transplantation immunology – Graft versus Host reaction; Immunosuppression; Oncoimmunology and Cancer Immunotherapy; Major Histocompatibility Complex (MHC); Mechanism of Resistance to Microbial infections; Current Research Thoughts in Immunology.

Text Books

Judith A. Owen, Jenni Punt, Sharon A. Stanford and Patricia P. Jones. 2009. Kuby's Immunology, 4th Edition, W. H. Freeman and Company, New York.

Jeffrey K. Actor. 2012. Elsevier's Integrated Review – Immunology and Microbiology, 2nd Edition, Sabir Foundation, China.

- Roitt, I. M. 2011. Roitt's Essential Immunology, 12th Edition, Wiley - Blackwell Scientific publishers, London, United Kingdom.
- Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- Robert W. Bauman. 2015. Microbiology with Body Diseases by Body System, 4th Edition, Pearson Education, UK.

References

- Robert W. Bauman. 2015. Microbiology with Body Diseases by Body System, 4th Edition, Pearson Education, UK.
- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Chakraborty, P. 2013. A Text book of Microbiology, Published by New Central Book Agency (P) Ltd, Kolkata, India.
- Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- Abul K. Abbas, Andrew H. H. Lichtman and Shiv Pillai. 2015. Basic Immunology, Functions and Disorders of the Immune System. 5th Edition. Elsevier.

Semester – I

4 Hours/4 Credits

MB704 - MOLECULAR MICROBIOLOGY

Objectives

- To make the students to understand the Molecular Biology and Genetic Engineering.
- To focus on Genome organization, Transcription and Translation process in Prokaryotes.
- To introduce the basic principles of DNA Replication, Transcription, Translation, Mutation and DNA Repair mechanisms.
- To explain the application of various Gene cloning vectors.
- To be highly experienced in Prokaryotic and Eukaryotic Genetic Transformation.

Unit – I

Genetics – History and Scope; DNA & RNA as a genetic material; DNA – History, Structure and form; Organization of Gene in Prokaryotes and Eukaryotes; Chromosomes – Structure, Types and Function; Chromosome theory of inheritance; Chromosomal aberrations. DNA Replication – Types and evidence for Semi-conservative replication; Enzymes involved in DNA Replication; DNA Replication in Prokaryotes and Eukaryotes; Inhibitors of DNA replication.

Unit – II

DNA - Structure and Types; Transcription and Inhibitors of Transcription; Genetic code; Translation and Inhibitors of Translation; Regulation of Gene expression – Lactose Operon concept and Tryptophan Operon concept; DNA Damage by Physical and Chemical agents; Mutation - Mutagens and Mutagenesis; Spontaneous Mutation; Induced Mutation and Point Mutation – Silent Mutation, Missense Mutation, Non-sense Mutation and Frameshift Mutation; Mutant detection, Mutant selection and Carcinogenicity testing; DNA Repair Mechanism – Excision repair, Direct repair, Recombination repair, Mismatch repair and SOS Response.

Unit – III

Restriction enzymes for cutting DNA; Enzyme for Joining DNA; Cloning Vectors – Plasmids (pBR 322), Phages (M13 & λ) and Cosmids; Plasmids – Structure, Characteristics, Types, Replication, Plasmid copy number, Partitioning and Segregative stability of Plasmids, Incompatibility of Plasmids, Isolation of Plasmids, Purification of Plasmid DNA and Desirable properties of Plasmid vector.

Unit – IV

Transposons - IS elements, Composite transposons, Simple transposition, Replicative transposition and Conjugative transposons; Mechanism of Transposition; Bacteriocinogens; Bacteriophages - General characteristics, Structure, Replication of Double stranded DNA Bacteriophages - Lytic cycle and Lysogenic cycle; Replication of Single stranded DNA Bacteriophage (M13 phage); Typing of Bacteriophage; Genetic recombination in Bacteria – Conjugation, Transformation and Transduction; Conjugation in Archaea.

Unit – V

Molecular Identification of Microorganisms – Fatty acid profiles, Flow Cytometry, DNA Base composition (G + C Content), DNA Fingerprinting, Nucleic acid Hybridization (Southern Blotting, Northern Blotting, DNA Chip, Ribotyping & rRNA Sequencing and FISH); Protein hybridization technique – Western Blotting technique; Gel Electrophoresis (Agarose Gel Electrophoresis & SDS-PAGE); Introduction to Genomics and Metagenomics; Genome Sequencing – First Generation, Second Generation, Third Generation and Fourth Generation; Metagenomics; CRISPR; Polymerase Chain Reaction (PCR), Types of PCR and Applications of PCR; Current Research Thoughts in Molecular Microbiology.

Text Books

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Freifelder, D. 2008. Molecular Biology, 2nd Edition, Narose Book Distributors Pvt. Ltd., New Delhi, India.
- Old, R. S and S. B. Primrose. 2006. Principles of Gene Manipulation, 7th Edition, Blackwell Scientific Publications, London.
- Nelson, D. L and Cox, M. M. 2008. Leininger Principles of Biochemistry, 5th Edition, W.H. Freeman and Company.
- Brown T. A. 1995. Gene Cloning. 4th Edition, Chapman and Hall.

References

- Gardner, E. J., M. J. Simmons and D. P. Snustad. 2005. Principles of Genetics, 8th Edition, John Wiley and Sons, New York.
- Klug, W. S and M. R. Cummings. 2001. Essentials of Genetics, 4th Edition, Prentice Hall, New Jersey.
- Chatterjee, N and Rana Shinde. 2012. Textbook of Medical Biochemistry, 8th Edition, Jaypee publication, New Delhi, India.
- Weaver, R. F. 2008. Molecular Biology, 5th Edition, McGraw Hill, New York.

Semester – I4 Hours/3 Credits

MB705A - ELECTIVE: MICROBIAL INSTRUMENTATION

Objectives

- To understand the principles and applications of various instruments used in Life science.
- To learn the techniques for operating the instruments.
- To study the concepts of Biological and Radiation hazard materials.
- To explain the principles and applications of types of centrifuge and chromatography techniques.
- To learn principles, types and applications of Spectroscopy.

Unit – I

History of Microscopy; Principles of Microscopy; Principle, Instrumentation and Applications - Bright Field Microscopy, Dark Field Microscopy, Phase Contrast Microscopy, Fluorescence Microscopy, Differential Interference Contrast (DIC) Microscopy, Confocal Scanning Laser Microscopy, Two – Photon Microscopy (TPM), Scanning Acoustic Microscopy (SAM), Electron Microscopy – Scanning Electron Microscopy (SEM) &

Transmission Electron Microscopy (TEM), Scanned – Probe Microscopy – Scanning Tunneling Microscopy and Atomic Force Microscopy.

Unit – II

Bioinstruments - Principle, Instrumentation and Applications of pH Meter, Bacterial Incubator, Hot air oven, Autoclave, Colony counter, Lyophilizer and Laminar flow cabinet. Electrophoretic techniques - Principle, Instrumentation and Applications of Paper electrophoresis, Gel electrophoresis, Immunoelectrophoresis, Capillary electrophoresis and SDS-PAGE; Gel Documentation System.

Unit – III

Chromatographic techniques - Principle and Applications of Paper Chromatography (Ascending Paper Chromatography & Descending Paper Chromatography), Thin Layer Chromatography (TLC), Gel Filtration Chromatography, Adsorption Column Chromatography, Ion Exchange Chromatography, Affinity Chromatography, Countercurrent Chromatography (CCC), Gas Chromatography, High Performance Liquid Chromatography (HPLC) and HPTLC.

Unit – IV

Centrifugation techniques - Basic principles of Centrifuge; Types of Centrifuges – Small Bench Centrifuges, Large Capacity Refrigerated Centrifuges, High Speed Refrigerated Centrifuges and Ultracentrifuges; Different types of Motors; Types of Centrifugation - Differential centrifugation, Density gradient centrifugation and Centrifugal sedimentation; Safety aspects of Centrifuges.

Unit – V

Spectroscopy - Principle, Instrumentation and Applications of Colorimeter, Spectrophotometer, UV-Visible Spectrophotometer, Flame Photometry, Atomic Absorption Spectroscopy, IR Spectrophotometry, Fourier Transform Infrared Spectroscopy (FT-IR), Nuclear Magnetic Resonance (NMR) and X – ray Crystallography; Biosensors – Basic characteristic, Components, Requirements, Types and Applications; Current Research Thoughts in Microbial Instrumentation.

Text Books

- Arumugam, S. 2002. Biomedical Instrumentation, Anuratha Agencies Publishers, 2nd edition, India.
- Asokan, P. 2001. Analytical Biochemistry, Chinnaa Publications, India.
- Gurumani, N. 2014. Research Methodology for Biological Sciences, MJP Publisher, India.
- Veerakumari, L. 2019. Bioinstrumentation, MJP Publisher, India.

References

- Chatwal, G. R and S. K. Anand. 2003. Instrumental Methods of Chemical Analysis. 5th Edition, Himalaya Publishing House, Mumbai
- Mandeep Singh. 2014. Introduction to Biomedical Instrumentation, Paperback publishers, India.
- Sharma, B. K. 2007. Instrumental Methods of Chemical Analysis, Krishna Prakashan Media (P) Ltd, India.
- Wilson, K., Walker, J., Clokie, S and Hofmann, A. 2018. Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology 8th Edition, Cambridge University Press.

Semester – I4 Hours/3 Credits

MB705B - ELECTIVE: BIOSTATISTICS

Objectives

- To demonstrate the importance of data collection and presentation of data
- To perform methods used for measuring central tendency, deviation and error
- To discuss Probability theory and applications
- To explain Correlation, regression and hypothesis testing methods
- To identify appropriate method for analysis of variance and learn few statistical packages

Unit – I

Introduction to Biostatistics, Biostatistics in Research; Data Collection and Analysis; Types of Data; Sampling Designs and Types; Representation of Data - Tabulation, Frequency distribution, Diagrams and Graphs.

Unit – II

Measures of Central tendency – Mean – Geometric and Harmonic, Median and Mode and Percentiles; Measures of Dispersion - Range, Quartile deviation, Mean deviation, Standard deviation and Coefficient of variation; Standard error, Skewness and Kurtosis.

Unit – III

Probability: Random experiment, Events, Sample space, Mutually exclusive events, Independent and dependent events, Statement of addition and Multiplication theorems of probability, Random variables (Discrete and continuous), Probability Distributions - Binomial, Poisson and Normal distributions.

Unit – IV

Correlation - Types, Methods, Coefficient of correlation; Regression – Equations and Regression lines; Testing of Hypothesis - Null Hypothesis, Alternate hypothesis, Type I and Type II errors; Tests of Significance - Chi-square test, Student t test and Z score.

Unit – V

Analysis of Variance, ANOVA - One-way classification and Two-way classification; Completely Randomized Design (CRD), Randomized Block Design (RBD), Least Significant Difference (LSD) and Duncan's multiple range test (DMR); Statistical package - Features of Statistical software; SPSS for various applications in Biostatistical programme; R Programming Language.

Text Books

- Rastogi, V. B. 2011. Fundamental of Biostatistics. 2nd Edition, Ane books Pvt. Ltd.
- Gupta, S. P. 2017. Statistical methods. 45th Edition, Sultan Chand & Sons Publisher, New Delhi.
- Snedecar, G. W and Cochran, W. G. 1967. Statistical Methods. Oxford Press.
- Zar, J. H. 2008. Biostatistical analysis. 4th Edition, Pearson education Inc. New Jersey.

References

- Chatwal, G. R and S. K. Anand. 2003. Instrumental Methods of Chemical Analysis. 5th Edition, Himalaya Publishing House, Mumbai
- Rosner, B. 2016. Fundamentals of Biostatistics, 8th Edition, Cengage Learning, USA.
- Pagano, M and Gauvreau, K. 2018. Principles of Biostatistics, 2nd Edition, CRC press.
- Daniel, W. W. 1999. Biostatistics: A foundation for analysis in health sciences. 7th Edition, John Wiley & Sons, New York.

Semester – I4 Hours/3 Credits

MB705C - ELECTIVE: PHYCOLOGY AND MYCOLOGY

Objectives

- To illustrate the basics of Phycology and Mycology.
- To understand the relevance of algal- fungal interactions in maintaining aquatic periodicity.
- To implement the biomimetic products by studying the real internal symbiotic mechanisms in lichen.
- To acquire knowledge regarding harmful environmental changes occurred due to anthropogenic activity via lichen indicator.
- To study the various applications of Algae and Fungi.

Unit – I

History of Indian Phycology; Ultrastructure of Algae; Classification of Algae; Habitat and Distribution of Algae – Freshwater and Marine; Reproduction of Algae – Sexual and Asexual reproduction; Life cycle of Algae; Culture medium for Algae cultivation; Bioluminescence; General characteristics of Cyanophyta, Dinophyta, Cryptophyta, Rhodophyta, Chrysophyta, Bacillariophyta, Xanthophyta, Phaeophyta, Chlorophyta, Charophyta and Euglenophyta.

Unit – II

Algal protein and Algal peptides; SCP – Cultivation and Health benefits; Pigments from Algae – Carotenoid, Phycocyanin and Phycoerythrin; Growth promoting substance from microalgae; Algal Toxins. Phycoremediation – Heavy metals remediation, Dye degradation and Hydrocarbon degradation; Products from Algae – Biofuel, Biodiesel, Biobutanol and Biohydrogen; Nanoparticles from Algae; Algae in Transgenics; Antimicrobials from microalgae; CO₂ sequestration; Algae in Space.

Unit – III

Fungi - General characteristics, Vegetative structure, Ultrastructure, Origin, Occurrence and Distribution, Nutrition, Ecological groups, Respiration and Reproduction; Economic importance of Fungi.

Unit – IV

Fungal taxonomy - Nomenclature and Classification of Fungi; Classification of Mycoses; Characteristics of Molds and Yeasts; Characteristic features of Chytridiomycetes, Zygomycota, Ascomycota, Basidiomycota, Urediniomycetes, Ustilaginomycetes, Glomeromycota and Microsporidia.

Unit – V

Fungi as food and natural recycler; Fungi in Antibiotics production; Fermented products from fungi - Organic acids and Enzymes; Pigment production from Fungi; Fungal diseases in plants, animals and humans; Fungi as Biocontrol agent and Bioinsecticide; Mycotoxins and its types; Current Research Thoughts in Phycology and Mycology.

Text Books

- Hoek, C., Mann, D. G and Jahns, H. M. 1995. Algae - An introduction to Phycology, 39; Cambridge University Press.
- Stephen, J. O. 1993. Bacteria, Algae, and Protozoa - Cold Spring Harbor Laboratory Press.
- Sarabhai, B. P and Arora, C. K. 2005. Textbook of Algae. Anmol Publishing Pvt. Ltd. New Delhi.
- Sharma, O. P. 2001. Textbook of Algae. Tata McGraw Hill Company, New Delhi.
- Sharma, O. P. 2001. Text book of Fungi. Tata McGraw Hill Company, New Delhi.

References

- Khan, M. 1970. Algae today, Gajendra Singh Gahlot at Siva Printers, Dehra Dun, India.
- Amrik, S. A. 2003. Phycology: Principles, processes and applications. Daya Publishing House, Delhi.
- Rajarao, V. N. 1990. Perspectives in Phycology, Today and Tomorrow Printers and publishers, New Delhi.
- Steve, P. 2009. Protozoans, Algae & Other Protists - Capstone Press.

Semester – II 6 Hours/4 Credits

MB801 - MEDICAL BACTERIOLOGY

Objectives

- To impart in-depth understanding of normal flora and its importance, learn bacterial classification and virulence factors contributing to pathogenicity.
- To provide insights into processing of samples and laboratory diagnosis of pathogenic bacteria.
- To illustrate methods involved in collection and transport of samples and its biosafety guidelines for bacterial identification.

To teach various cultivation methods, pathogenesis and clinical features of bacteria affecting humans.
To provide the ability to characterize, isolate and identify different Medically important bacteria.

Unit - I

Normal microbial flora of human body; Microbial Infection – Types, Source, Transmission and Factors predisposing to Microbial Pathogenicity; Epidemiology of Microbial infections; Clinical Specimens - Collection, Transport and Storage; Laboratory diagnosis of Bacteria – Staining techniques, Culture medium, Biochemical tests and Serological tests; Antibiotics – Microorganisms involved in Antibiotics production, Spectrum of activity of Antibiotics; Classification based on mode of action, Antibiotic Sensitivity Test and Antimicrobial Resistance.

Unit – II

Morphology, Cultural characteristics, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Gram Positive Cocci - *Staphylococcus aureus*, Coagulase negative *Staphylococcus* sp., *Streptococcus pyogenes*, *Streptococcus agalactiae*, Viridans *Streptococci* (*Streptococcus pneumoniae*, *Enterococcus* sp. and Gram Negative Cocci – *Neisseria meningitidis* and *Neisseria gonorrhoeae*.

Unit – III

Morphology, Cultural characteristics, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Gram Positive Bacilli - *Bacillus anthracis*, *Bacillus cereus*, *Clostridium tetani*, *Clostridium perfringens*, *Clostridium botulinum*, *Clostridium difficile*, *Listeria monocytogenes*, *Erysipelothrix rhusiopathiae*, *Corynebacterium diphtheriae*, *Nocardia brasiliensis*, *Mycobacterium leprae*, *Mycobacterium tuberculosis* and *Mycobacterium avium* Complex.

Unit – IV

Morphology, Cultural characteristics, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Enterobacteriaceae (*Escherichia coli*, *Klebsiella pneumoniae*, *Proteus* sp., *Salmonella* sp., *Shigella* sp., *Serratia marcescens* and *Yersinia pestis*), *Pseudomonas aeruginosa*, *Vibrio cholerae*, *Aeromonas hydrophila*, *Campylobacter jejuni* and *Helicobacter pylori*.

Unit – V

Morphology, Cultural characteristics, Pathogenicity, Laboratory diagnosis, Treatment and Preventive measures for *Mycoplasmata* (*Mycoplasma* sp., *Rickettsia* sp. and *Chlamydia trachomatis*); Current Research Thoughts in Medical Bacteriology.

Text Books

- Jawetz, E., J. L. Melnic and E. A. Adelberg. 2013. Review of Medical Microbiology, 26th Edition, Lange Medical Publishers, New York.
- Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. Medical Microbiology, 8th Edition, Elsevier Publications, United States.
- Saranraj, P. 2020. Medical Bacteriology, 1st Edition, JPS Scientific Publications, India.
- Robert W. Bauman. 2015. Microbiology with Body Diseases by Body System, 4th Edition, Pearson Education, UK.

References

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- Chakraborty, P. 2013. A Text book of Microbiology, Published by New Central Book Agency (P) Ltd, Kolkata, India.

Baron, E. J and S. M. Finegold. 1990. Bailey and Scott's Diagnostic Microbiology, 8th Edition, The C.V. Mosby Company. St. Louis, Missouri.

Semester – II 5 Hours/4 Credits

MB802 - MEDICAL VIROLOGY

Objectives

- To make the students to understand the role of viruses in major diseases.
- To provide the knowledge on general characters and classification of viruses.
- To teach the structure, cultivation and various strategies of Virus replication.
- To impart knowledge regarding the diagnostics, clinical aspects and related implications of human viral diseases and emerging viral infections.
- To describe the growth behaviour differences between normal cells and cells transformed by DNA and RNA viruses.

Unit – I

General properties and Structure of Viruses; Classification of Virus – Based on Host, Structure and Nucleic acid; Replication of Viruses; Viral pathogenesis; Viral Epidemiology; Lab diagnosis of Viruses – Microscopic examination, Cultivation of Viruses, Serological and Molecular diagnosis of Viruses; Antiviral agents; Viral vectors for therapy; Interferons; Interleukins; Viral Vaccines and its Immunization Schedule; Control of Viral spread.

Unit – II

General properties, Structure, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for DNA Viruses – Poxviridae (Pox Virus); Herpesviridae (Herpes Simplex Virus, Varicella Zoster Virus, Cytomegalovirus and Epstein-Barr Virus); Adenoviridae (Adenovirus); Hepadnaviridae (Hepatitis B Virus); Papillomaviridae (Human Papilloma Virus); Polymaviridae (BK Virus & JC Virus) and Parvoviridae (B19 Parvo Virus).

Unit – III

General properties, Structure, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for RNA Viruses – Paramyxoviridae (Parainfluenza virus, Measles virus, Mumps virus, Respiratory syncytial virus & Nipah virus); Orthomyxoviridae (Influenza virus); Coronaviridae (SARS, MERS & Covid-19); Caliciviridae (Noroviruses); Rhabdoviridae (Rabies Virus).

Unit – IV

General properties, Structure, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for RNA Viruses – Filoviridae (Ebola virus & Marburg virus); Retroviridae (HIV, Human T-cell lymphotropic virus & Other Oncogenic Retroviruses); Togaviridae (Togaviruses - Rubella virus & Chikungunya); Flaviviridae (Flaviviruses - Yellow fever virus, Dengue virus & Hepatitis C virus).

Unit – V

General properties, Structure, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for RNA Viruses – Reoviridae (Rotavirus & Colorado Tick fever virus); Bunyaviridae (Bunyaviruses & Arenaviruses); Arenaviridae (Lassa fever virus); Picornaviridae (Rhinoviruses, Poliovirus, Echoviruses, Coxsackievirus & Hepatitis A virus); Current Research Thoughts in Medical Virology.

Text Books

- Jawetz, E., J. L. Melnic and E. A. Adelberg. 2013. Review of Medical Microbiology, 26th Edition, Lange Medical Publishers, New York.
- Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. Medical Microbiology, 8th Edition, Elsevier Publications, United States.
- Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- Robert W. Bauman. 2015. Microbiology with Body Diseases by Body System, 4th Edition, Pearson Education, UK.

References

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Dimmock, N. J., Easton, A. J., and Leppard, K. N. 2001. Introduction to Modern Virology. 5th Edition, Blackwell publishing, USA.
- Baron, E. J and S. M. Finegold. 1990. Bailey and Scott's Diagnostic Microbiology, 8th Edition, The C.V. Mosby Company. St. Louis, Missouri.
- John, B. C and Venetia, A. S. 2007. Virology, Principles and Applications. John Wiley and Sons limited, England.

Semester – II

5 Hours/4 Credits

MB803 - MEDICAL MYCOLOGY AND PARASITOLOGY

Objectives

- To illustrate the basics of medically important Fungi and Parasites.
- To provide in-depth knowledge on Superficial and Systemic fungi.
- Demonstrate the importance of Opportunistic infections caused by fungi.
- To study general aspects of Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Fungal and Parasitic diseases.
- To explain the role of Protozoans and Helminths as infectious agents.

Unit – I

General characteristics of Fungi (Mold and Yeast); Classification of Human Mycoses – Superficial Mycoses, Cutaneous Mycoses, Subcutaneous Mycoses, Endemic Mycoses and Opportunistic Mycoses; Pathogenesis of Fungal diseases - Primary fungal pathogens and Opportunistic fungal pathogens; Laboratory diagnosis of fungi from clinical specimens – Microscopic examination, Culture medium; Antigenic, Biochemical, and Molecular Markers for Direct Detection of Invasive Fungal Infections; Antifungal agents; Antifungal activity testing methods; Mechanism of resistance to Antifungal agents.

Unit – II

General Characteristics, Pathogenesis, Clinical Manifestations, Laboratory Diagnosis and Treatment for Opportunistic Mycoses (Candidiasis, Cryptococcosis, Aspergillosis, Trichosporonosis, Hyalohyphomycosis, Mucormycosis, Phaeohyphomycosis and Pneumocytosis); Endemic Mycoses (Blastomycosis, Histoplasmosis, Coccidioidomycosis, Paracoccidioidomycosis and Penicilliosis).

Unit – III

General Characteristics, Pathogenesis, Clinical Manifestations, Laboratory Diagnosis and Treatment for Superficial Mycoses (Black piedra, White piedra, Tinea nigra & Pityriasis versicolor), Cutaneous and Subcutaneous Mycoses (Dermatophytoses, Tinea unguium, Onychomycosis, Mycotic keratitis and Chromoblastomycosis); Mycotoxins and Mycotoxicoses.

Unit – IV

General characteristics of Protozoa; Morphology, Life cycle, Clinical Manifestations, Lab diagnosis and Treatment for Intestinal Protozoa (*Entamoeba histolytica*, *Giardia lamblia*, *Cryptosporium parvum* & *Balantidium coli*), Urogenital Protozoa (*Trichomonas vaginalis*) and Blood and Tissue Protozoa (*Plasmodium* sp., *Leishmania donovani*, *Leishmania tropica*, *Leishmania mexicana*, *Leishmania braziliensis*, *Toxoplasma gondii*, *Trypanosoma cruzi* & *Trypanosoma brucei*); Antiprotozoan drugs.

Unit – V

General characteristics of Helminths; Morphology, Life cycle, Clinical Manifestations, Lab diagnosis and Treatment for Nematodes (*Ascaris lumbricoides*, *Trichuris trichiura*, *Enterobius vermicularis* & *Wuchereria bancrofti*), Trematodes (*Fasciola hepatica*, *Paragonimus westermani* & *Schistosoma* sp.) and Cestodes (*Taenia saginata*, *Taenia solium*, *Dipylidium caninum* & *Echinococcus granulosus*); Anthelmintic drugs; Current Research Thoughts in Mycology and Parasitology.

Text Books

- Subhash Chandra Parija. 2013. Textbook of Medical Parasitology, 4th Edition, All India Publishers and Distributors, India.
- Jagdish Chander. 2017. Textbook of Medical Mycology, 4th Edition, Jaypee Brothers Medical Publisher, India.
- Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. Medical Microbiology, 8th Edition, Elsevier Publications, United States.
- Chatterjee, J. 2009. Medical Parasitology. 13th Edition, CBS Publishers, New Delhi.
- Robert W. Bauman. 2015. Microbiology with Body Diseases by Body System, 4th Edition, Pearson Education, UK.
- Alexopolus, C. J and Mims, C. W. 1995. Introductory Mycology. 4th Edition, John Wiley and Sons, New York.

References

- Jawetz, E., J. L. Melnic and E. A. Adelberg. 2013. Review of Medical Microbiology, 26th Edition, Lange Medical Publishers, New York.
- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- Levanthal, R and Cheadle, R. S. 2012. Medical Parasitology. 6th Edition, S. A. Davies Co., Philadelphia.
- Choidini, P. L., Moody, A. H and Manser, W. M. 2001. Atlas of Medical Helminthology and Parasitology. 4th edition, Churchill Living Stone.

Semester – II

4 Hours/3 Credits

MB804A - ELECTIVE - PHARMACEUTICAL MICROBIOLOGY

Objectives

- To illustrate the Principles of Pharmaceutical Microbiology.
- To understand the basics of Pharmaceutical Microbiology and important microorganism playing role pharmaceutically.
- To understand different products of microbial origin playing key role in Pharmaceutical applications.
- To understand role of Secondary metabolites in Pharmaceutical industry.
- To understand good practices and regulation involved in utilizing microbial product for pharmaceutical application

Unit – I

Pharmaceutically Useful and Problematic Microorganisms; Identification and Characterization of Pharmaceutically Important Microbes; Microbial contamination of Pharmaceutical products; Pharmaceutical products and its Sterilization; Sterility testing of Pharmaceutical products and Quality assurance; Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP) in Pharmaceutical industry; Laboratory animals for Pharmaceutical testing; Biosensors in Pharmaceutical industry.

Unit - II

History of Chemotherapy; Common terminologies related to Chemotherapy; Drugs - Definition, Source, Classification, Routes of Drug administration, Dosage forms, Drug receptors, Mechanism of action of Drug, Combined effect of Drugs, Factors modifying Drug action and Selective toxicity; Molecular principles of Drug delivery; Drug delivery system in Gene therapy; Negative interaction between Drugs and Host.

Unit - III

Chemical Disinfectants, Common terminologies related to Disinfectants; Antiseptics and Preservatives – Acids and Esters, Alcohols, Aldehydes, Biguanides, Halogens, Heavy metals, Hydrogen peroxide & peroxygen compounds, Phenols, Surface active agents and Dyes; Required Concentrations and Times for Chemical Destruction of Microorganisms; Evaluation of Disinfectants – Phenol coefficient test, Filter paper method, Use-Dilution test, In-Use Test and Kelsey-Sykes Capacity Test. Antimicrobial combination and systems; Disinfection policy.

Unit - IV

Antibiotics – Cell wall inhibitors, Cell membrane inhibitors, Protein synthesis inhibitors, Nucleic acid inhibitors and Antimetabolites; Antimicrobial drug resistance; Antibiotic sensitivity tests; Therapeutic index; Common side effects of Antibiotics.

Unit - V

Antiviral drugs; Antifungal drugs; Antiprotozoan drugs; Vaccines and its types; Covid-19 Vaccine and its impact; Anthelmintic drugs; Common side effects of Antiviral, Antifungal, Antiprotozoan and Anthelmintic drug; Natural products as Antimicrobial agents – Medicinal plants, Mushrooms, Kitchen spices, Algae, Actinobacteria and Lactic acid bacteria; Government regulatory practices and policies in Pharmaceuticals; Current Research Thoughts in Pharmaceutical Microbiology.

Text Books

- Luis Jimenez. 2004. Microbial Contamination Control in the Pharmaceutical Industry, Marcel Dekker Inc, New York, USA.
- Hugo and Russell. 2011. Pharmaceutical Microbiology. 8th Edition. Wiley Blackwell Publications, USA.
- Ashutosh Kar. 2008. Pharmaceutical Microbiology, New Age International Publishers, New Delhi, India.
- Vyas, S. P and Dixit, V. K. 2010. Pharmaceutical Biotechnology, CBS Publishers & Distributors, New Delhi, India.
- Geoff Hanlon and Norman A. Hodges. 2013. Essential Microbiology for Pharmacy and Pharmaceutical Science, Wiley-Blackwell, USA.

References

- Stephen P Denyer, Norman A Hodges and Sean P Gorman. 2011. Hugo and Russell's Pharmaceutical Microbiology, 8th Edition, Blackwell Publishing Company, New York, United States.
- Thomas N. Tozer, Malcolm Rowland. Introduction to Pharmacokinetics and Pharmacodynamics: The Quantitative Basis of Drug Therapy. 2006. Lippincott Williams & Wilkins publishers.
- Nita K. Pandit. 2007. Introduction to the Pharmaceutical Sciences. Lippincott Williams & Wilkins publishers.
- Joseph D Nally. 2016. Good Manufacturing Practices for Pharmaceuticals. 6th Edition, CRC Press, USA.
- Madhu Raju Saghee, Tim Sandle and Edward C. Tidswell. 2011. Microbiology and Sterility Assurance in Pharmaceuticals and Medical Devices, Business Horizons.

Semester – II

4 Hours/3 Credits

MB804B - ELECTIVE - BIOINFORMATICS

Objectives

- To explain basics and uses of internet and biological databases.
- To provide an overview of various bioinformatics tools, databases available and sequence analysis.
- To provide knowledge on database concept, management, retrieval along with utilization in gene and protein analysis.
- To demonstrate the use of tools for parsing and retrieving sequences and structures from appropriate databases and predicting genes.
- To impart in-depth knowledge on deducing protein structures, analyse the expression of proteins, genes and to study variations.

Unit – I

Bioinformatics – Definition, History and Development, Role of Bioinformatics in Biology; Introduction to Internet – Local area and wide area network, Types of files – HTML, TXT and PDF; Search Engines - Types and applications; Application of Bioinformatics.

Unit – II

Biological sequence database – Primary databases (NCBI, EMBL and DDBJ), Secondary databases – Nucleic acid secondary databases and Protein secondary databases; Phylogenetic analysis and Sequence submission tools; Sequence Annotation; DNA analysis for repeats (Direct and Inverted palindromes) related tools BLAST, FASTA, SEARCH, Phylogenetic analysis and Multiple sequence alignment.

Unit – III

Applied Genomics – Prokaryotic and Eukaryotic Genomes, DNA Microarray, Microarray Database, Tools for analysis of Human Genome and Human Genome Project; Pharmacogenomics; Proteomics – Protein – protein interaction and Yeast two hybrid system; Protein Microarray; MALDI-TOF method of analysis of Proteins; 2D Two Gel Electrophoresis; Proteomics in Drug discovery.

Unit – IV

Structural Biology; Principles of Structural organization, Conformational analysis and Structure determination; Visualization and Computational methods used in Protein structure prediction, Homology modelling, Threading, Ab initio, Neural networks and Structure based drug design; Molecular docking - Mechanisms in Molecular docking, Virtual screening, Active site analysis tools, Docking tools de novo Ligand design; Application of Molecular docking.

Unit – V

Commercial application of Bioinformatics, Genome technology, High throughput sequencing and assembly; Genomics in Medicine - Disease monitoring and Profiles for Therapeutic Molecular Targeting; Drug discovery and genomics; Comparative Proteomics and its applications; IPR and Bioinformatics patents; Current Research Thoughts in Bioinformatics.

Text Books

- Jin Xiong. 2006. Essential Bioinformatics, 1st Edition, Cambridge University Press, New York, United States.
- Hooman Rashidi and Lukas K. Buehler. 2005. Bioinformatics Basics: Applications in Biological Science and Medicine, CRC Press, Taylor & Francis Group, United Kingdom.
- Mount, D. W. 2013. Bioinformatics Sequence and Genome analysis. 2nd Edition, CBS Publishers, New Delhi.
- Rastogi, S. C., Mendiratla, N and Rastogi, P. 2013. Bioinformatics methods and applications - Genomics, Proteomics and Drug Discovery. Prentice Hall India.

References

Stephen A. Krawetz, David D. Womble. Stephen A. Krawetz and David D. Womble. 2003. Introduction to Bioinformatics: A theoretical and Practical approach, Humana Press, USA.
Bryan Bergeron. 2002. Bioinformatics Computing, Prentice Hall.
Claverie, J. M and C. Notredame. 2003. Bioinformatics for Dummies, Wiley Publishing, Inc., United Kingdom.
Xiong, J. 2011. Essential Bioinformatics, First south Indian Edition, Cambridge University Press.

Semester – II

4 Hours/3 Credits

MB804C - ELECTIVE – PUBLIC HEALTH MICROBIOLOGY

Objectives

- To strengthen the knowledge of personal health care and hygienic to students.
- To provide a detailed study on vaccine and its schedule throughout the life time for all age group.
- To acquaint the student with basic concept of public health and prophylactic measures.
- To understand air, Food, water, insect borne infectious diseases.
- To create public awareness, individual behavior, and disease prevention.

Unit – I

Hygiene – Personal hygiene and Grooming routines; Importance of Public Health Microbiology; Factors for Good health; Importance of Hand washing; Role of Microbiologists in Public health; Indicators of health; National Health Programmes; Health status in India; Present and Future challenges in Public health.

Unit – II

Vaccines and Vaccination – History, Types of Vaccines, Route of Administrations, Mechanisms of Inducing immunity; Diseases prevented by Vaccination; Microbial synthesis of Vaccines; Vaccines for Tuberculosis and Covid-19; Vaccination schedule; Vaccine risks and safety.

Unit – III

Child Health Management – General child health and Types of infection in Child; Vaccination schedule in Children – New born, Child below 5 years and Child below 10 years; Vaccination schedule for Adults - Hepatitis B vaccines, MMR vaccines, Tetanus vaccines and Varicella vaccines; Vaccines for Travelers; Universal Immunization Programme; Public awareness about Vaccines and Vaccination.

Unit – IV

Common diseases caused by Microorganisms – Air borne, Water borne, Soil borne, Vector borne and Zoonotic diseases; Vaccination for Pets; Methods for controlling Insect vectors; Sexually transmitted diseases and its awareness to public; Air pollution and Indicators of Air pollution; Water pollution; Water quality and analysis of Drinking water quality; Sanitary surveys; World Health Organization (WHO) and Centre for Disease Control and Prevention (CDC).

Unit – V

Industrial Pollution and Toxic pollutants from industries; Hygienic practices in Industries; Hygienic practices in Hospitals; Nosocomial Infections and its preventive measures; Vaccines for Healthcare workers; Biomedical wastes and its management in Hospitals; Public awareness about Water, Air and Insect borne diseases; Current Research Thoughts in Vaccines and Pollution control.

Text Books

- Robert S. Burlage. 2012. Principles of Public Health Microbiology. Jones & Bartlett learning LLC, Canada.
- Robert W. Bauman. 2015. Microbiology with Body Diseases by Body System, 4th Edition, Pearson Education, UK.

Reed, G. 2004. Prescott and Dunn's Industrial Microbiology, 4th Edition, CBS Publishers and Distributor, New Delhi, India.

Prasada Rao, J. V. R. 1999. Manual for Control of Hospital Associated Infections National AIDS Control Organization. Ministry of Health and Family Welfare, Government of India. New Delhi.

References

Judith A. Owen, Jenni Punt, Sharon A. Stanford and Patricia P. Jones. 2009. Kuby's Immunology, 4th Edition, W. H. Freeman and Company, New York.

Chaudhri, A. K. 1998. Tripathy, G. C. and D. Sharma - Common sense rules for wellbeing, Naval Printing Press, New Delhi.

Dunne, J. 1997. Webb, M., R. Scott and P. Beale - First Aid Manual, 7th Edition, Dorling Kindersley Ltd, London.

Spencer, John F. T., Alicia L. Ragout de Spencer. 2004. Public Health Microbiology-Methods and Protocol. Springer.

Semester – I & II

5 Hours/4 Credits

PMB801 - PRACTICAL – I: GENERAL AND MEDICAL MICROBIOLOGY

Orientation to the Microbiology Laboratory

Sterilization Techniques

Handling of Microscopes

Preparation of Broth and Agar medium for Bacteria and Fungi

Bacterial Staining Techniques

Motility Test – Hanging Drop Method

Biochemical tests for Bacterial identification

Pure culture technique – Spread plate technique and Pour plate technique

Bacterial Growth curve

Effect of pH, NaCl concentration and UV light on Bacterial growth.

Lyophilization of Bacterial culture.

Collection and transport of clinical samples.

Identification of bacteria from clinical samples – *Staphylococcus aureus*, *Escherichia coli*, *Salmonella typhi*, *Shigella* sp., *Proteus vulgaris*, *Klebsiella pneumoniae*, *Vibrio cholerae* and *Pseudomonas aeruginosa*.

Antibiotic sensitivity test – Disc diffusion assay.

Antibiotic sensitivity test – Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC).

Determination of β -Lactamase activity- Acidometric method and Iodometric method.

Slide Culture Technique for fungal identification.

Examination of *Candida albicans* by Germ tube test and Sugar assimilation test.

Microscopic examination of Protozoa.

Microscopic examination of Algae.

Inoculation of Viruses in Egg membrane.

Isolation of Bacteriophages and Plague assay.

Semester – I & II 5 Hours/4 Credits

PMB802 - PRACTICAL – II: IMMUNOLOGY, HEMATOLOGY AND MOLECULAR MICROBIOLOGY

Blood collection and Plasma/Serum separation.

Blood Grouping and Rh Typing.

Staining and Microscopic examination of Blood cells - RBC, WBC and Differential Cell Counts.

Separation of Lymphocytes from Peripheral Blood by Density Gradient Centrifugation.

Purification of Antibodies by Ammonium Sulfate Precipitation.

Agglutination reaction – WIDAL Test, RPR Card Test, TPHA Test, ASO Test, RA Test, CRP Test and Pregnancy Test.

Precipitation reaction – Mancini Radial Immunodiffusion, Ouchterlony Double Immunodiffusion, Immunoelectrophoresis, Serum electrophoresis and Rocket electrophoresis.

ELISA Test.

Isolation of Plasmid DNA

Isolation of Chromosomal DNA

Transformation in *Escherichia coli*

Estimation of DNA by Diphenylamine method.

Estimation of RNA.

Chromatographic techniques – Paper chromatography, Thin Layer chromatography and Column chromatography

Polymerase Chain Reaction (PCR)

Semester – III 4 Hours/4 Credits

MB901 - RESEARCH METHODOLOGY

Objectives

To learn about research designs, ethics in scientific research, data collection and analysis of scientific data using software.

To analyze the Art of Report and Scientific writing.

To study the basic Statistics methods used for Life science research.

To gain the knowledge on Laboratory animals and its maintenance.

To provide insights on importance of scientific communication, ethical issues in research, plagiarism and IPR.

Unit – I

Importance and need for research; Basic and Applied Research; Essential steps in Research; Ethics and Scientific research; Designing of research work; Hypothesis and Null – hypothesis; Scientific writing – Research article, Review article, Case reports and Short communication; Components of a Research report – Title, Author name & Institution details, Abstract, Introduction, Review of Literature, Materials and Methods, Results, Discussion, Summary, Conclusion, Acknowledgement and References – Harvard and Vancouver systems; Components of Thesis writing.

Unit – II

Importance of Scientific communication - Types and Modes of Scientific communications; Journals in Microbiology and Life Sciences; Impact factor of Journals; Indexing agencies for Journals; Book publication – Text books, Monographs and Edited books; Ethical issues related to Publishing; Plagiarism and Self plagiarism; Software to detect Plagiarism; Role of Computers in Biology; Useful search engines for Research; Social media related to Research

Unit - III

Collection and Classification of Data; Representation of Data - Tabulation, Frequency distribution, Diagrams and Graphs; Measurement of Central tendency; Tests of Significance - Chi-square test, Student t-test and Z score; Analysis of Variance – ANOVA (One-way classification and Two-way classification); Completely Randomized Design (CRD), Randomized Block Design (RBD), Least Significant Difference (LSD) and Duncan's multiple range test (DMR); SPSS for various applications in Biostatistical programme; R Programming Language.

Unit – IV

Laboratory animals used for Life Science Research; CPCSEA Guidelines for Laboratory Animal Facility; Veterinary care - Animal procurement, Quarantine, Stabilization & Separation and Surveillance, Diagnosis & Treatment; Animal Husbandry for Animal maintenance – Caging or Housing system, Sheltered or Outdoor housing, Social environment, Monitoring Animal activity, Food, Bedding and Water; Sanitation, Cleanliness and Waste disposal in Animal house; Record keeping in Animal house; Standard Operating Procedures for Animal Husbandry; Transport of Laboratory Animals; Anesthesia and Euthanasia.

Unit – V

Composition of Institutional Ethical Committee (IEC) - General Ethical Issues, Laboratory Animal Ethics, Food and Drug safety Ethics; Ethical issues in Human Gene Therapy and Human Cloning; Environmental release of Genetically Engineered Microorganisms; Intellectual Property Rights (IPR) – Protection of IPR in India, Terminology Associated with IPR and Issues Relating to IPR; Patentable and Non – patentables; World Intellectual Property Rights Organization (WIPO); Research funding agencies in India.

Text Books

- Gurumani, N. 2004. Research Methodology for Biological Sciences. MJP Publishers, India.
- Anderson, J. B and M. Poole. 2011. Assignment and Thesis Writing. 4th Edition, Wiley India Private Limited, UK.
- Kothari, C. R and G. Garg. 2004. Research Methodology: Methods and Techniques. 2nd edition, New Age International Publishers, India.
- Sateesh, M. K. 2008. Bioethics and Biosafety. I. K. International Pvt. Ltd, New Delhi, India.

References

- Gupta, S. P. 2013. Fundamentals of Statistics, Sultan Chand, India.
- Goel, D and S. Parashar. 2013. IPR, Biosafety and Bioethics. Pearson Education in South Asia.
- Ethical guidelines for biomedical research on human subjects. ICMR, New Delhi, 2000.
- Ahuja, V. K. 2017. Laws Relating to Intellectual Property Rights. Lexis Nexis.

Semester – III

4 Hours/4 Credits

MB902 - BIOINOCULANT TECHNOLOGY AND PLANT PATHOLOGY

Objectives

- To study about the Production, Formulation, Method of application and Quality control of Bioinoculants.
- To create an awareness on Soil microorganisms in Agriculture.
- To understand the role of Nitrogen fixers, Phosphate solubilizers, AM fungi and Algal biofertilizers.
- To give knowledge on Plant pathogen interaction and its control.
- To learn the ability of Biopesticides and Biocontrol agents in Plant growth.

Unit – I

Bioinoculants – Definition, Types and Importance; Advantages of Biofertilizers over Chemical fertilizers; Formulations of Bioinoculants; Methods and application of Bioinoculants in different crops; Quality control of different Bioinoculants; Plant – Microbe Interaction; PGPR and its role in agriculture – Direct mechanism and Indirect mechanism; Role of PGPR in Soil Bioremediation.

Unit – II

Nitrogen fixation by bacteria; Isolation, Characterization, Mass multiplication, Field application and Plant growth promoting activities of Nitrogen fixing bacteria (*Rhizobium* sp., *Frankia* sp., *Azotobacter* sp., *Azospirillum* sp. and *Gluconacetobacter* sp.). Phosphate solubilization – Phosphate solubilizing microorganisms, Screening of Phosphate solubilizing efficiency, Mechanism of Phosphate solubilization and Benefits of Phosphate solubilizing microorganisms; Algal Biofertilizers – Isolation and Mass multiplication of Blue Green Algae (BGA), Mass multiplication of *Azolla*, *Azolla – Anabaena* symbiosis, Heterocyst and its importance in N₂ fixation.

Unit – III

Mycorrhizal Bioinoculants – Significance, Types and Benefits; Arbuscular Mycorrhiza (AM) fungi – Taxonomy, Isolation, Assessment of AM colonization in roots, Mass inoculum production, Field applications; AM fungi and Abiotic stress; Role of AM fungi in agriculture; Biopesticides – Entomopathogenic bacteria (*Bacillus thuringiensis*); Entomopathogenic fungi (*Beauveria bassiana*, *Verticillium lecanii*, *Isaria fumosorosea*, *Lecanicillium* sp. & *Metarhizium anisopliae*); Entomopathogenic virus (Cydia pomonella granulosis virus – CpGv); Plant disease control agents (*Bacillus subtilis*, *Bacillus megaterium*, *Pseudomonas fluorescens* & *Trichoderma viride*).

Unit – IV

History of Plant Pathology; Host-parasite relationship in plants; Principles of Plant diseases; Plant Disease Triangle; Plant diseases - Symptoms and Types; Pathogenic and Non-pathogenic Plant diseases; Plant Pathology in Practice - Plant Clinic and Plant Doctor Concept; Biochemical aspects of disease development; Principle of Biotrophic, Hemibiotrophic and Perthotrophic colonization; Molecular detection of Phytopathogens.

Unit – V

Antibiosis and Biological control of Soil borne plant pathogens; Microbial pest management; Mycotoxins in plants; List of important Plant diseases; Bacterial diseases – Blight of rice, Citrus canker & Wilt of potato; Fungal diseases – Blast of rice, Late blight of potato, Rust of wheat, Smut of sugar cane, Wilt of cotton, Tikka leaf spot of ground nut, Mildews of fruits, Leaf curl disease & Little leaf disease; Viral diseases - Mosaic disease; Disease Resistance - Biochemical and Genetic aspects; Defense mechanism in Plants; Current Research Thoughts in Bioinoculant Technology and Plant Pathology.

Text Books

- Saranraj, P and Sivasakthivelan, P. 2020. Text Book of Bioinoculants Technology. 1st Edition, JPS Scientific Publications, India.
- Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
- Subba Rao N.S. 1999. Soil Microbiology, 4th Edition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.
- Mehrotra, R. S. 1983. Plant Pathology, Tata McGraw Hill Publishing Company Ltd., New Delhi.

References

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Atlas, R.M and R. Bartha. 1998. Microbial Ecology. Fundamentals and Applications, 4th Edition, Red Wood City. C.A. Benjamin.
- Bagyaraj, D. J and G. Rangasamy. 2002. Agricultural Microbiology, 2nd Edition, Prentice Hall, India.
- Mahendra K. Rai. 2005. Hand book of Microbial Biofertilizers, The Haworth Press, Inc. New York.

Semester – III

4 Hours/4 Credits

MB903 - MUSHROOM TECHNOLOGY

Objectives

- To modify of the Mushroom cultivation in a scientific way for livelihood.
- To differentiate edible and poisonous mushrooms and their effects.
- To encode the importance of the Mushrooms.
- To outline the process of Mushroom cultivation.
- To obtain a good understanding of Mushroom cultivation and its disease control.

Unit - I

Mushroom – Historical development, Origin, Characteristics, Importance, Morphology and Life cycle; Classification of Mushroom; Commonly cultivated mushrooms in the world; Nutritional value of Mushroom; Medicinal value of Mushroom; Edible mushrooms and Non - edible mushroom; Medicinal and Environmental uses of Mushrooms.

Unit - II

Mushroom farms – Farm layout and Farm hygiene; Substrates used for Mushroom cultivation; Spawn production for Mushroom cultivation – Starter culture, Sterilization process, Clean Environmental Condition, Culture, Preparation of Media & Slants, Spawn containers, Mother Spawn, Preparation of Final Spawn, Precautions and Storage of Spawn.

Unit - III

Genetic Improvements of Mushroom; Growth factors for Mushroom cultivation; Cultivation of Button mushroom (*Agaricus bisporus*), Oyster mushroom (*Pleurotus sajor – caju*), Milky mushroom (*Calocybe indica*), Reishi mushroom (*Ganoderma lucidum*) and Paddy straw mushroom (*Volvariella volvacea*); Management of wastes generated during Mushroom cultivation; Insect pests and its management during Mushroom cultivation.

Unit - IV

Diseases of Mushrooms – Bacterial disease (Bacterial blotch, Mummy disease & Drippy gill), Viral disease (Die back disease); Fungal diseases (Dry bubble disease, Wet bubble disease, Cobweb disease, *Trichoderma* Blotch and Mildew caused by *Cladobotrym* sp. and *Aphanocladium* disease); Fungal competitors during Mushroom cultivation - Green mould, Olive Green mould, Brown plaster mould, White plaster mould, Inkcaps, Yellow mould, Sepedonium Yellow mould, Lipstick mould, Oedocephalum mold, False truffle and Cinnamon mould.

Unit - V

Post Harvest Technology of Mushroom – Harvesting, Grading, Packaging & Storage, Transportation, Preservation and Marketing (Fresh market and Drying); Environmental impact of Mushroom cultivation; Mushroom food recipes; Antimicrobial compounds from Mushroom; Economical value of Mushroom; Cost analysis for Mushroom cultivation; Challenges in Mushroom cultivation; Mushroom Research Centers in India; Current Research Thoughts in Mushroom Technology.

Text Books

Kannaiyan. 2001. Handbook of Edible Mushrooms, TNAU Publication, Coimbatore, India.

- Alice, D., K. Muthusamy and M. Yesuraja. 1999. Mushroom Culture, Agricultural College, Research Institute Publications, Madurai, Tamil Nadu, India.
- Russell, S. 2003. Essential Guide to Cultivating Mushrooms. 1st Edition. Storey Publishing, LLC.
- Tiwari, S. C and Kapoor, P. 2018. Mushroom - The art of Cultivation. 1st Edition. Mittal Publications, India.

References

- Marimuthu, T. 1991. Oster Mushroom, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
- Nita Bhal. 2000. Handbook on Mushrooms, 2nd Edition, Volume - I and II, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.
- Tripathi, D. P. 2005. Mushroom Cultivation, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, India.
- Naidu, N. V. R. 2008. Management and Entrepreneurship. I.K. International Pvt. Ltd., India.

Semester – III

4 Hours/4 Credits

MB904 - ENVIRONMENTAL MICROBIOLOGY

Objectives

- To describe the distribution and enumeration of air microflora and categorize the air borne diseases.
- To discuss the Terrestrial ecosystem and Aquatic ecosystem.
- To give an overview about role of microorganisms for the cycle of Carbon, Nitrogen, Phosphorus and Sulphur in the nature.
- To illustrate the process of Solid waste treatment and Sewage water treatment, and determine the role of microorganisms in water pollution and water quality.
- To gain knowledge about Bioremediation mechanisms provided by microbes.

Unit – I

Organization of the Biosphere; Common Terminologies in Microbial Ecology; Microbiome; Ecosystem and its types; Major role of Microorganisms in Ecosystem; Atmosphere – Aeromicrobiology and Relationship between Microorganisms and Atmosphere; Sampling of Air; Aeroallergens; Air borne disease; Air pollution; Indicators of Air pollution; Green house effect; Air Sanitation; CO₂ sequestration.

Unit – II

Terrestrial Ecosystem – Importance of Soil; Formation of Soil; Composition of Soil; Soil Horizons; Soil characteristics (Physical & Chemical); Soil Microbiology – Major group of Soil microorganisms; Qualitative microflora of soil (Bacteria, Actinobacteria, Fungi, Viruses, Algae & Protozoa); Soil types and their microflora; Quantification of Soil microflora; Role of microorganisms in Soil fertility.

Unit – III

Aquatic ecosystem – Major communities of Aquatic ecosystem (Phytoplankton and Zooplankton); The Microbial Loop; Types of Aquatic ecosystem - Fresh water ecosystem, Marine ecosystem, Estuarine ecosystem and Mangrove ecosystem; Water zonations; Eutrophication; Winogradsky column; Bioluminescence; Water pollution; Bacteriological analysis of water; Water based disease transmission mechanism – Water borne, Water-washed, Water-based and Water related; Water borne diseases; Purification of water; Recycling of water.

Unit – IV

Organic matter decomposition; C:N Ratio; Formation and composition of Soil organic matter - Fluvic acid & Humic acid; Biogeochemical cycles – Carbon cycle, Nitrogen cycle, Phosphorous cycle, Sulphur cycle and Iron cycle; Microbe – Microbe Interactions; Plant – Microbe Interactions; Root exudates and Rhizosphere effects.

Unit – V

Solid waste management - Incineration, Composting & Sanitary Landfill; Sewage treatment – Small scale sewage treatment (Cesspools, Septic tank & Imhoff's tank) and Large scale sewage treatments (Primary treatment,

Secondary treatment, Tertiary treatment & Anaerobic Sludge Digestion); Xenobiotics; Acid Mine Drainage; Bioremediation; – Uranium, Hydrocarbons, Pesticides, Chlorinated compounds and Plastics; Biodegradation; Bioaccumulation; Bioleaching; Biodeterioration of Paper, Leather, Wood, Textiles, Stone and Concrete; Microbially Induced Corrosion; Biofilms in Environment; Pollution control bodies and Environmental laws in India; Current Research Thoughts in Environmental Microbiology.

Text Books

- Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
- Saranraj, P and Sivasakthivelan, P. 2020. Text Book of Environmental Microbiology. 1st Edition, JP Scientific Publications, India.
- Subba Rao N.S. 1999. Soil Microbiology, 4th Edition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.
- Jeffrey C. Pommerville. 2006. Alcamo's Fundamentals of Microbiology. 4th Edition, Jones and Bartlett Publishers, Canada.
- Kathleen Park Talaro and Bary Chess. 2015. Foundations in Microbiology. 9th Edition, McGraw Hill Publication, New York.
- Jacquelyn G. Black. 2012. Microbiology – Principles and Explorations. 8th Edition, John Wiley and Sons, United States.

References

- Marjorie Kelly Cowan. 2012. Microbiology – A System Approach. 3rd Edition, MacGraw Hill Publication, United States.
- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.
- Madigan, M. T., J. M. Martinko and J. Parker. 2009. Brock's Biology of Microorganisms, 12th Edition, Pearson/Benjamin Cummings, New York.
- Maier, R. M., I. L. Pepper and C. P. Gerba. 2009. Environmental Microbiology, 2nd Edition, Academic Press, United States.

Semester – III

4 Hours/3 Credits

MB905A - ELECTIVE: MICROBIAL REMEDIATION

Objectives

- To motivate against environmental pollution.
- To find solution for pollution using microbes.
- To study the remediation process by plants, fungi, plants and algae.
- To develop knowledge about the environmental risk assessment and remediation.
- To gain knowledge on role of microorganisms in their environment.

Unit – I

Bioremediation - Process and Organisms involved; Constraints and priorities of Bioremediation; Major pollutants and Polluted sites; Bioaugmentation; Intrinsic and Engineered Bioremediation; Pollutants and associated risk; Polyaromatic hydrocarbon pollution; Organic pollutant degradation; Advantages and Disadvantages of Bioremediation.

Unit – II

Microbes involved in Aerobic and Anaerobic processes in nature - Removal of Heavy metals; Biotransformation of Heavy metals and Xenobiotics; Petroleum biodegradation; Microbial leaching of Ores - Process,

Microorganisms involved and Metal recovery with special reference to Copper and Iron; Dechlorination; Biodegradable plastics and Super bug.

Unit – III

Aerobic and Anaerobic digesters - Design and Various types of Digester for Bioremediation of Industrial effluent; Pros and Cons of Anaerobic process; Dendroremediation; Composting of Solid wastes; Methane production and important factors involved; Sulphur, Iron and Nitrate reduction; Hydrocarbon degradation; Nitroaromatic compounds degradation; Bioremediation of dyes; Bioremediation in Paper and Pulp industries.

Unit – IV

Fungi, Mushrooms and their enzymes in Bioremediation; Transformation of Industrial and Agro-industrial wastes into useful products; Characteristic of Solid and Liquid waste; Solid waste management - Incineration, Composting & Sanitary landfill; Sewage treatment – Small scale sewage treatment (Cesspools, Septic tank & Imhoff's tank) and Large scale sewage treatments (Primary treatment, Secondary treatment & Tertiary treatment).

Unit – V

Phytoremediation of polluted soil and wastewater; Advantages of Phytoremediation; Phycoremediation of Domestic and Industrial wastewater; Advantages of Phycoremediation; Potentials of Microalgae for Industrial effluents treatment; Conventional methods vs Algal technology; Novel technologies for Bioremediation of Industrial effluents; Genetic engineering in Bioremediation; Pollution control bodies and Environmental laws in India; Current Research Thoughts in Microbial Remediation.

Text Books

- Singh, S. N. 2014. Biological Remediation of Explosive Residues, Springer International Publishing, Switzerland.
- Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
- Saranraj, P and Sivasakthivelan, P. 2020. Text Book of Environmental Microbiology. 1st Edition, JP Scientific Publications, India.
- Cheremisinoff, N. P. 2013. Biotechnology for Waste and Wastewater Treatment, Elsevier, UK.
- Sathyanarayana, T., Johri, B. N and Prakash, A. 2012. Microorganisms in Environmental Management – Microbes and Environment, Springer, Heidelberg.

References

- Chandrappa, R and Das, D. B. 2012. Solid Waste Management Principles and Practice, Springer-Verlag, Heidelberg.
- Anjum, N. A., Pereira, M. E., Ahmad, I., Duarte, A. C., Umar, S and Khan, N. A. 2013. Phytotechnologies Remediation of Environmental Contaminants, CRC Press, Boca Raton, FL, USA.
- Gupta, D. K. 2013. Plant-Based Remediation Processes, Springer-Verlag, Berlin Heidelberg.
- Gupta, D. K and Sandalio, L. M. 2013. Metal Toxicity in Plants: Perception, Signaling and Remediation Springer, Berlin Heidelberg.
- Khan, M. S., Zaidi, A., Goel, R and Mussarat, J. 2012. Biomanagement of Metal-Contaminated Soil, Springer, Dordrecht.

Semester – III

4 Hours/3 Credits

MB905B - ELECTIVE: VERMITECHNOLOGY

Objectives

- To study about the properties of soil and microbial composting.
- To classify and compare the characteristics of earthworm species and waste materials needed for Vermicomposting.
- To describe the process and benefits of Vermicomposting.
- To understand the biology of Earthworms and its role in Vermicomposting.

To learn the ability of Earthworms in Organic farming and Solid waste reclamation.

Unit – I

Vermitechnology – History and Scope; Influence of Soil microorganisms in Vermitechnology; Development and Future of Vermitechnology in India and other countries; Earthworms – Diversity, Geographical distribution, Morphology, Life cycle and Behaviour patterns.

Unit – II

Burrowing activity of Earthworms; Physical, Chemical and Biological changes caused by Earthworms in Soil; Drillospheres and Vermicasts; Effect of Earthworm on Soil structure – Carbon, Nitrogen and Phosphorus Transformation; Microclimate of Rhizosphere and Drillosphere.

Unit – III

Composting – Wastes used for Composting process; Methods of Composting; Difference between Microbial Composting and Vermicomposting; Millicomposting; Factors affecting Composting process; Analysis of Physical-chemical characteristics and Microbial quality of Compost materials; Microbial Composting - Aerobic and Anaerobic Composting.

Unit – IV

Vermicompost – Morphological identification of Earthworm species used in Vermicompost production (*Eisenia fetida*, *Eisenia andrei*, *Dendrobaena veneta*, *Eudrilus eugeniae*, *Lampito mauririi* and *Perionyx excavates*); Methods for Collection and Preservation of Earthworms; Materials used for Vermicomposting; Vermicomposting methods – Small scale and Large scale; Packaging, and Marketing; Factors influencing Vermicomposting process; Cost benefit analysis of Vermicompost; Applications of Vermicomposting in Agriculture and Horticulture practices; Advantages of Vermicompost over Chemical inputs.

Unit - V

Vermiculture; Vermiculture unit – Materials required and Maintenance; Vermiwash and its applications; Feeding habits and food for Composting worms; Importance of Microorganisms as Food for Earthworms; Problems in Vermiculture units and Remedial suggestions; Problems during Vermicomposting - Pests, Parasites and Pathogens; Earthworms in recycling of various Solid wastes; Benefits of Earthworms other than Vermicomposting; Current Research Thoughts in Vermitechnology.

Text Books

- Edwards, C. A., Arancon, N. Q and Sherman, R. L. 2011. Vermiculture Technology: Earthworms, Organic Wastes, and Environmental Management. 1st Edition, CRC Press, USA.
- Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
- Subba Rao N.S. 1999. Soil Microbiology, 4th Edition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.

References

- Satyanarayana, U. 2005. Biotechnology, 1st Edition, Books and Allied (P) Ltd., Kolkata, India.
- Edwards, C. A and Bohlen, P. J. 1996. Biology and Ecology of Earthworms, Chapman and Hall, London.
- Ismail, S. A. 1997. Vermitechnology: The Biology Earth worm, Orient Longman, United Kingdom.
- Kale Radha, D. 1998. Earthworm: Cinderella of organic farming. Prism Books Pvt. Ltd., Bangalore, India.

Semester – III

4 Hours/3 Credits

MB905C - ELECTIVE – MICROBIAL NANOTECHNOLOGY

Objectives

To assess types of nanoparticles for various medical research to find out the solution of human diseases.
To overcome the disadvantages of nanoparticle application.
To Physical and chemical properties of nanoparticles give idea about the biological process.
To apply the nanoparticle research in human health sector for their healthy society.
To motivate the researchers to carry the better advanced research on this field.

Unit – I

History of Nanotechnology; Common Terminologies – Nanotechnology, Microbial nanotechnology, Nanomedicine, Nanowires, Quantum Dots, Nanocomposite and Nanoparticles; Applications of Nanotechnology in Life Sciences; Present status and Future prospects of Microbial Nanotechnology.

Unit - II

Molecular Nanotechnology - Nanomachines and Collagen; Uses of Nanoparticles - Cancer therapy and Manipulation of cell and biomolecules; Types of Nanoparticles - Physical, Chemical and Biological; Microbial synthesis of Nanoparticles.

Unit – III

Nanoparticles - Types and functions; Physical and Chemical properties of Nanoparticles; Carbon nanotube; Nanorobots; Characterization of Nanoparticles using UV-Vis, FTIR spectroscopy, Electron Microscopy – HRTEM, SEM, AFM, EDS, XRD and Nanoparticle size analyzer.

Unit – IV

Advantages of Nanoparticles - Drug targeting, Protein detection and MRI; Development of Green chemistry; Commercial viability of Nanoparticles. Disadvantages – health risk associated with nanoparticles; Inadequate knowledge on nanoparticles research.

Unit – V

Drug delivery - Protein and Nanoparticle mediated; Uses of Nanoparticles in MRI, DNA and protein microarray; Nanotechnology in Health, Agriculture and Environmental sectors; Toxicology in Nanoparticles; Current Research Thoughts in Microbial Nanotechnology.

Text Books

- David, S. G. 2004. Bionanotechnology, Lessons from nature, John Wiley & Sons Inc. Publication.
- Parthasarathy, B. K. 2007. Introduction to Nanotechnology, Isha Publication, India.
- Elisabeth, P and Aravind, P. 2007. Bionanotechnology. Morgan & Claypool Publishers, USA.
- Bernd, R. 2006. Microbial Bionanotechnology: Horizon Scientific Press, Canada.

References

- David, E. R and Joseph, D. B. 2009. Bionanotechnology: Global Prospects. CRC Press, USA.
- Ehud, G. 2013. Plenty of Room for Biology at the Bottom: An Introduction to Bionanotechnology, World Scientific Publishers, UK.
- Silva, G. A and Parpura, V. 2011. Nanotechnology for Biology and Medicine: At the building block level, Springer Science, USA.

MB1001 - FOOD MICROBIOLOGY

Objectives

- To distinguish the intrinsic and extrinsic factors of growth of microbes in food and illustrate the various food preservation techniques.
- To describe the causes of spoilage of different types of food and plan the methods for detecting the causative microbes of food spoilage.
- To obtain a good understanding of food microbiology and become qualified as microbiologist in food industries.
- To detect and interpret the food borne infections, intoxications and prevent food borne outbreaks.
- To implement quality control and represent the standards in food production.

Unit – I

History and Development of Food Microbiology; Importance of microorganisms in Food microbiology – Molds, Yeast and Bacteria; Microbial growth in food - Intrinsic and Extrinsic factors; Principles of Food preservation – High & Low temperature, High pressure, Drying, Radiation, Modified atmosphere, Pulsed Electric fields, Aseptic package and Manothermosonication; Food preservatives – Natural preservatives & Chemical preservatives.

Unit – II

Microbial Contamination of Foods; Sources of Microbial Contamination – Green plants, Fruits, Animals, Air and Handling & Processing practices; Classification of foods in term of potential for spoilage; Contamination, Spoilage and Preservation of Cereals and its products, Sugars and its products, Canned foods, Vegetables, Fruit, Milk products, Alcoholic products, Egg, Meat products, Seafoods and Poultry products.

Unit – III

Fermentation and its types; Traditional Indian fermented foods; Production of Baker's Yeast; Bread production from Yeast and its spoilage; Fermented Vegetables – Olives, Pickles & Sauerkraut; Fermented Meat & Fish; Mold fermentations – Tempeh, Soy sauce & Rice wine and Mycoprotein; Genetically Modified Foods (GMF).

Unit – IV

Milk – Composition, Microflora and Prevention of Microbial contamination; Products from Milk; Lactic acid bacteria; Bacteriocin production and its health benefits; Diseases caused by Lactic acid bacteria; Concept of Probiotics & Prebiotics; Lactic starter cultures; Fermented dairy products – Cheese, Butter, Cream Yogurt and Fermented milk; Spoilage and defects of Fermented dairy products; Testing of Milk and its products; Microbiology of Ice cream and related products.

Unit – V

Food borne infection and intoxication; Seafood Toxicants; Mycotoxins in Agricultural food crops; Biosensors in Food; Food wastes and its types; Microbiology of Food products preparation; Codes of Good Manufacturing Practices; Government Regulatory Practices and Policies – FDA, EPA, HACCP, ISI, BIS and FSS; Enforcement and Control Agencies; Microbiological criteria for food; Recent trends and development in Food Technologies in India; Current Research Thoughts in Food Microbiology.

Text Books

- William C. Frazier and Dennis C. Westhoff. 2013. Food Microbiology, 5th Edition, McGraw Hill, New York.
- James M. Jay, Martin J. Loessner and David A. Golden. 2005. Modern Food Microbiology, 7th Edition, Springer Publications, United States.
- Martin R. Adams and Maurice O. Moss. 2008. Food Microbiology, 3rd Edition, RSC Publishing, United Kingdom.
- Vijaya, R. K. 2004. Food Microbiology. 1st Edition, MJP Publishers, Chennai, India.

References

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.
- Casida, L. E. 2007. Industrial Microbiology, New Age International Publishers, New Delhi, India.
- Reed, G. 2004. Prescott and Dunn's Industrial Microbiology, 4th Edition, CBS Publishers and Distributor, New Delhi, India.

Semester – IV

5 Hours/5 Credits

MB1002 - INDUSTRIAL MICROBIOLOGY

Objectives

- To impart theoretical knowledge of role of microbes in Industrial production of different bioproducts.
- To describe the industrial Fermentation processes.
- To explain the Construction, Design and Operation of Fermentor.
- To encompass the use of Industrially important microorganisms in the manufacture of food or industrial products.
- To study the use of microorganisms for the production of Antibiotics, Vaccines, Organic acids, Organic solvents, Amino acids, Vitamins and Industrial enzymes.

Unit – I

History of Industrial Microbiology; Industrially important microorganisms; Comparison of Bacterial and Fungal fermentation; Primary and Secondary metabolites from microorganisms; Bioproducts – Classification, Types and Advantages; Types of Fermentation process – Batch fermentation, Fedbatch fermentation & Continuous fermentation; Methods of Fermentation – Submerged fermentation & Solid state fermentation; Design of Fermentor; Factors affecting Fermentor design; Types of Fermentor; Industrial Sterilization of Fermentor and Air; Fermentation economics; Computer control of Fermentation process.

Unit – II

Difference between Wild strains and Industrial strains; Industrial strains – Characteristics, Screening techniques, Industrial strain development methods, Preservation of Industrial strains and Preparation of Inoculum; Fermentation medium – Composition and Sterilization; Downstream Processing; Foam formation and Antifoam agents.

Unit – III

Microbial production of Antibiotics (Penicillin, Streptomycin & Tetracyclines), Vaccines (Hepatitis – B Vaccine & Rabies Vaccine), Organic acids (Citric acid, Acetic acid, Lactic acid & Gluconic acid) and Amino acids (Glutamic acid & Lysine); Microbial assay of Antibiotics and Amino acids.

Unit – IV

Microbial production of Vitamins (Vitamin – B₂, B₁₂, & Vitamin – C) and Enzymes (Amylases, Proteases & Pectinases); Microbial assay of Vitamins and Enzymes; Production of SCPs – Bacterial proteins, Actinomycetous proteins, Fungal proteins and Algal proteins; Biopolymers – Classification, Properties, Applications and Industrial production of Polyhydroxyalkanoates (PHAs) and Poly-lactic acid (PLA); Production of Biodiesel, Biological Hydrogen and Biogas.

Unit – V

Yeasts and its industrial uses; Production of Baker's Yeast *Saccharomyces cerevisiae*; Factors influencing the selection of Baker's Yeast for Fermentation; Contaminants during production of Baker's Yeast; Production of Food Yeast & Fodder Yeast; Microbial production of Solvents (Bioethanol, Glycerol & Acetone – butanol) and

Alcoholic beverages (Beer & Wine); Factors affecting Alcohol fermentation; Current Research Thoughts in Microbial Fermentation Technology.

Text Books

- Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.
Casida, L. E. 2007. Industrial Microbiology, New Age International Publishers, New Delhi, India.
Waites, M. J. 2007. Industrial Microbiology, Blackwell Publishing Company, United Kingdom.
Stanbury, P. T and A. Whitaker. 2005. Principles of Fermentation Technology, Pergamon Press, New York.

References

- Reed, G. 2004. Prescott and Dunn's Industrial Microbiology, 4th Edition, CBS Publishers and Distributor, New Delhi, India.
Crueger, W and Crueger, A. 2000. Biotechnology: A Test Book of Industrial Microbiology, Second Edition, Panima Publishing Corporation, New Delhi, India.
William C. Frazier and Dennis C. Westhoff. 2013. Food Microbiology, 5th Edition, McGraw Hill, New York.
Martin R. Adams and Maurice O. Moss. 2008. Food Microbiology, 3rd Edition, RSC Publishing, United Kingdom.

Semester – IV

4 Hours/3 Credits

MB1003A - ELECTIVE: MICROBIAL BIOTECHNOLOGY

Objectives

- To learn the basic tools in Microbial Biotechnology.
- To study the various Immobilization techniques.
- To understand the various concepts of Recombinant DNA Technology and Microbial products.
- To understand the production of Microbial Biotechnology products.
- To emphasize on IPR issues and need for knowledge in patents in Biotechnology.

Unit – I

Biotechnology – Definition, Various branches and Scope; Metabolites from Microorganisms – Primary and Secondary metabolites; Microbial production of Industrial enzymes; Enzyme immobilization – Immobilization techniques and Advantages; Industrial application of Enzymes.

Unit – II

Recombinant DNA technology – Principles and applications; Cutting and joining enzymes in rDNA technology; List of Protein products from rDNA Technology; Genetic engineering of microbes for Plant improvement; Hair root culture and their applications; Recombinant Vaccines; Microbial synthesis of Pharmaceutical products – Recombinant Vaccines, Insulin, Interferon, Hormones, Monoclonal antibodies and Polyclonal antibodies; Steroid transformations - Substrates, Typical structures, Microorganisms, Inoculum preparation, 11-hydroxylation, process and Recovery.

Unit – III

Production of Microbial biotechnology products – Xanthan, Dextran, Biosurfactants, Steroids transformation and Polyhydroxyalkanoates (PHA & PHB); Biofuels – Bioethanol, Biodiesel, Biological Hydrogen and Biogas; Microbiology of Methane production - Methanogenesis; Biopolymers – Classification, Properties, Applications and Industrial production of Polyhydroxyalkanoates (PHAs) and Poly-lactic acid (PLA); Production of Microbial Pesticides.

Unit – IV

SCP (Algae & Yeast) – List of organisms, Cultivation Techniques, Advantages and Disadvantages; SCP cultivation from wastes; Genetically modified foods; Recombinant Microbes; Transgenic Animals; Transgenic

Organisms in Agriculture and Aquaculture; *Agrobacterium* mediated transfer; Synthetic Biology; Gene therapy; Stem cell therapy; Stem cell research – Reproductive cloning and Therapeutic cloning.

Unit – V

Animals used for laboratory experiments; Care and Maintenance for Laboratory animals; Ethics in Animal experimentation; Ethical issues in Human Gene Therapy; Protection of Biotechnological inventions – Patent protection, Trade secrets and Plant Breeder's Rights; Biowarfare and Bioterrorism; Current Research Thoughts in Microbial Biotechnology.

Text Books

- Dubey, R. C. 2014. A Text Book of Biotechnology, 5th Edition, S. Chand Publishing, India.
Satyanarayana, U. 2005. Biotechnology, 1st Edition, Books and Allied (P) Ltd., Kolkata, India.
Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.
Casida, L. E. 2007. Industrial Microbiology, New Age International Publishers, New Delhi, India.

References

- Old, R. S and S. B. Primrose. 2006. Principles of Gene Manipulation, 7th Edition, Blackwell Scientific Publications, London.
Jogdand, S. N. 2005. Gene Biotechnology, Himalaya Publishing House, Mumbai, India.
Singh, B. D. 2012. Biotechnology, 5th Edition, Kalyani Publishers, Chennai, Tamil Nadu, India.
Kumarasan, V. 2001. Biotechnology, Published by Saras Publication, Nagercoil, Tamil Nadu, India.

Semester – IV

4 Hours/3 Credits

MB1003B - ELECTIVE: MICROALGAL TECHNOLOGY

Objectives

- To learn the basic tools in Microbial Biotechnology.
- To learn about classification, characteristics of microalgae.
- To formulate algal cultures and importance of culture collections.
- To learn Upstream and Downstream techniques of microalgae.
- To analyze the benefits of Microalgae for this universe.

Unit – I

Microalgae – Characteristics, Habitat, Distribution, Morphology, Reproduction (Asexual & Sexual) and Life cycle; Cyanobacteria; Diatoms; Algal identification (Microscopic examination) and Cultivation in Culture medium; Photosynthesis in Microalgae; Freshwater algae and Marine algae; Economical importance of Microalgae.

Unit – II

Photobioreactor based Microalgal production; Downstream processing; Heterotrophic production; Mass cultivation in Circular – Tubular column, Raceway pond and Pit method; Mass cultivation of *Chlorella*, *Spirulina* and *Dunaliella*; Algal bloom; Factor influence Algal growth – Nutrients, Temperature and Light.

Unit – III

Microalgal proteins and peptides; SCP – Advantages, Disadvantages and Pigments – Carotenoids, Phycocyanin & Phycoerythrin; Growth promoting substance from Microalgae; Extracellular polymeric Substance; Microalgal Toxins.

Unit – IV

Microalgae in Human welfare –Nutraceuticals, Pharmaceuticals, Biofertilizers and Pollution control; Biofuels – Biodiesel, Biobutanol, Biohydrogen and Bioethanol; Nanoparticles from microalgae; Algae in Transgenic; Antimicrobials from microalgae; Algal food colorants; Microalgae in CO₂ sequestration; Algae in Space.

Unit – V

Targeted Genetic Modifications: Genome shuffling and Evolutionary Engineering of Microalgae; Application of Microalgae in Synthetic biology; Bioluminescence; Quorum sensing in Microalgae – Introns, CRISPR-CAS discovery, Mode of action and Application; Current Research Thoughts in Microalgal Technology.

Text Books

- Amrik, S. A. 2003. Phycology: Principles, processes and applications. Daya Publishing House, New Delhi, India.
- Steve, P. 2009. Protozoans, Algae & Other Protists, Capstone Press, USA.
- Hoek, C., Mann, D. G and Jahns, H. M. 1995. Algae - An Introduction to Phycology, 39; Cambridge University Press, UK.
- Sharma, O. P. 2001. Textbook of Algae. Tata McGraw Hill Company, New Delhi, India.

References

- Ismail, R., Sanjay K. Gupta, Amritanshu, S., Poonam, S., Sheena, K and Faizal, B. 2016. Microalgae Applications in Wastewater Treatment. 7th Edition, New India Publication, New Delhi, India.
- Biris, E. S., Maria, T., Tania, M., Radu, M and Antonia, O. 2016. Applications of Microalgae in Wastewater Treatments. ProEnvironment, India.
- Stephen, J. O. 1993. Bacteria, Algae, and Protozoa - Cold Spring Harbor Laboratory Press, USA.
- Sarabhai, B. P and Arora, C. K. 2005. Textbook of Algae. Anmol Publishing Pvt. Ltd. New Delhi, India.

Semester – IV

4 Hours/3 Credits

MB1003C - ELECTIVE: PROBIOTIC MICROBIOLOGY

Objectives

- To acquire the knowledge and utilization of Probiotics and Prebiotics in our daily life.
- To develop the Entrepreneurial Skill production and assessment of Probiotic microbes.
- To list out the Commercial probiotic strains.
- To explain the definition and types of Probiotics.
- To characterize the limitation and dosage of Probiotics

Unit – I

Gastrointestinal tract architecture; Intestinal microbiota; Functions of Endogenous microflora; Gastrointestinal microbiota and regulation of the immune system; Factors affecting the Gut microbial balance; Role of enteric pathogens in Gastrointestinal diseases; Treatment and prevention of Gastrointestinal disease - Antibiotics, Probiotics, Prebiotics, Synbiotics.

Unit – II

History of Probiotics; Features of Probiotics; Types of Probiotics - Human probiotics and Animal probiotics; Forms of Probiotics; Probiotic territorial colonization; Physiological effects and Mechanism of action of Probiotics; Side effects and safety profile of Probiotics; Limitations of Probiotics; Dosage of Probiotics; Prebiotics - Definition and Prebiotics vs. Probiotics; Prebiotics in Diet and Health benefits.

Unit – III

Probiotic strains - Lactic acid bacteria (LAB): *Lactobacillus*, *Leuconostoc*, *Pediococcus*, *Lactococcus*; Actinobacteria: *Bifidobacteria*, *Streptomyces* and *Oerskovia*; Fungi - *Saccharomyces*, *Candida* and *Aspergillus*.

Others Probiotic strains: *Escherichia coli*, *Bacillus* and *Enterococcus*; Commercial Probiotic strains; Genetically Modified Probiotics (GMP).

Unit – IV

In vitro assessment of Probiotic microbes – Survivability, Acid resistance, Bile salt resistance, Pepsin resistance and Pancreatin resistance; Colonization properties - Aggregation, Hydrophobicity, Adhesion with intestinal epithelial cell lines, Mucin adhesion assay, Biofilm forming ability, Hemolytic activity and Antibiotic resistance; Functional properties - Antimicrobial activity, Bacteriocin production, Bile salt hydrolase activity and Production of digestive enzymes; *In vivo* assessment of probiotic microbes in chicken model.

Unit – V

Adaptation factors - Stress resistance, Cell envelope integrity, DNA repair and Protein repair; Transport and Hydrolysis of bile (*bsh* gene); Adhesion factors - S layer and Mucus binding proteins (*mub* gene), LTA, EPS and PG; Health promoting factors - Microbe - Microbe interaction, Production of Antimicrobial peptides and Competitive exclusion; Genetic tools used for the identification of Adaptation and Probiotic factors; Current Research Thoughts in Probiotic Microbiology.

Text Books

- William C. Frazier and Dennis C. Westhoff. 2013. Food Microbiology, 5th Edition, McGraw Hill, New York.
- Kenji Sonomoto and Atsushi Yokota. 2011. Lactic acid bacteria and *Bifidobacteria*, Caister Academic Press Publisher, China.
- Charalampopoulos, Dimitris, Rastall and Robert. 2009. Prebiotics and Probiotics. Science and Technology, Springer Publication, USA.
- Nicholas Joseph Talley and Christopher J. Martin. 2006. Clinical Gastroenterology: A practical problem-based approach, Elsevier Publication, USA.
- Gary B. Huffnagle and Mairi Catherine Noverr. 2008. GI microbiota and regulation of the immune system, Springer Publication, USA.

References

- Malago. 2011. Probiotic Bacteria and Enteric Infections: Cytoprotection by Probiotic Bacteria, Springer Publication, USA.
- Wolfgang Kneifel and Seppo Salminen. 2011. Probiotics and Health Claims, John Wiley and Sons Publication, UK.
- Natasha Trenev, 1998. Probiotics: Nature's Internal Healers, Penguin Publication, India.
- Dash, Allan N. Spreen and Beth M. Ley. 2000. Health Benefits of Probiotics. BL Publications, India.
- Yuan Kun Lee and Seppo Salminen. 2008. Handbook of Probiotics and Prebiotics, Wiley-Interscience Publication, UK.

Semester – IV 0 Hours/2 Credits

SSP: COMPREHENSIVE MICROBIOLOGY

Objectives

- To understand the overall concept of all fields of Microbiology.
- To provide knowledge about basic and advanced concepts in Microbiology.
- To compare the characteristics of various categories of microorganisms.
- To train the student for their Competitive exams (NET) like ARS/ASRB/CSIR.
- To motivate the students to participate in Microbiology Competitive exams.

Learning Outcomes

Students will gain knowledge about the overall concepts of Microbiology and it will be helpful for them

Unit – I (History of Microbial world)

History, Development and Scope of Microbiology; Evolution of Microbial life; Theory of Spontaneous generation; Prokaryotes; Eukaryotes; Archaeobacteria; Techniques used in Identification and Classification of bacteria; Important groups of Prokaryotes - Photosynthetic bacteria, Blue Green Algae, *Mycoplasma* and Actinobacteria; Heterotrophic bacteria; Nitrobacteria; Nitrogen fixing bacteria; Cyanobacteria; Lactic acid bacteria; Halophiles; Thermophiles; Acidophiles; Methanogens; Structure of Virus; Classification of Virus; Lytic and Lysogenic cycle; Plant viruses; Viroids.

Unit - II (Microbial Ecology and Physiology)

Principles of Microbial Ecology; Microbiology of Ecosystems – Soil, Rhizosphere and Phyllosphere; Water – Fresh water and Marine; Air Microbiology; Microbial interactions – Symbiosis, Synergism, Commensalism, Parasitism, Amensalism, Antagonism and Predation; Adaptation of microorganisms to various Ecosystems; Microbial growth curve; Mathematical expression of growth – Continuous and Batch culture; Diauxic and Synchronous growth; Microbial nutrition; Bacterial Metabolism – Aerobic and Anaerobic respiration; Electron Transport Chain; Microbial Photosynthesis; Oxidative and Substrate level Phosphorylation; Biosynthesis of Cell wall; Protein breakdown by microbes.

Unit - III (Soil Microbiology)

Soil Microorganisms – Major groups, Decomposition of organic matter and Soil health; Root exudates and Rhizosphere effects; Manipulation of rhizosphere microflora in plant productivity; Microbial Biomass; Nitrogen cycle – Ammonification, Nitrification and Denitrification; Microbial transformation of Phosphorous, Sulphur and Minor nutrients; Role of biofertilizers in agriculture and forestry; Bioremediation of soil; PGPR and their mode of action; Formation and composition of soil organic matter: Fulvic acid and Humic acid.

Unit - IV (Environmental Microbiology and Basic Microbiological Techniques)

Isolation and preservation of different types of microorganisms; Methods of Sterilization and Disinfection; Microscopy – Optical microscope, Phase contrast microscope, Fluorescent microscope, Dark field microscope and Electron microscope; Microbial assay of Vitamins, Enzymes and Antibiotics; Pollution of water, soil and air; Role of microorganisms in Pollution, Sources of pollution and their disposal; Management of Solid and Liquid organic wastes; Composting; Biogas; Water purification; Sewage treatment; Water borne diseases; Water management.

Unit –V (Microbial Biotechnology)

Industrial production of metabolites – Organic acids, Alcohols, Antibiotics; Fermentor design and types; Control of fermentation process – Batch, Fedbatch and Continuous; Downstream processing in fermentation industry; Production of Single Cell Protein (SCP) – SCP as food and feed; Production of Probiotics (Bioactive foods), Hormones, Biofertilizers and Biopesticides; Phytoremediation; Microbiology of raw and processed food; Fermented food – Vinegar, Wine, Sauerkraut, Pickles, Cheese and Yoghurt; Food preservation, contamination and spoilage; Food borne illness and intoxication; Food as substrate for microorganisms; Microflora of meat, fish, egg, fruits, vegetables, juices, flour and canned foods; Biodegrading microbes.

Text Books

- Gerard J. Tortora, Berdell R. Funke and Christine L. Case. 2015. Microbiology – An Introduction, 12th Edition, Pearson Publishers, San Francisco.
- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- Satyanarayana, U. 2005. Biotechnology, 1st Edition, Books and Allied (P) Ltd., Kolkata, India.
- Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
- Subba Rao N.S. 1999. Soil Microbiology, 4th Edition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.

References

- Dubey, R.C. and D. K. Maheswari. 2010. A Text book of Microbiology. 3rd Edition, S. Chand and Company, New Delhi.
- Chakraborty. 2003. A Text book of Microbiology. 2nd Edition, Published by New Central Book Agency (India) Ltd., Kolkata.
- Pelczar Jr. M. J., Chan, E. C. S and Kreig, N. R. 2006. Microbiology. 5th Edition Mc Graw Hill Inc. New York.
- William C. Frazier and Dennis C. Westhoff. 2013. Food Microbiology, 5th Edition, McGraw Hill, New York.
- Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.
- Casida, L. E. 2007. Industrial Microbiology, New Age International Publishers, New Delhi, India.
- Waites, M. J. 2007. Industrial Microbiology, Blackwell Publishing Company, United Kingdom.

Semester – III & IV 5 Hours/5 Credits

PMP1001 - PRACTICAL – III: BIOINOCULANT, COMPOSTING AND MUSHROOM TECHNOLOGY

- Isolation, Purification, Mass production and Formulation of Nitrogen fixing bacteria – *Rhizobium* sp., *Azotobacter* sp. and *Azospirillum* sp.
- Isolation, Purification, Mass production and Formulation – *Bacillus subtilis* and *Pseudomonas fluorescens*, *Trichoderma viride* and *Beauveria bassiana*.
- Isolation of Phosphate solubilizers from Soil.
- Study of Phylloplane microflora by Leaf impression method.
- Estimation of Plant growth promoting substance produced by PGPR.
- Antagonistic activity of Biocontrol agents.
- Assessment of AM colonization in roots.
- Different formulations of Bioinoculants.
- Method of application and Quality control.
- Mass cultivation of *Azolla* and BGA.
- Preparation of Microbial Compost and Vermicompost.
- Analysis of Physical, Chemical and Microbial characteristics of Microbial Compost and Vermicompost.
- Substrates preparation for Mushroom cultivation.
- Spawn production for Mushroom cultivation.
- Sterilization process and Media preparation for Mushroom cultivation
- Cultivation of Milky mushroom and Oyster mushroom

Semester – III & IV

5 Hours/5 Credits

PMB1002 - PRACTICAL – IV: ENVIRONMENTAL AND FOOD MICROBIOLOGY

- Assessment of Milk quality by MBRT and Resazurin method.
- Enumeration of microorganisms in Milk by Direct Microscopic Count and SPC Method.
- Enumeration of microorganisms in Water by SPC Method.
- Estimation of Physical parameters of Waste water.
- Bacteriological examination of water by MPN test.
- Isolation and enumeration of microorganisms from Air.
- Isolation and enumeration of microorganisms from Fruits and Vegetables.

Isolation and enumeration of Antibiotic producing fungi from soil.
Estimation of Soil enzymes - Urease and Phosphatase.
Extracellular enzyme activities – Amylase, Cellulase, Protease and Lipase.
Preparation of Immobilized Sodium alginate beads.
Isolation of Fungi from spoiled Bread.
Isolation of Cellulose, Phenol and Pesticide degrading bacteria.
Determination of inhibitory effect of Food preservatives.
Isolation and Microscopic examination of Yeast from Grapes.
Media formulation and Cultivation of *Spirulina platensis*
Microscopic examination, Growth analysis and Extraction of *Spirulina platensis*.
Extraction of Pigments from microorganisms.

B. A. HISTORY

Year/Semester: I Year / I Semester

Code: HT103

Credits: 5

Hours/Week: 5

HISTORY OF INDIA UP TO 712 A.D.

Objectives:

- To impart the main features of the cultural heritage of early India.
- To enable the students to learn the political, social, economic and religious condition of India.

Unit – I: Sources: Archaeological sources – Literary sources – Foreign accounts – Geographical Features – Pre and Proto-history: Paleolithic Age – Mesolithic Age – Neolithic Age – Chalcolithic Age – Indus Valley Civilization.

Unit – II: Aryans and Vedic Period: Expansion of Aryans in India – Rig Vedic Period – Later Vedic Period: Political – Social and Economic life – Evolution of Monarchy and Varna System – Mahajanapadas – Emergence of Jainism and Buddhism.

Unit – III: Mauryan Empire: Chandragupta – Bindusara – Ashoka: Concept of Dharma – Edicts – Administration – Economy – Art and Architecture – Disintegration of the Empire.

Unit – IV: Post-Mauryan Period: Sungas – Kanvas – Indo-Greeks – Sakas – Kushanas: Art and Architecture – Kharavelas – Satavahanas.

Unit – V: Gupta and Post Gupta Period: Political History – Administration – Art and Architecture – Literature – Harsha Vardhana – Arab Conquest of Sind.

Outcomes:

- The student can understand the cultural foundations of India and its gradual achievements over the years.
- The student would have a background understanding of the socio – economic, political and religious developments shaping India in its early phase.

Text Books:

1. Khurana K.L., Ancient India, Lakshmi Narain Agarwal, Agra, 2001.
2. Mahajan V. D., Ancient India, S. Chand & Co., New Delhi, 2019.

Books for Reference:

1. Basham A.L., The Wonder that was India, London, Macmillan, 2004.
2. Luniya B.N., Evolution of Indian Culture, Agra, Lakshmi Narain Publication, 2005.
3. Majumdar R.C., Raychaudhuri H.C. and Datta K., An Advanced History of India, Macmillan, Chennai, 2004.
4. Romila Thapar, The Penguin History of Early India: From the Origins to AD 1300, New Delhi, Penguin Books, 2002.
5. Sathyanatha Aiyar R., A Political and Cultural History of India, Madras, Viswanathan & Co., 1980.
6. Sharma L.P., History of Ancient India, New Delhi, Vikas Publisher, 1981.
7. Upinder Singh, A History of Ancient and Early Medieval India: From the Stone Age to the 12th Century, Pearson, New Delhi, 2008.

Year/Semester: I Year / I Semester

Code: HT104

Credits: 5

Hours/Week: 5

HISTORY OF TAMIL NADU UP TO 1336 A.D.

Objectives:

- To become aware of the political, social and economic developments of Tamilnadu.
- To enable the students to learn the cultural contribution of ancient Tamils.

Unit – I: Sources – Geographical Features – Sangam Age – Cheras – Cholas – Pandyas – Administration – Society – Economy – Literature – Kalabhra Interregnum.

Unit – II: Pallavas: Origin – Early Pallavas and Later Pallavas – Political, Social and Economic Conditions – Bhakthi Movement – Art and Architecture – Literature – First Pandyan Empire.

Unit – III: Imperial Cholas – Vijayalaya – Raja Raja – I and Rajendra – I – Later Cholas: Kulothunga I – Administration – Social, Economic and Religious Conditions – Art and Architecture – Disintegration.

Unit – IV: Second Pandya Empire: Maravarman Sundara Pandyan I – Jatavaraman Sundra Pandya I – Maravarman Kulasekara Pandya – Administration – Social, Economic and Religious Conditions – Art and Architecture.

Unit – V: Muslim Invasions: Malik Kafur – Khusru khan – Ulugh khan – Establishment of Madurai Sultanate – Subordinate Chieftains of Medieval Period – Overseas contact of the Tamils.

Outcomes:

- The student knows the formation of various ruling dynasties and the consequent socio – economic and political developments in Tamilnadu.
- The student would understand the enriched cultural contribution of the Tamils.

Text Book:

1. Devanesan A., History of Tamil Nadu, Marthandam, Renu Publication, 2004.
2. Subramaniam N., History of Tamilnad upto 1336 A.D., Koodal Publishers, Madurai, 1972.

Books for Reference:

1. Chopra P.N., Ravindran T.K. and Subramaniam N., History of South India: Ancient, Medieval & Modern, Delhi, Chand and Co., 2010.
2. Kanakasabhai V., The Tamils Eighteen Hundred Years Ago, New Delhi, Asian Educational Services, 1979.
3. Manoranjithamoni. C, History of Tamilnadu upto 1565 AD, Dave – Beryl Publications, Tirunelveli, 2012.
4. Nilakanta Sastri K. A., A History of South India: From Pre-historic Times to the Fall of Vijayanagar, Oxford University Press, Madras, 1958.
5. Nilakanta Sastri K. A., The Colas, University of Madras, 2000.
6. Pillai K.K., A Social History of the Tamils, University of Madras, 1975.
7. Srinivasa Iyengar P.T., History of the Tamils: From the Earliest Times to 600 A.D., New Delhi, Asian Educational Services, 1989.

Year/Semester: I Year / I Semester

Code: AH111

Credits: 4

Hours/Week: 6

Allied – I: PRINCIPLES OF TOURISM

Objectives:

- To enable the students to understand the importance of tourism.
- To study about the development of tourism as an industry.

Unit – I: Nature and Scope of Tourism – Origin and Growth – Basic Components and Elements – Importance of Tourism.

Unit – II: Types of Tourism: Cultural – Adventure – Sports – Religious – Medical – Business – Ethnic and Ecotourism.

Unit – III: Tourism Product and Marketing: Characteristics, Nature and Types Products – Marketing Services – Familiarization Tours – Marketing Research.

Unit – IV: Tourism and Contemporary Issues: Tourism as an Industry – Role of Information Technology – Environmental Concerns – Human Rights and Tourism – Emerging Trends in Tourism.

Unit – V: Impact of Tourism: Social, Economic and Cultural Impact of Tourism – Multiplier Effect – Tourism and International Trade – Tourism and International Understanding: Manila Declaration.

Outcomes:

- It would enable the students to realize the significance of tourism for a nation.
- The students absorb the nuances on the evolution of tourism.

Text Book:

1. Barkat A. M. A., Travel and Tourism Management, New Delhi, Prentice Hall India Learning, 2015.
2. Bhatia A. K., Tourism Development: Principles and Practices, New Delhi, Sterling Publishers, 1983.

Books for Reference:

1. Charles R. Goeldner and Brent Ritchie J. R., Tourism: Principles, Practices, Philosophies, John Wiley & Sons, New Jersey, 2009.
2. Gill Pushpinda S., Dynamics of Tourism, Anmol Publication, Delhi 1999.
3. Kunal Chattopadhyay, Economic Impact of Tourism Development: An Indian Experience, Kanishka, 1995.
4. Lajipathi Raj H., Development of Tourism in India, Ropa Books, Hyderabad, 1993.
5. Page Stephen J., Tourism Management, New York, Routledge, 2015.
6. Parveen Sethi, Hand Book of Tourism, Anmol Publication, New Delhi, 1999.
7. Parveen Sethi, Millennium Trends in Travel and Tourism, Rajat Publication, Delhi 2002.
8. Percy. K. Singh, 50 years of Indian Tourism, Kanishka Publishers, Delhi, 1998.
9. Pran Nath Seth, Successful Tourism Management, New Delhi, Sterling Publishers, 1997.
10. Romila Chawla, Coastal Tourism and Development, Sonali Publications, New Delhi, 2004.
11. Sunetra Roday, Archana Biwal, Vandana Joshi, Tourism: Operations and Management, New Delhi, Oxford University Press, 2009.

Year/Semester: I Year / II Semester

Code: HT203

Credits: 5

Hours/Week: 5

HISTORY OF INDIA (712 – 1526 A.D.)

Objectives:

- To enable the students to acquire knowledge about the role of Rajputs and Delhi Sultanate.
- To enable the students to learn the economic and religious policies pursued by the great rulers.

Unit – I: Impact of Arab's Invasion – Rajputs – Pratiharas – Palas – Chauhans – Rashtrakutas – Invasions of Muhammad Ghazni and Muhammad Ghori.

Unit – II: Slave Dynasty: Consolidation of the Delhi Sultanate – Qutb-Ud-Din Aibak – Iltutmish – Sultan Razia – Balban – Khalji Dynasty: Jalal-Ud-Din Khalji – Ala-Ud-Din Khalji.

Unit – III: Tughlaq Dynasty: Ghiyas-Ud-Din Tughlaq – Muhammed Bin Tughlaq – Feroz Tughlaq – Timur's Invasion.

Unit – IV: Sayyids and Lodis – Decline of the Sultanate – Administration – Social and Economic Condition – Art and Architecture.

Unit – V: Vijayanagar Empire: Polity and Administration – Social and Economic Condition – Art and Literature – Bahmani Kingdom.

Outcomes:

- The students are exposed to political and administrative aspects of the medieval period.
- It facilitates the understanding of the Delhi Sultanate's society, economy and culture.

Text Book:

1. Khurana K.L., History of India: Earliest Times to 1761 A.D., Lakshmi Narain Agarwal, Agra, 2006.
2. Mahajan V. D., History of Medieval India, S. Chand & Co., New Delhi, 2019.

Books for Reference:

1. Chaurasia R. S., History of Medieval India: From 1000 A.D. to 1707 A.D, New Delhi, Atlantic, 2002.
2. Habibullah ABM., The foundation of Muslim Rule in India, Central Book Depot, Allahabad, 1976.
3. Lanepoole, Medieval India, Universal Publication, Delhi, 1971.
4. Majumdar R. C., Raychaudhuri H.C. and Dutt R.C., An Advanced History of India, Macmillan, Chennai, 2004.
5. Mehta J.L., Medieval India, Sterling Publication, New Delhi, 1979.
6. Natarajan S., and Prema Ramakrishnan, Political and Cultural History of India, Secunderabad, 1991.
7. Satish Chandra, Medieval India, Part I & II, New Delhi, NCERT, 1971.
8. Sharma L.P., Medieval India, Konark Publication, New Delhi, 1993.
9. Srivastava M.Y., Society and Culture in Medieval India, Allahabad, Chugh Publication, 1975.
10. Srivastava A.L., History of India 1000 to 1707, Shivalal Agarwal Publication, Agra, 1976.
11. Tripathi R. P., Some Aspects of Muslim Administration, Central Book Depot, Allahabad, 1992.

Year/Semester: I Year / II Semester

Code: HT204

Credits: 5

Hours/Week: 5

HISTORY OF TAMIL NADU (1336 – 1947 A.D.)

Objectives

- To become aware of the political, social and cultural developments of Tamilnadu.
- To enable the students to understand the impact of British administration and the role of Tamilnadu in freedom movement.

Unit – I: Sources – Tamilnadu under Vijayanagar Rule – Nayaks of Madurai, Tanjore and Senji: Political, Social, Economic and Cultural Contributions.

Unit – II: Marathas of Tanjore – Marava kingdoms of Ramnad and Sivaganga – Thondamans of Pudukottai – Nawabs of Arcot: Zulfiqar Ali Khan, Sadatullah Khan and Muhammad Ali.

Unit – III: Advent of the Europeans: Portuguese – Dutch – Danes – French – English – Anglo – French conflict in the Carnatic – Anglo Mysore Wars.

Unit – IV: Tamilnadu under the British Rule – Ryotwari Settlement – Christian Missionaries: Tamil Revivalism and Education – Poligar Rebellion – Vellore Mutiny – Social and Religious Reformers: Ramalinga Adigal, Vaikunda Swamigal, Rettamalai Srinivasan and Iyothee Thass Pandithar.

Unit – V: Role of Tamilnadu in the Freedom Movement – Political Awakening: Madras Native Association – Madras Mahajana Sabha – Justice Party – Self – Respect Movement – Dravidar Kazhagam.

Outcomes:

- The students would realize the socio – economic and political developments under various rulers up to the arrival of European powers in Tamilnadu.
- The British rule, various reform movements and freedom struggle as well as the governance of Tamilnadu after independence as a focal point of understanding.

Text Books:

1. Devanesan A., History of Tamil Nadu, Marthandam, 2004.
2. Subramaniam N., Social and Cultural History of Tamilnad (1336 – 1984 A.D.), Ennes Publications, Udumalpet, 1994.

Books for Reference:

1. Chopra P.N., Ravindran T.K. and Subramanian N., History of South India, Chand and Co. Delhi, 1979.
2. Eugene F. Irshick, Politics and Social Conflict in South India, The Non-Brahman Movement and Tamil Separatism, 1916-1929, Bombay, OUP, 1969.
3. Kanakasabhai V., The Tamils Eighteen Hundred Years Ago, Asian Educational Services, New Delhi, 1979.
4. Rajayyan K., History of Tamilnadu, (1565-1965), Madurai Publishing House, Madurai, 1977
5. Sathyanatha Aiyar R., History of the Nayaks of Madura, University of Madras, 1980.
6. Srinivasan C.K., The Maratha Rule in the Carnatic, Annamalai University, 1944.
7. Varghese Jeyaraj S., Social-Economic History of Tamil Nadu (1565-1967), Uthamaalayam, Anns Publication, 2017.
8. Vriddhagirisan V., The Nayaks of Tanjore, Asian Educational Service, New Delhi, 1955.

Year/Semester: I Year / II Semester

Code: AH211

Credits: 4

Hours/Week: 5

Allied – II: TOURISM AND TRAVEL MANAGEMENT

Objectives:

- To enable the students to understand the origin and development of tourism in India.
- To make them to know about the importance of travel management and the relative role of regional, national and international organisations.

Unit – I: International Tourism Organisations: United Nations World Tourism Organisations (UNWTO) – International Air Transport Association (IATA) – United Federation of Travel Agents Association (UFTAA) – Pacific Asia Travel Association (PATA).

Unit – II: Tourism in India: Development of Tourism – Sargent Committee – Tourist Information Offices – Ministry of Tourism – Department of Tourism – India Tourism Development Corporation – State Tourism Development Corporation – Tamilnadu Tourism Development Corporation (TNTDC).

Unit – III: Travel Agents and Tour Operators: Types of Travel Agencies – Functions – Sources of Income – Types of Tour Operators – Package Tours.

Unit – IV: Tourism Regulations: Travel Regulations – Economic Regulations – Health Regulations – Law and Order Regulations.

Unit – V: Tourism Management: Accommodation – Modes of Transport – Indian Railway Catering and Tourism Corporation (IRCTC) – Dimensions of Domestic and International Tourism.

Outcomes:

- The student will understand the growth of tourism since independence of India.
- The student would know the various issues on tourism planning and the role of various national and international organisations.

Text Books:

1. Barkat A. M. A., Travel and Tourism Management, New Delhi, Prentice Hall India Learning, 2015.
2. Bhatia A. K., Tourism Development: Principals and Practices, New Delhi, Sterling Publishers, 2018.

Books for Reference:

1. Charles R. Goeldner and Brent Ritchie J. R., Tourism: Principles, Practices, Philosophies, John Wiley & Sons, New Jersey, 2009.
2. Gill Pushpinda S., Dynamics of Tourism, Anmol Publication, Delhi 1999.
3. Kunal Chattopadhyay, Economic Impact of Tourism Development: An Indian Experience, Kanishka, 1995.
4. Lajipathi Raj H., Development of Tourism in India, Ropa Books, Hyderabad, 1993.
5. Page Stephen J., Tourism Management, New York, Routledge, 2015.
6. Parveen Sethi, Hand Book of Tourism, Anmol Publication, New Delhi, 1999.
7. Parveen Sethi, Millennium Trends in Travel and Tourism, Rajat Publication, Delhi 2002.
8. Pran Nath Seth, Successful Tourism Management, New Delhi, Sterling Publishers, 1997.
9. Sunetra Roday, Archana Biwal, Vandana Joshi, Tourism: Operations and Management, New Delhi, Oxford University Press, 2009.

Year/Semester: II Year / III Semester

Code: HT303

Credits: 5

Hours/Week: 5

HISTORY OF INDIA (1526 – 1707 A. D.)

Objectives:

- To enable the students to understand the condition of India for the establishment of Mughal Empire.
- To enable students to learn the major political, social and cultural developments during the Muslim Rule.

Unit – I: Foundation of the Mughal Empire: Sources – India on the Eve of Babur’s Invasion – Babur – Humayun – Sher Shah and his Administration.

Unit – II: Consolidation of the Empire: Akbar: Rajput Policy – Religious Policy – Jahangir – Nur Jahan – Shah Jahan.

Unit – III: Aurangzeb – Deccan policy – Religious policy – North – West Frontier policy – Rise of Marathas under Shivaji.

Unit – IV: Mughal Administration – Social and Economic Conditions – Sufi Movement – Bakhti Movement – Art and Architecture – Literature.

Unit – V: Decline of the Mughal Empire – Popular Revolts: Jats – Satnamis – Afghans – Sikhism – Advent of the Europeans.

Outcomes:

- The students realize the administrative and economic developments of the medieval period.
- The students understand the contributions of the Imperial Mughals.

Text Books:

1. Sharma L. P., History of Medieval India, New Delhi, Konark Publication, 1993.
2. Khurana K.L., History of India (1526 – 1967 A.D.), Agra, Lakshmi Narain Agarwal, 1995.

Books for Reference:

1. Bakshi S. R., Advanced History of Medieval India, New Delhi, Anmol Publication, 2002.
2. Banerjee A.C., New History of Medieval India, New Delhi, S. Chand & Co., 1990.
3. Chandra, Satish, History of Medieval India (1800-1700), Orient Black Swan, 2009.
4. Irfan Habib, The Agrarian system of Mughal India (1556 – 1707), Bombay, Asia Publishing House, 1957.
5. John F. Richard, The New Cambridge History of India, Cambridge University Press, 1996.
6. Lanepoole, Medieval India, Universal Publication, Delhi, 1971.
7. Mehta J.L., Advanced Study in the History of the Medieval India (1000 – 1526 A.D.), Sterling Publishers, New Delhi, 1989.
8. Nurul Hasan S., Religion, State and Society in Medieval India, Oxford University Press, New Delhi, 2005.
9. Srivastava A.L., History of India 1000 to 1707, Shivlal Agarwal Publication, Agra, 1976.
10. Tripathi R. P., Some Aspects of Muslim Administration, Central Book Depot, Allahabad, 1992.
11. Vincent A. Smith, The Oxford History of India, New Delhi, OUP, 2002.

Year/Semester: II Year / III Semester

Code: HT304

Credits: 5

Hours/Week: 5

HISTORY OF INDIA (1707 – 1857 A. D.)

Objectives:

- To enable the students understand the establishment and consolidation of the British Rule in India.
- To study the factors for the emergence of national consciousness against the foreign rule.

Unit – I: Advent of Europeans: Portuguese – Dutch – English and French East India Companies: Carnatic Wars – Battle of Plassey – Third Battle of Panipat – Battle of Buxar.

Unit – II: Consolidation of the Company's rule: Dual Government – Permanent Revenue Settlement – Subsidiary Alliance – Reforms of William Bentinck – Doctrine of Lapse.

Unit – III: Native Resistance to the Company's Rule: Anglo-Mysore Wars – Anglo-Sikh wars – Anglo-Maratha Wars – South Indian Rebellion.

Unit – IV: Constitutional Development – Regulating Act – Pitt's India Act – Charter Acts of 1793, 1813, 1833 and 1853.

Unit – V: Indian Response to British Rule: Peasant Movements and Tribal Uprisings in the 18th and 19th Centuries: The Kol Rebellion – The Mopla Rebellion – The Santal Rebellion – Great Revolt of 1857: Cause, Nature, Failure and Consequences.

Outcomes:

- The student understands the arrival of Europeans and the consolidation of British Rule in India.
- The student has knowledge on the challenges to the British rule and the constitutional developments.

Text Book:

1. Grover B.L., Grover S., A New Look at Modern Indian History, New Delhi, S. Chand & Co., 2004.
2. Khurana K.L., History of India (1526 – 1967 A.D.), Agra, Lakshmi Narain Agarwal, 1995.

Books for Reference:

1. Banerjee A.C., The New History of Modern India, Delhi, Bagchi & Co, 1983.
2. Bayly C.A., An Illustrated History of Modern India 1600-1947, Bombay, Oxford University Press, 1991.
3. Desai A.R., Social Background of Indian Nationalism, Popular Prakashan, Bombay, 1976.
4. Majumdar R.C., Raychaudhuri H.C. and Dutt R.C., An Advanced History of India, Macmillan, Chennai, 2004.
5. Percival Spear, The Oxford History of India 1740 – 1975, New Delhi, Oxford University Press, 2000,
6. Rajayyan K., History of Tamilnadu, (1565 – 1965), Madurai Publishing House, Madurai, 1977
7. Ramachandran C., East India Company and the South Indian Economy, Madras, New Era Publications, 1980.
8. Sekhar Bandyopadhyay, From Plassey to Partition: A History of Modern India, New Delhi, Orient Longman, 2004.
9. Thompson Edward & Garratt G.T., A History of British Rule in India, Delhi, Atlantic Publishers, 1999.

Year/Semester: II Year / III Semester

Code: AH309

Credits: 4

Hours/Week: 5

Allied – III: Principles of Public Administration

Objectives

- It briefly traces upon the core elements of Public Administration that includes problems in administration.
- It incorporates the Budget and other financial aspects of administration.

Unit – I: Nature, Scope and Importance of Public Administration – Different Approaches – Relations with Other Social Sciences – Public and Private Administration.

Unit – II: Organization – Theories: Classical Theory – Human Relations Theory – Principles of Organization: Hierarchy – Span of Control – Unity of Command – Centralization VS Decentralization – Formal and Informal Organizations.

Unit – III: Chief Executive – Line, Staff and Auxiliary Agencies – Departments – Public Corporations – Independent Regulatory Commissions.

Unit – IV: Personnel Administration – Recruitment and Training – Classification of Services – Promotion – Retirement – Association.

Unit – V: Financial Administration – Budget and its Principles – Process of Budget Making – Parliamentary Control Over Finances – Accounting and Auditing.

Outcomes:

- The students understand the theories and key factors governing public administration.
- The students would realize the structure of public administration and its financial management highlighting budget and control.

Text Book

1. Vishnoo Bhagwan & Vidya Bhushan – Public Administration, S. Chand & Co. New Delhi, 2006.

Books for Reference:

1. Avasthi A. and Maheswari S.R., Public Administration, Lakshmi Narain Aggarwal, Agra 1996.
2. Bidyut Chakrabarty and Prakash Chand – Public Administration in a Globalizing World, Sage Publications, New Delhi, 2012.
3. Felix A., Nigro & Lloyd G.Nigro – Modern Public Administration, Harper and Row, London, 1973.
4. Pandey A.K., Handbook of Public Administration, Dominant pub, New Delhi, 2005.

Year/Semester: II Year / IV Semester

Code: HT403

Credits: 5

Hours/Week: 5

HISTORY OF INDIA (1858 – 1947 A. D.)

Objectives:

- To learn the significance of Queen's Proclamation and the policy of the British Government on India Administration.
- To understand the emergence of Indian National Congress and its role for the liberation of India.

Unit – I: Queen's Proclamation – Reforms of Lord Ripon and Lord Curzon – Socio – Religious Reform Movements: Brahma Samaj, Arya Samaj, Prarthana Samaj, Theosophical Society, Wahabi Movement, Aligarh Movement.

Unit – II: Indian National Movement – Formation of the INC – Moderates – Extremists – Partition of Bengal – Swadeshi Movement – Formation of Muslim League – Minto Morley Reforms – Lucknow Pact – Home Rule Movement – Montague Chelmsford Reforms.

Unit – III: Gandhian Era: Rowlat Act and Jallianwalabagh Massacre – Khilafat Movement – Non Cooperation Movement – Swaraj Party – Simon Commission – Civil Disobedience Movement – Round Table Conferences – Gandhi-Irwin Pact – Communal Award and Poona Pact.

Unit – IV: Government India Act of 1935 – Congress Ministries and Provincial Autonomy — The August Offer – Individual Satyagraha – Indian National Army (INA) – The Cripps Mission – Quit India Movement.

Unit – V: C. Rajagopalachari Formula – Wavell Plan – Shimla Conference – INA Trial – Cabinet Mission – Mahatma Ali and The Idea of Pakistan – Mohammed Ali Jinnah and Two Nation theory – Mountbatten Plan – Indian Independence Act.

Outcomes:

- The students would understand the role of political and reform movements under the crown rule, leading to Constitutional Advancements.
- The students come to know the consolidation of independent struggle under Gandhiji and the challenges of partition and independence.

Text Book:

1. Bipan Chandra, India's Struggle for Independence, Penguin Books, New Delhi, 1989.

Books for Reference:

1. Ahluwalia M. M., Freedom Struggle in India 1858 to 1909, Delhi, Ranjit Printers and Publications, 1968.
2. Chhabra G.S., Advanced Study in The History of Modern India, 1920 – 1947, Sterling Publishers, New Delhi, 1984
3. Chopra P.N., Quit India Movement, Publication Division, New Delhi, 1992.
4. Damodaran Vinita & Maya Kumar: Postcolonial India, New Delhi, Manohar, 2000.
5. Majumdar R.C., Raychaudhuri H.C. and Kali Kinkar Datta, An Advanced History of India, Macmillan, New Delhi, 2001.
6. Pran Chopra, Uncertain India: A Political Profile of Two Decades of Freedom, Asia Publishing House, Bombay, 1968.
7. Sekhar Bandyopadhyay, From Plassey to Partition: A History of Modern India, Orient Longman, New Delhi, 2004.
8. Sumit Sarkar, Modern India 1885 – 1947, Macmillan, New Delhi, 1983.
9. Tara Chand, History of Freedom Movement in India, Publication Division Ministry of India, New Delhi, 1983.

Year/Semester: II Year / IV Semester

Code: HT404

Credits: 5

Hours/Week: 5

CONTEMPORARY HISTORY OF INDIA (1947 – 2014 A. D.)

Objectives:

- To understand and update knowledge on Contemporary issues and challenges
- To prepare the students for competitive examinations.

UNIT – I: Nehru Era – Constitution making – Integration – Five Year Plans – India’s Foreign Policy: Panch-Sheela and NAM – Kashmir Issue – Sino – Indian War of 1962.

UNIT – II: Lal Bahadur Shastri – Domestic Policy – Indo – Pak War of 1965 and Tashkent Agreement – Indira Gandhi: 1966 – 1975 – Internal Reforms – Indo – Soviet Treaty of Friendship – Indo – Pak War of 1971 and Simla Agreement.

UNIT – III: Jayaprakash Narayan and Total Revolution – Indira Gandhi and Emergency – Janata Government: Internal Reforms and Foreign Policy – Re-Emergence of Indira Gandhi: Khalistan Issue and Operation Blue Star.

UNIT – IV: Rajiv Gandhi: Programmes and Policies – Rajiv – Jayewardene Accord and Creation of SAARC – V.P. Singh and National Front Government – P.V. Narashima Rao: New Economic Policy – Ayodhya Issue and Emergence of BJP.

UNIT – V: Changing Trends in Coalition Governments: United Front Governments – NDA and UPA Coalition Governments – Economic Reforms – Consolidation of Economic Development – Growth of Science and Technology – Foreign Policy Directions.

Outcomes:

- It enables the students to grasp the challenges faced in the making of the Constitution of independent India, five year plans and India’s war with the neighbours.
- It enables the students on current affairs as well as the challenges of successive governments to facilitate their preparation for competitive examination.

Text Book:

1. Bipan Chandra, Mridula Mukherjee and Aditya Mukherjee – India since Independence, New Delhi, Penguin, 2008.
2. Venkatesan G., History of Contemporary India, Madurai, J.J. Publication, 2001.

Reference Books:

1. Bipan Chandra, Communalism in Modern India, Delhi, Vikas Publications, 1987.
2. Christophe Jaffrelot, India Since 1950, New Delhi, Yatra Books, 2012.
3. Dutt, V.P., India’s Foreign Policy, New Delhi, Vikas Publications, 1993.
4. Grover, B.L., and Grover, S. A New Look at Modern Indian History, New Delhi, S. Chand & Co., 2004.
5. Ira Pande, India 60: Towards a New Paradigm, New Delhi, HarperCollins, 2007.
6. Keswani K.B., History of Modern India (1800 – 1984 A.D.), Bombay, Himalaya Publishing House, 1985.
7. Mahajan, V.D., History of Modern India (1919 – 1982), New Delhi, Chand & Co. 2004.
8. Pal R., Brass, The Politics of India since Independence, New York, Cambridge University Press, 2001.
9. Ramachandra Guha, India After Gandhi, Noida, Picador, 2008.
10. Satish Chander, Fifteen Years of Indian Independence 1947 – 1962, Delhi, Culture Meeting Publications, 1963.
11. Shashi Tharoor, India: From Midnight to the millennium, New Delhi, Penguin Books, 2000.
12. Venkatesan G., History of Contemporary India, Rajapalayam: V.C. Publications, 2016.

Year/Semester: II Year / IV Semester

Code: AH409

Credits: 4

Hours/Week: 6

Allied – IV: Outlines of Comparative Governments

Objectives:

- To make the students understand the state and its important organs including judiciary that maintains balance between the pillars of government.
- To study the role of pressure groups and political parties for the effective functioning of democracy.

UNIT – I: State and its Elements – Unitary and Federal – Forms of Governments: Monarchy – Democracy – Dictatorship.

UNIT – II: Constitutions: Aristotle’s classification of Constitutions – Modern classification: Written – Unwritten – Rigid and Flexible Constitutions – Amendments: USA and Switzerland.

UNIT – III: Theory of Separation of Powers – Legislature: Types and Functions – Direct Legislation.

UNIT – IV: Executive: Types and Functions – Judiciary – Rule of Law – Administrative Law – Judicial Review.

UNIT – V: Political Parties – Types and Functions of Political Parties – Adult Suffrage – Pressure Groups.

Outcomes:

- It makes the students to understand state and its elements, types of constitutions and the significance of the theory of separation of powers.
- The students would realize the types and functions of executives and the role of judiciary as well political parties in a state.

Text Book

1. Agarwal R.C., Political Theory: Principles of Political Science. New Delhi, S. Chand & Co. 2002.

Reference Books:

1. Eddy Asirvatham & K.K. Mishra, Political Theory. New Delhi, S. Chand & Co. 2004.
2. Ray S. N., Modern Comparative Politics, New Delhi, Prentice – Hall, 1999.
3. Rout B.C., Political Theories: Concepts and Ideologies. New Delhi, S. Chand & Co. 1987.
4. Vidya Dhar Mahajan, Political Theory: Principles of Political Science, New Delhi, S. Chand & Co. 2013.
5. Wheare K. C., Federal government, London, oxford University Press, 1963.

PG Diploma in MEDICAL LABORATORY TECHNOLOGY

| | | | | |
|----|--------|---|---|---|
| II | BCD209 | Advanced Molecular Laboratory Techniques | 5 | 4 |
|----|--------|---|---|---|

**Course
Objectives:**

- To learn the fundamentals of nucleic acid blotting techniques.
- To explore the Polymerase Chain Reaction.
- To understand the basic concepts of DNA sequencing.
- To give basic ideas about how Hybridization are useful in research investigation.
- To get familiar with the Radio isotopic techniques.

Unit - I: Nucleic acid Blotting Techniques – Principle, instrumentation, types – southern,northern,Dot, western blotting, colony and plaque blotting and its applications

Unit - II: PCR [Polymerase Chain Reaction]- source, Principle, instrumentation, applications and its types.

Unit - III: DNA sequencing –Maxam and Gilbert technique, Dideoxy nucleotide method, DNA sequencing by primer walking, Chromosome walking, chromosomal jumping, RFLP and chromosomal aberrations, DNA fingerprinting and genome analysis.

Unit - IV: Hybridization - Tissue *in situ* hybridization; relationship of *in situ* hybridization to other molecular methods of immunohistochemistry, technical consideration and methodology; HLA DNA polymorphism, and parentage testing.

Unit - V: Radio isotopic techniques – Principle, instrumentation and applications of Dilution studies, dynamic function test, organ scanning auto radiography and radio immuno assay

Reference Books

- Sathyanarayana.U. Biotechnology
- Henry, John Bernard, Todd Sanford and Davidson, 2002. Clinical diagnosis and management by laboratory methods. W.B. Saunders& Co
- Fischbach Francis A, 2003. Manual of laboratory and diagnostic tests. Philadelphia,J.B. Lippincott& Co, N.Y.
- Gradwohls, 2000. Clinical laboratory methods and diagnosis ed.Alex.C. Sonnenwirth& Leonard Jarret.M.D.B.I.Publications, New Delhi,
- Sood, R, 2005, Medical Laboratory methods and interpretation, Jaypee brothers medical publications, New Delhi.

| Semester | Course Code | Title of the Course | Hours/Week | Credits |
|----------|-------------|------------------------------|------------|---------|
| VI | BCD210 | Human Pathogens & Body Fluid | 5 | 4 |

Course Objectives:

- To acquire broad knowledge on human pathogens, its symptoms, causes and treatment.
- To understand the fundamentals concepts in bacteriology, virology and mycology.
- To know the basics of source and mode of action of Viruses and fungi infecting the humans.
- To comprehend the formation, collection and functions of Amniotic and Cerebrospinal fluids.
- To exhibit skills on the formation, collection and functions of Serous fluid and other body fluids.

Unit-I: Bacteriology: Symptoms, causes and treatment of pathogenic and non-pathogenic bacterias. Pathogenic Bacteria-TB, Salmonella typhi, vibrio cholera, Clostridium tetani coli, bifidobacteria, -Non-Pathogenic Bacteria- Staphylococcus, lactobacillus, Escherichia bacteroides and *Brevibacterium linens*.

Unit-II: Virology: Classification, Source and mode of action of Human Viruses – HIV, HSV, Swine flu (H1 N1), chicken guinea, Rota virus, Ebola virus, SAARS, Dengue, Corona, Adenovo virus, Hepatitis and Bacteriophage.

Unit-III: Mycology: Dimorphic fungi causing systemic Mycoses, Diamataeaceous Fungi, agents of Zygomycosis, Fungi causing Eumycoticmycetoma.

Unit-IV: Amniotic & Cerebrospinal fluid

Amniotic Fluid: Formation and function of amniotic fluid, Chemical composition, Collection, Testing – Alpha fetoprotein, Acetyl cholinesterase, Neural tube defects, Chromosomal abnormalities, Haemolytic disease of new born, Gestation age, Fetal maturation. Cerebrospinal fluid: Formation, Specimen collection, Chemical analysis, Microbiologic examination, Immunologic tests, Cytological examination and clinical correlation.

Unit-V: Serous fluid & other body fluids

Formation, Collection, Classes of effusions, Cell types and clinical correlations. Lymph, Gastric fluid, Urine, Faeces, Seminal fluid, Sputum and sweat, Biomarker evaluation in body fluids for specific therapeutic prognostic and /or diagnostic potential.

Reference Books

Richard, D.G., C.B., Slack, J.F. Penthere, 1996. Medical Microbiology. Churchill Livingstone, USA.
 Chatterjee, 1986, Medical Parasitology, Tata McGraw Hill, India.
 Pelczar, M.J., E.C.S. Chan., Krieg, N.R, 1996. Microbiology, Tata McGraw Hill, India.
 Tortora, G.S., Grabowski, S.R., Principles of Anatomy & Physiology, 1996, 8th edition, Harper Collins, NY.
 Guyton & Hall., Textbook of Medical Physiology, 2000, 10th edition, Elseiner, New Delhi.
 June H. Cella, Juanita Watson, Manual of Laboratory Tests, 2004, Aitbs Publishers, New Delhi
 Elkinton & Danowski, The Body Fluids, 2002, Williams & Wilkins, Baltimore

Lab Course – III

Urine Analysis and Stool Examination

5 Hrs / week

4 Credits

Practical - III

I. Urine Analysis

i. Collection and physical examination:

Collection of urine, Types of preservative, physical examination; Volume, colour, odour, appearance, specific gravity and pH.

ii. Chemical examination

Reducing sugar-Benedict test, protein:- Heat and acetic acid test, and sulfosalicylic acid method, Ketone bodies-Roth's test, Bile pigment (Fouchet method), bile salt (Hay's test), Urobilinogen-Ehrlich aldehyde test and Bence Jones protein test, Renal clearance test-urea, creatine, Test for mucin.

iii. Microscopical Examination

Microscopic examination; Identification of casts and crystals and blood cells-RBC, WBC, SE epithelial cells, smear for gram staining and urine culture.

II. Stool Analysis

i. Collection and physical examination:

Collection of fecal specimen, preservation, physical examination; volume, colour, odour and appearance.

ii. Chemical examination:

reducing sugar, occult blood test Demonstration of fat in stool, detection of steatorrhoea.

iii. Microscopic Examination

Concentration method, direct centrifuge floatation method and ether extraction method for ova and cysts. Identification of crystals, meat fibers, fat globules and blood cells. Culture especially for enriched group of organisms.

III. Salivary Analysis: Salivary Cortisol

IV. Tears Analysis

V. Other Body fluid Analysis

Seminal fluid, Amniotic fluid and CSF

Reference Books

1. Sabitrisanyal-(1991): Text book of pathology, first edition,
2. June H.cella- (1994): Manual of laboratory test, AITBS publishers.

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| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|-------------------------|-------|---------|
| I | MSDH123 | Human Resource Planning | 4 | 5 |

Diploma in Human Resources Management

Unit I: Human Resource Planning (HRP) (9 Hours)

Significance and methods of HRP and methods of Forecasting, Demand and supply forecasting, Objectives of HRP, Model of HRP, Job Analysis, Job Specification, Job Description, Job evaluation, linking HRP with strategic business plan and organizational goals.

Unit II: Sources of Recruitment (9 Hours)

Recruitment plan and methods, Recruitment policy, Features of a good recruitment policy, Employee Referral Initiatives, E-Recruitment /Online recruitment Technique-Recent trends in Recruitment, Evaluation of a recruitment program.

Unit III: Selection & On Boarding Process (9Hours)

Selection: Selection- Process, Methods, Test, Interview Techniques, Skills Analysis
Placement: differences between recruitment and selection. Placement Induction: significance of on boarding process -Purpose – Objectives - How to make on boarding process more effective-Socialization process

Unit IV: Career Management (9 Hours)

Procedure & Program, Demotion, Transfer- Purpose and Procedure-types-separations, VRS, terminations- Dismissals, suspension, retrenchment, layoffs, resignations

Unit V: Effective HRP (9 Hours)

Ethical issues in Recruitment and Selection, Attrition and Retention Strategies, Importance of Social Media in Recruitment and Selection Process, Enhancing the effectiveness of recruitment & Selection.

References

Heneman III. H.G, Judge. T.A, R.L. Heneman, (2014), Staffing Organizations, McGraw-Hill Education.

Seema Sanghi, (2014), Human Resource management, Macmillan publishers Pvt Ltd.

C.J. Jr, (2014), Interviewing: Principles and Practices, 14th edition, McGraw-Hill.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---|-------|---------|
| I | MSDH124 | Industrial Relations And Employee Welfare | 4 | 5 |

Monica Belcourt, Kenneth McBey, Ying Hong, Margaret yap, (2013), Strategic Human Resource Planning, 5th edition, Cengage Learning.

Unit I: Introduction of Industrial Relations(9 Hours)

Overview of Industrial Relations : Concept of Industrial Relations; Nature of Industrial Relations; Objectives of IR; Evolution of IR in India ; Role of appropriate Government; Employers' Organisation; ILO (International Labour Organization) in IR.

Unit II: Trade Union(9 Hours)

Trade Union :origin,Evolutionand growth - concept, objectives, functions and role of Trade Unions in collective bargaining; problems of Trade Unions. Industrial Disputes – Impact – Causes – Strikes - Prevention – Industrial Peace – Settlement Machinery- Conciliation – Arbitration – Adjudication.

Unit III: Employee Welfare Measures(9 Hours)

Concept – Objectives – Scope – Need – Voluntary Welfare Measures – Statutory Welfare Measures - Labour Welfare Funds – Education & Training Schemes.

Unit IV: Employee Health and Safety(9 Hours)

Industrial Safety-Causes of Accidents – Prevention – Safety Provisions – Industrial Health and Hygiene – Importance – Problems – Awareness on safety standards - Safety Audit - Occupational Hazards – Diseases – Psychological problems – Counseling – Statutory Provisions.

Unit V: Labour Management(9 Hours)

Welfare of Special Categories of Labour- Child Labour – Female Labour – Contract Labour –

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|----------------------|-------|---------|
| II | MSDH221 | Employee Legislation | 4 | 5 |

Construction Labour – Agricultural Labour – Differently abled Labour– CPO & KPO Labour- Social Assistance – Social Security – Implications.

References

Mamoria C.B. and SathishMamoria, Dynamics of Industrial Relations, Himalaya PublishingHouse, New Delhi, 2007.

C.S.VenkataRatnam,Globalisation&Labour Management Relations,Sage Response; 1st edition,2001.

Unit I: Introduction to Employee Legislation(9 Hours)

Introduction to the Historical Dimensions of Labor & Employee Legislation in India - Labor Protection & Welfare - Social Security & Social Justice - System of Economic Governance -Principles of Labour Legislation – Labour and the Constitution

Unit II: Labor Legislation Acts(9 Hours)

Factories Act 1948 – Maternity Act 1961 - Contract Labour Act 1970 – The Shops and Establishment Act 1947 – The Trade Union Act 1926 – The Industrial Disputes Act 1947.

Unit III: Employee Welfare Acts(9 Hours)

Payment of Wages Act 1936 – Payment of Bonus Act 1965 – Payment of Gratuity Act 1972.

Unit IV: Social Security and Miscellaneous Acts(9 Hours)

The Role of Human Capital – Organised and UnorganisedLabour – UnorganisedLabour Act -Workmen’s Compensation Act – The Employees Pension Scheme.

Unit V: Legal Aspects of Employees(9 Hours)

Quality of Life of Workers - Governance of Enterprises – Views on the Role of Labor Legislation - Gender Dimensions of Labor Laws – Pros and Cons of Legal System

References

P.L. Malik, Industrial Law, Eastern Book Company, New Delhi, 2011

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------------|-------|---------|
| II | MSDH222 | Compensation and Benefits | 4 | 5 |

C.S. Venkata Ratnam, Globalization And Labour-Management Relations - Dynamics Of Change, Response Books, 2001

Biswajeet Pattanayak, Human Resource Management, PHI Learning, New Delhi

Vipin Gupta Et al , Creating Performing Organizations: International Perspectives For Indian Management, Response Books

Unit I: Compensation Management (9 Hours)

Compensation and Organizational Strategy – Lifestyle and Compensation – Pay and Social Class

– Reward System – Compensation System – Compensation Dynamics – Rates of Pay – Compensation Program – Jobs and Pay in India.

Unit II: Compensation Act (9 Hours)

Strategic and Tactical Compensation Issues – Employees - a Critical Resource – Division of Labour – Pay Relationships – Legislation and Compensation – Indian Legal System – Minimum Wages Act, Employee Compensation Act, Apprenticeship Act, Bonus Act.

Unit III: Managing of Employee Job (9 Hours)

Job Analysis – Gaining Employee Acceptance – Collecting and Describing Job Data – Job Facts

– Job Contract – Elements of Job Descriptions – Job Requirements and Pay – Job Evaluation – Job Ranking – Market Pricing Approach – Maturity Curve Method.

Unit IV: Employee Job Evaluation (9 Hours)

Polifactor Method of Job Evaluation – Job Evaluation Committee – Determining the Need for a Survey – Preparing for the Survey – Identifying Survey Methods – Designing the Survey – Using Third Party Surveys.

Unit V: Administration of Performance Appraisal on Pay (9 Hours)

Pay Structure Architecture – Pay for Performance – Application of Motivation Theories –

Merit Pay –Performance Appraisal Issues and Opportunities – Designing a File Content – Short Term Incentives – Premium and Differentials – Individual Based Bonus and Rewards- Long Term Incentive and Deferred Compensation Plan – Executive Compensation – International Competition – Benefits Administration – Employee Benefits – QWL and Pay Administration

Reference

Richard I. Derson, “Compensation Management”, Pearson Education, 2016

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--------------------------|-------|---------|
| II | MSDH223 | Training and Development | 4 | 5 |

Unit I: Introduction of Training & Development (9 Hours)

Definition – Scope – Objectives and, Benefits of training – The role of Training in Organizations

Place of Training in Organizational structure – A training process Model – Difference between Training and Development.

Unit II: Gathering Training Needs (9 Hours)

Training Needs Analysis : - Organizational Analysis, Operational analysis, Personal Analysis – Approaches to Training Needs Analysis Business –training need -Job Description – Competencies – assessment – training gap analysis.

Unit III: Training & Development Design (9 Hours)

Training Design – Factors – Organizational constraints – Developing objectives-Facilitation of learning – Focus on Trainee Learning – Design – Organizational intervention – Design theory –Outcome of design.

Unit IV: Methods of Training and Online Learning (9 Hours)

Training Methods and Aids – Lectures and Demonstrations – Discussion Methods – ComputerBased Training – Programmed Instruction - Intelligent Tutoring Systems, Classroomlearning Online Learning-Blended learning.

Unit V: Evaluation of Training & Development (9 Hours)

Training Evaluation – Types and methods of Evaluation – Evaluation Designs – Implementationof Evaluation Systems.

Reference

Janakiraman B. – Training and Development – Biztantra/Wiley Dreamtech – 2005

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------|-------|---------|
| II | MSDH224J | Project | 4 | 5 |

The objective of this course is to prepare the student to conduct a research study of an Industry / organization utilizing the tools and techniques learned in period of study. The focus of the study could be in depth analysis of an industry or a diagnostic problem solving exercise of an organization. The student is expected to conduct a detailed survey of literature. In case of a statusreport of an industry, it is expected that the student collects all aspects related to a particular industry analyze data and present the findings.

PROJECT WORK REPORTFRAMEWORK

Initial pages

Executive Summary

Introduction / statement of problem

Detailed survey of literature

Methodology / Focus / Scope / Limitations

Text of the study including analysis

Conclusions and Recommendations

Bibliography

Appendices

FORMAT OF PRESENTATION

The student in expected to follow the required style for presentation of the report including Tables, References, Bibliography and Appendices

Literature Survey should be related to the problem of study. Review of the studies in the area and critical examination of them including conclusions of the student should form part of the literature survey.

Acknowledgement of all sources of information through footnoting and bibliography is an essential requirement of the study.

PG DIPLOMA IN IMPORT AND EXPORT MANAGEMENT

| Sem ester | Cour se Code | Title of the Course | H ou rs | Cr edi ts |
|--------------|---------------------|---|---------------|-----------------|
| I | MSD I121 | EXIM Policy & Export Procedur e & Documen tation | 5 | 5 |

UNIT-I Introduction to export policy & procedure (9 Hours)

Preliminaries for exports. (a) Registration – IEC, RCMC, EPC, Central Excise. (BCMC *changed to RCMC*)- Categories of Export - Physical – Direct & Indirect, Deemed Exports, Merchant & Manufacturer Exports.

UNIT-II Terms for export (9 Hours)

Shipping documents and terms used in shipping- Export Procedures - Excise clearance for exports, Marine insurance of Export cargo, Shipment goods, Quality and Pre-Shipment inspection, EGC Services, GSP rules of origin.

UNIT-III Export benefits (9 Hours)

Benefits of Exports - Excise clearance Benefit / Rebate, Income Tax Benefit (*IPRS is discontinued*)- Shipment & Transport – Sea, Air, Rail, Road, Pipeline - Role of overseas agent & remittance of commission.

(Recent EXIM Policy existing at the time of commencement of the course.)

UNIT- IV Export promotion scheme (9 Hours)

Overview of various export promotion schemes- Duty Drawback- Advance License- Export Promotion Capital Goods Scheme - Diamond & Jewelry, Agricultural & Pharmaceutical product exports promotion scheme.

UNIT-V Export of principal**(9 Hours)**

Export of Principal Commodities in India -SEZ, EHTP, STP & EOU's, Types of Export Houses.
(Free trade zones have been changed to SEZ)

References:

How to Export – Nabhi Publications, 2018

EXIM Policy & Handbook of EXIM Procedure – VOL I & II, 2018

Mahajan, a Guide on Export Policy Procedure & Documentation, Snow white Publications,
2009

D.C. Kapoor, Export Management, Schand Publications, 2007

| Semes ter | Cours e Code | Titl e of the Cou rse | Ho urs | Cre dits |
|----------------------|-----------------------------|---|-------------------|---------------------|
| I | MSDI 122 | Basi cs of Exp ort and Imp ort | 5 | 5 |

Unit- 1 Introduction

(9 Hours)

Global trade and its growth, India's relative position in the world trade over a period time.
Analysis of India's Foreign trade since 1950- Commodity, composition, direction Changes.
Balance of trade, balance of payment.

Unit-2 Procedure

(9 Hours)

Registration of Firms- PAN No- IE code no- EPC, Central Excise .

Unit- 3 Export & Exporters

(9 Hours)

Category of Exports: Direct, Indirect Third Party Category of Exporters; Manufacturer and Merchant Exporters

Unit- 4 Benefits

(9 Hours)

Duty Drawback- Advance Authorization -Scheme Duty free Import Authorization- Export Promotion Capital Goods

Unit- 5 Import & Foreign Trade

(9 Hours)

Procurement: Planning -Identification Selection of Suppliers- Terms of Payment. Foreign Trade: Trends of Exports and Imports of India- Composition of India's Foreign Trade- Direction of India's Foreign Trade- Growth and Structure of India's Foreign Trade.

References:

- Export Import procedure and documentation, Kushpat Jain, Oscar Publications, Delhi, 2018
- Export-Import and Logistics Management, Usha Kiran Rai, PHI Learning Pvt. Ltd, 2017
- Foreign Exchange Hard Book By H. P. Bhandari, 2015
- Annual Report (recent years) Ministry of Commerce, Government, 2020
- Exports – Do it Yourself, Mahajan M.I., Snow White Publications, New Delhi, 2017
- Import – Do it Yourself, M. I. Mahajan, Snow White Publications, New Delhi, 2018

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---|-------|---------|
| I | MSD I123 | International Logistics and Supply Chain Management | 5 | 5 |

Unit –I Introduction to logistics management (9 Hours)

Logistics Management: Concepts – Importance – Elements of the logistic System – Marketing and logistic mix - Logistics and marketing interface.

Unit – II Shipping transport (9 Hours)

Shipping Industry: Types of ships – Shipping systems: linear, Tramp, conference, chartering, Baltic freight exchange – Shipping intermediaries: agent, forwarder, brokers and others – containerization – types of containers.

Unit – III Air transport (9 Hours)

Air transport: Air freight – IATA – Cargo handling – Designing the International Information system – system modules – Distribution and Transportation.

Unit – IV Supply chain (9 Hours)

Supply chain: Definition – scope and importance of supply chain – supply chain drivers and metrics - Designing supply chain network: Distribution network – Factors influencing distribution.

Unit – V Forecasting and Planning in SCM (9 Hours)

Forecasting and planning in supply chain management – Pricing in supply chain management- co-ordination in supply chain management- Role of IT in supply chain management.

Reference Books

Chopra S and P Meindl “Supply chain management: Strategy, planning and operations”,

Himalaya Publications, 2014.

David P, "International Logistics" Biztantra, New Delhi , 2013.

Donald J Bowersox Davi J Class" Logistics Management, Tata Mc.Graw Hill, New Delhi, 2014.

David Stewart,"International Supply chain Management", Cengage publications, 2008.

| Sem ester | Cour se Code | Title of the Course | H ou rs | Cre dits |
|------------------|---------------------|----------------------------------|----------------|-----------------|
| I | MSD I124 | Internat ional Econom ics | 5 | 5 |

UNIT-I Introduction of international economics (9 Hours)

Study of International Trade, Difference between Internal & International Trade, International trade & Economic Development.

UNIT-II Economic development (9 Hours)

Theories of International Trade Classical, Hecker Ohlin theorem. Trade and Economic Development- Hickian Theory, Terms of Trade, Determination of Gains, Technical progress and trade.

UNIT-III International trade (9 Hours)

Balance of Payments, Definitions & Concepts - Foreign Trade & National Economy – Factor Mobility, Full Employment & Perfect Competition, Free Trade, System of Barter Trade, Static World Economy - Limitations to the Growth of International Trade.

UNIT-IV Theories on international economics (9 Hours)

Trade Problems of Less Developed Countries – CFS, GATT & UNCTAD, International Commodity Agreements, Common Fund Scheme - Optimum Currency Area Theories – Open Economic Theory, Product Diversification theory, Cost Benefit Theory & Other International

Theories.

UNIT-V International liquidity & world monetary system (9 Hours)

International Liquidity & the World Monetary System – IMF & International Liquidity, Operation of IMF, Repurchase Clause of IMF, Subsequent Reforms of IMF, International Monetary System - World Trade Organization (WTO), World Bank, Asian Development Bank, European Union.

References:

D. M. Mithani, International Economics, Himalaya Publication House, 2013.

H. G. Mannur, International Economics, vikas publishing house, 2015.

Berg Hendrik Van Den, International Economics, Taylor and Francis, 2014.

Robert Carbaugh, International Economics, Cengage Learning, 2014.

| Sem ester | Cour se Code | Title of the Course | H ou rs | Cre dits |
|------------------|---------------------|---|----------------|-----------------|
| II | MSD I221 | Internat ional Finance & Foreign Exchan ge Manage ment | 5 | 5 |

UNIT- I International finance management

(9 Hours)

Importance – Finance Functions – Emerging Challenges – Recent changes in global financial markets- Impact of Change in exchange rates – interest rates – inflation rates – accounting treatments of transactions, translation and operating exposures.

UNIT- II- Foreign exchange market

(9 Hours)

Markets and Market Participants- Foreign Exchange transaction mechanism (Option – forward contract – arbitrage – hedging and swaps) – Pricing pattern-Exchange Rate principles: Trade – PPP – IRP – IFE – Portfolio – Balance – Demand and Supply Growth – BOP Monetary Approach-

Role of Swap, Currency futures and options in International Market.

UNIT- III Financing of international trade

(9 Hours)

Trade financing techniques-instruments for both capital and money market (including pre & Post Shipment Finance) - Foreign investment Management: FDI - National FDI policy – Liberalization- Economic determination - Impact of globalization.

UNIT-IV Foreign portfolio investments

(9 Hours)

Management of foreign Exchange with special reference to India: Meaning- Concept-importance- Exchange Market- Statutory basis of Foreign Exchange- Evolution of Exchange Control- Outline of Exchange Rate & Types- Import & Export Overview.

UNIT- V India's forex scenario

(9 Hours)

Balance of payment: crisis of 1990- L.E.R.M.S(Liberalized Exchange Rate Management System) - Convertibility- Introduction to International Monetary Development: Gold Standard, Bretton Woods system- Fixed & Flexible Exchange Rate Systems- Euro Market. Non resident accounts : Repatriable and Non-Repatriable- Significance for the Economy & Bank- Open Account Clean Advance- Documentary Credit- Documentary Collection- Financing of Imports & Exports.

References:

Esha Sharma, Foreign Exchange Management - H.P. Bhardwaj, 2017

CA Sudha, G Bhushan, Foreign Exchange Management Wolters Kluwer, 2016

P. G. Apte, International Financial Management -, Mcgraw Higher Ed, 2014

V. K. Bhalla, International Financial Management -, Anmol Publications Pvt.Ltd, 2012.

| Se me ster | Cou rse Cod e | Title of the Cours e | H o u r s | C re di ts |
|---------------------------|----------------------------------|---|----------------------------------|-------------------------------|
| II | MS DI2 22 | Intern ational Marke t Resear ch | 5 | 5 |

UNIT- I Introduction of international market research (9 Hours)

International Marketing Research: Nature, scope and complexities. International marketing Information system.

UNIT-II Marketing research (9 Hours)

Marketing research: Market Research, Definition, Need & Importance - Different application of Market research: Scope and obstacle in acceptance - Problem definition, determination of information needs, Research design – Types of research design, Primary and secondary data collection methods.

UNIT-III Sampling & questionnaire (9 Hours)

Sample design: sampling method and sample size - Sources & collection of Market information, postal surveys, telephone interviews and personal discussion methods - Setting up & Implementation of market research project, Questionnaire preparation and scaling techniques.

UNIT-IV Data analysis and interpretation

Data Analysis and Interpretation: uni-variate, multi-variate and multi-country data analysis and techniques - Analysis of market data, presentation of data, Market research report writing

UNIT-V International market opportunity (9 Hours)

International market opportunity analysis, product analysis, need and significance of analysis, advertising and sales research, ethical issues - Specialized Techniques in market research, readership surveys, opinion polls, marketing audits, shop audits, advertising effectiveness studies, consumer panel, test marketing and overseas market research.

References:

Philip R. Cateora, Mary C. Gilly, International Marketing, Mcgraw Higher Ed, 2017.

Dr. Gaurav Sankalp, Dr. Shalini Agarwal, International Marketing, Sahitya Bhawan Publications, 2018.

Donald R. Cooper, Business Research Methods, 10th Edition, McGraw-Hill, 2008.

Sakthi K Guptha, Praneeth Rangi, Marketing Research, Kalyani Publsihers, 2016

| Se me ster | Cou rse Cod e | Title of the Cours e | H o u r s | C re di ts |
|---------------------------|----------------------------------|---|----------------------------------|-------------------------------|
| II | MS DI2 23 | Expor t and Impor t Mana gemen t | 5 | 5 |

M. N. Mithani Modern Marketing Research, Himalaya Publishing House, 2015.

UNIT – 1 Overview of export and import

(9

Hours) Export and Import Overview – Importance- Need- Starting an export Business

and Export Pricing, Location Prospective buyers and selecting overseas agents -
Developing Export Strategy- Marketing Plan and Export Marketing Mix.

UNIT- 2 International trade 9

Hours)

International Trade: Reasons, Features, Benefits, Advantages. Registration Formalities, Types of Exporters – Manufacturer/Merchant Exporter. Methods of entry into foreign market.

UNIT – 3 Documentation (9

Hours)

A.D.S. – Commercial and Regulatory Documents viz L/C, B/L, Shipping Bill, Invoice, Pricing Factors, Objectives, Strategies. Payment Terms – L/C, D/A, D/P. Sale Terms – FOB, CIF, C&F. Financing – Pre-Shipment and Post-Shipment. Insurance-Marine, Credit, Exchange Rate. Calculation of FOB, CIF and C&F Prices.

UNIT – 4 Foreign trade policy (9

Hours)

F.T.P.(Latest): Highlights. Export Incentives, Schemes, Assistance viz EPCG, FMS, FPS, MDA, DBK, Institutional Frame Work – Export Promotion Organization viz EPC, CB, DGFT, FIEO, ICA.

UNIT- 5 Process (9

Hours)

Processing of an Export Order: Quality Control, Pre-Shipment Inspection, INCOTERMS. Realizing Payment of Export Proceeds, Negotiation of Documents – CHA, SEZ, EOU, Deemed Exports.

References:

Dr. Khushpat S, Jain. Export Procedures and Documentation. Himalaya Publishing House, 2018

T.A.S. Balagopal. Export Management. Himalaya Publishing House, 2017.

Dr. Francis Cherunilam. International Marketing (Text and Cases). Himalaya Publishing House, 2016

| Semester | Course Code | Title of the Course | Hours | Credits |
|-----------------|--------------------|----------------------------|--------------|----------------|
| II | MSD I223 | Project work | 10 | 10 |

Paras Ram. Export-What, Where and How. Anupam Publishers, 2015

Government of India: Export - Import Policy, 2020

Note: Latest Edition of Text books may be used.

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The objective of this course is to prepare the student to conduct a research study of an Industry / organization utilizing the tools and techniques learned in period of study. The focus of the study could be in depth analysis of an industry or a diagnostic problem solving exercise of an organization. The student is expected to conduct a detailed survey of literature. In case of a status report of an industry, it is expected that the student collects all aspects related to a particular industry analyze data and present the findings.

Project report framework

Initial pages

Executive Summary

Introduction / statement of problem

Detailed survey of literature

Methodology / Focus / Scope / Limitations

Text of the study including analysis

Conclusions and Recommendations

Bibliography

Appendices

Format of Presentation

The student is expected to follow the required style for presentation of the report including Tables, References, Bibliography and Appendices

Literature Survey should be related to the problem of study. Review of the studies in the area and critical examination of them including conclusions of the student should form part of the literature survey.

Acknowledgement of all sources of information through footnoting and bibliography is an essential requirement of the study

PG DIPLOMA IN LOGISTICS MANAGEMENT

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|-------------------------|-------|---------|
| I | MSDL121 | SUPPLY CHAIN MANAGEMENT | 5 | 5 |

Unit I Introduction

(9 Hours)

Supply Chain – Fundamentals –Evolution- Role in Economy - Importance - Decision Phases - Supplier - Manufacturer-Customer chain. - Enablers/ Drivers of Supply Chain Performance. Supply chain strategy - Supply Chain Performance Measures.

Unit II Strategic Sourcing

(9 Hours)

Outsourcing – Make Vs buy - Identifying core processes - Market Vs Hierarchy - Make Vs buy continuum - Sourcing strategy - Supplier Selection and Contract Negotiation. Creating a world class supply base - Supplier Development - World Wide Sourcing.

Unit III Supply Chain Network

(9 Hours)

Distribution Network Design – Role - Factors Influencing Options, Value Addition – Distribution Strategies - Models for Facility Location and Capacity allocation. Distribution Center Location Models. Supply Chain Network optimization models. Impact of uncertainty on Network Design - Network Design decisions using Decision trees.

Unit IV Planning Demand, Inventory and Supply

(9 Hours)

Managing supply chain cycle inventory. Uncertainty in the supply chain -- Analysing impact of supply chain redesign on the inventory - Risk Pooling - Managing inventory for short life - cycle products - multiple item -multiple location inventory management. Pricing and Revenue Management

Unit V Current Trends

(9 Hours)

Supply Chain Integration - Building partnership and trust in SC Value of Information: Bullwhip Effect - Effective forecasting - Coordinating the supply chain. . SC Restructuring - SC Mapping - SC process restructuring, Postpone the point of differentiation – IT in Supply Chain - Agile Supply Chains – Reverse Supply chain. Agro Supply Chains.

References

1. Janat Shah, Supply Chain Management – Text and Cases, Pearson Education, 2009.
2. Sunil Chopra and Peter Meindl, Supply Chain Management-Strategy Planning and Operation, PHI Learning / Pearson Education, Sixth edition, 2015.

3. Ballou Ronald H, Business Logistics and Supply Chain Management, Pearson Education, 5th Edition, 2007.
4. David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi, Designing and Managing the Supply Chain: Concepts, Strategies, and Cases, Tata McGraw-Hill, 2005.
5. Altekhar Rahul V, Supply Chain Management-Concept and Cases, PHI, 2005.
6. Shapiro Jeremy F, Modeling the Supply Chain, Cengage, Second Reprint, 2002.
7. Joel D. Wisner, G. Keong Leong, Keah-Choon Tan, Principles of Supply Chain Management- A Balanced Approach, South-Western, Cengage, 2012.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---|-------|---------|
| I | MSDL122 | TRANSPORTATION AND DISTRIBUTION MANAGEMENT | 5 | 5 |

Unit - I Distribution

(9 Hours)

Role of Distribution in Supply chain, Distribution channels – Functions, resources, Operations in Distribution, Designing Distribution network models - its features - advantages and disadvantages.

Unit - II Planning

(9 Hours)

Distribution network planning, Distribution network decisions, Distribution requirement planning (DRP)

Unit - III Transportation

(9 Hours)

Role of Transportation in Logistics and Business, Principle and Participants-Scope and Relationship with other business functions, Modes of Transportation - Mode and Carrier selection, Routing and scheduling.

Unit - IV International Transportation

(9 Hours)

International transportation, Carrier, Freight and Fleet management, Transportation management systems-Administration, Rate negotiation, Trends in Transportation.

Unit - V Information Technology (IT)

(9 Hours)

Usage of IT applications -E commerce – ITMS, Communication systems-Automatic vehicle location systems, Geographic information Systems.

References

1. Raghuram and N. Rangaraj, Logistics and Supply chain Management – Leveraging Mathematical and Analytical Models: Cases and Concepts, New Delhi: Macmillan, 2000.
2. Janat Shah, Supply Chain Management, Pearson Education India, 2009.

3. Sunil Chopra, Peter Meindl, Supply Chain Management: Strategy, Planning, and Operation, Pearson, 2010.
4. Michael B Stroh, Practical Guide to Transportation and Logistics, Logistics Network, 2006.
5. Alan Rushton, John Oxley, Handbook of Logistics & Distribution Management, Kogan Page Publishers, 2002

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|---------------------------------------|-------|---------|
| I | MSDL123 | REVERSE AND CONTRACT LOGISTICS | 5 | 5 |

Unit - I Contract Logistics (9 Hours)

Third party logistics industry overview - A framework for strategic alliances - Evolution of contract logistics - Types of third party logistics providers – Automobile, FMCG and Retail- Third party services and integration

Unit - II Closed Loop Supply Chains and Logistics (9 Hours)

Introduction closed loop supply chains and logistics – Logistics and closed loop supply chain service - Overview of return logistics and closed loop supply chain models – Introduction product returns - Product Vs Parts returns - Strategic issues in closed loop supply chains

Unit - III Business and Market (9 Hours)

Overview - Introduction life cycle management - Trends and opportunities – Auto Warranty management, return process and benchmarks - Market overview - Reasons for using reverse logistics - General characteristics - Consumer goods Depot repair and value added services – Operating dynamics - Competitive evaluation - Secondary markets and final disposal.

Unit - IV Emerging Trends (9 Hours)

Emerging trends in Retail, E-Commerce- FMCG and Automobile sectors- Systems and technology - For consumer goods operations, High tech logistics system - Impact and value of advanced logistics

Unit - V Managing Processes (9 Hours)

Managing processes - Step by step process - Use of third party service providers - Additional factors – Contemporary issues – Make in India and its impact on Countries GDP and Economic Growth.

References

1. Janat Shah, Supply Chain Management: Text and Cases, Pearson Education India, 2009
2. John Manners-Bell, Logistics and Supply Chains in Emerging Markets, Kogan Page, 2014.
3. Coyle et.al, Management of Transportation, 7th Edition, Cengage Learning, 2011
4. D. F. Blumberg, Reverse Logistics & Closed Loop Supply Chain Processes, Taylor and Francis, 2005
5. Hsin-I Hsiao, Wageningen, Logistics Outsourcing in the Food Processing Industry, Academic Pub, 2009.

6. Surendra M. Gupta, Sustainability in Supply Chain Management Casebook: Applications in SCM, McGraw Hill, 2013

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|----------------------|-------|---------|
| I | MSDL124 | LOGISTICS MANAGEMENT | 5 | 5 |

Unit I Introduction

(9 Hours)

Definition and Scope of Logistics – Functions & Objectives – Customer Value Chain – Service Phases and attributes – Value added logistics services – Role of logistics in Competitive strategy – Customer Service

Unit II Distribution Channels and Outsourcing Logistics

(9 Hours)

Distribution channel structure - channel members, channel strategy, role of logistics and support in distribution channels. Logistics requirements of channel members. Logistics outsourcing – catalysts, benefits, value proposition. Third and fourth party logistics. Selection of service provider.

Unit III Transportation and Packaging

(9 Hours)

Transportation System – Evolution, Infrastructure and Networks. Freight Management – Vehicle Routing – Containerization. Modal Characteristics, Inter-modal Operators and Transport Economies. Packaging- Design considerations, Material and Cost. Packaging as Unitisation. Consumer and Industrial Packaging.

Unit IV Performance Measurement and Costs

(9 Hours)

Performance Measurement – Need, System, Levels and Dimensions. Internal and External Performance Measurement. Logistics Audit. Total Logistics Cost – Concept, Accounting Methods. Cost – Identification, Time Frame and Formatting.

Unit V Current Trends

(9 Hours)

Logistics Information Systems – Need, Characteristics and Design. E-Logistics – Structure and Operation. Logistics Resource Management eLRM. Automatic Identification Technologies. Reverse Logistics – Scope, design and as a competitive tool. Global Logistics – Operational and Strategic Issues, ocean and air transportation. Strategic logistics planning. Green Logistics

References

1. Bowersox Donald J, Logistics Management – The Integrated Supply Chain Process, Tata McGraw Hill, 3rd edition 2016
2. Sople Vinod V, Logistics Management – The Supply Chain Imperative, Pearson Education, 3rd Edition, 2012.
3. Coyle et al., The Management of Business Logistics, Cengage Learning, 7th Edition, 2004.
4. Ailawadi C. Sathish & Rakesh Singh, Logistics Management, PHI, 2011.

5. Bloomberg David J et al., Logistics, Prentice Hall India, 2005.
6. Ronald H. Ballou, Business Logistics and Supply Chain Management, Pearson Education, 5th Edition, 2007.

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|----------------------|-------|---------|
| II | MSDL221 | WAREHOUSE MANAGEMENT | 5 | 5 |

Unit - I Introduction Warehousing (9 Hours)

Introduction Warehousing – Basic Warehousing Decisions – Warehouse Operations – Types of Warehouses – Functions – Centralized & Decentralized – Storage Systems – Warehousing Cost Analysis – Warehouse Layout – Characteristics of Ideal Warehouse

Unit - II Inventory Management (9 Hours)

Inventory: Basic Concepts – Role in Supply Chain – Role in Competitive Strategy – Independent Demand Systems – Dependent Demand Systems – Functions – Types – Cost – Need for Inventory – Just in Time

Unit - III Inventory Control (9 Hours)

Inventory Control – ABC Inventory Control – Multi-Echelon Inventory Systems – Distribution Requirement Planning – Bull Whip Effect – Using WMS for Managing Warehousing Operations

Unit - IV Materials Handling (9 Hours)

Principles and Performance Measures of Material Handling Systems – Fundamentals of Material Handling – Various Types of Material Handling Equipment – Types of Conveyors – Refrigerated Warehouses- Cold Chain- Agri SCM

Unit - V Modern Warehousing Methods (9 Hours)

Modern Warehousing – Automated Storage & Retrieval Systems & their Operations – Bar Coding Technology & Applications in Logistics Industry – RFID Technology & Applications – Advantages of RFID

References

1. Vinod.V.Sople, Logistics Management, Pearson Education, 2004.
2. Arnold, Introduction Materials Management, Pearson Education, 2009.
3. Frazelle, World Class Warehousing & Material Handling, Tata McGraw-Hill, 2008
4. Satish K. Kapoor and Purva Kansal, Basics of Distribution Management - A Logistical Approach, Prentice Hall, 2003
5. Satish K. Kapoor and Purva Kansal Marketing, Logistics - A Supply Chain Approach, Pearson Education, 2003

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|--|-------|---------|
| II | MSDL222 | SUPPLY CHAIN INVENTORY MANAGEMENT | 5 | 5 |

Unit I Introduction to Inventory Management (9 Hours)

Inventory in SCM, Cash to cash cycle time, measure of inventory in terms of days, Inventory turnover ratio and its relationship with working capital, Review of models, Q-models and P-models Aggregation of Inventory, Cycle stock concepts, Ordering multiple items in a single order to reduce cycle stock

Unit II Inventory Models (9 Hours)

Safety stock issues Safety stock with lead time and demand uncertainty (for Q-models), Short term discounting & Forward Buying, Periodic review models with safety stock, Comparison of P and Q Systems

Unit III Inventory Management Strategies (9 Hours)

Single period models, Inventory management for fashion supply chains, Postponement strategies to reduce inventory, Examples of Fashion supply chains: NFL Reebok, ZARA and Sport Obermeyer Risk Pooling, Applications, Risk pooling in different forms-Substitution, Specialisation, Postponement and Information pooling

Unit IV Inventory Optimization (9 Hours)

Distribution resource planning techniques, Inventory and transportation integration decisions, Vendor Managed Inventory, Product availability measures, Product fill rate, order fill rate, Cycle service level.

Unit V Latest Trends In Inventory Management Systems (9 Hours)

Industry initiatives, efficient consumer Response and Quick response, CPFR and other industry Initiatives, Inventory reduction strategies, Managing inventory in Reverse Logistics and Remanufacturing situations , Best practices in Inventory Management in a Supply Chain

References

1. Sunil Chopra, Peter Meindl, Supply Chain Management: Strategy, Planning, and Operation, Pearson, 2010.
2. Janat Shah, Supply Chain Management, Pearson Education India, 2009
3. Supply chain management, Chandrasekaran, N., Oxford University Publications, 2010
4. Supply Chain Management for the 21st Century by B S SAHAY. Macmillan Education, 2001

| Semester | Course Code | Title of the Course | Hours | Credits |
|----------|-------------|-----------------------------------|-------|---------|
| II | MSDL223 | PURCHASE AND INVENTORY MANAGEMENT | 5 | 5 |

Unit I: Introduction of Purchase Management (9 Hours)

Purchase policy- Rate and Running Contract – Subcontracting- Systems Contract – Stockless purchase –Buying seasonal items – Forward Buying – Hedging – Purchasing Activities – Indent Status – Purchase Order –Transportation – Incoming Inspection – Bill settlement – Documentation.

Unit II: Price Management (9 Hours)

Meaning of Right Price – Price Analysis – Determination of Right Price – Influencing Factors on Pricing – Classification of Pricing – Price Forecasting - Right Place – Purchase Budgets – Budgetary control – Need Identification Problems – Definition of lead time Elements- Cost Reduction and Lead time.

Unit III: Buyers & Suppliers (9 Hours)

Relevance of Good Supplier - Advantages of Good Relations –Prerequisites – Evaluation of Suppliers – The Buyers Role – Role of the Vendor –Relevance of Good Suppliers – Need for vendor evaluation – Goals of Vendor Rating – Advantages of Vendor Rating – Parameters of Vendor Rating.

Unit IV: Material Management (9 Hours)

Role of Material Management – Classes of Material – Materials and Profitability – Profit Center Concept – Material Objective – Centralized Purchasing-Decentralizing – Delegation of Powers – Definition of Material Planning – Bill of Material – Material Requirement Planning II.

Unit V: Data Analysis (9 Hours)

Codification – Classification – Methodology–Requirement of codes – Coding Structure and Design –Advantages - International Codification – Cost and Consequences – Right Quantity – Economic Ordering Quantity – Derivations of EOQ.

References

1. Gopalakrishnan P, Purchasing and Materials management, Tata McGraw Hill, 2001.
2. J. M. Dewan and K.N. Sundarshan, Purchasing and Materials Management, Discovery Publishing Pvt. Ltd, 2006.

| Semester | Course Code | Title of the Course | Hours | Credits |
|-----------------|--------------------|---------------------------------|--------------|----------------|
| II | MSDL224J | PAPER VIII: PROJECT WORK | 10 | 10 |

The objective of this course is to prepare the student to conduct a research study of an Industry / organization utilizing the tools and techniques learned in period of study. The focus of the study could be in depth analysis of an industry or a diagnostic problem solving exercise of an organization. The student is expected to conduct a detailed survey of literature. In case of a status report of an industry, it is expected that the student collects all aspects related to a particular industry analyze data and present the findings.

PROJECT REPORT FRAMEWORK

- (1) Initial pages
- (2) Executive Summary
- (3) Introduction / statement of problem
- (4) Detailed survey of literature
- (5) Methodology / Focus / Scope / Limitations
- (6) Text of the study including analysis
- (7) Conclusions and Recommendations
- (8) Bibliography
- (9) Appendices

Format of Presentation

- 1) The student is expected to follow the required style for presentation of the report including Tables, References, Bibliography and Appendices.
- 2) Literature Survey should be related to the problem of study. Review of the studies in the area and critical examination of them including conclusions of the student should form part of the literature survey.
- 3) Acknowledgement of all sources of information through footnoting and bibliography is an essential requirement of the study.

PG DIPLOMA IN CYBER SECURITY

I SEMESTER

CADC111 - FUNDAMENTALS OF INFORMATION SECURITY 4-0-0:100

Introduction

Information Security refers to the technique to prevent unauthorized access, use, deletion or disruption of information. The concept of information security rests in ensuring the four basic security principles viz. confidentiality, authentication, integrity and non-repudiation. The security principles are enforced through cryptographic algorithms, protocols or standards.

This course aims to deliver the basics of information security, outlines on the four basic principles of information security, highlights the cryptographic algorithms, teaches the symmetric and asymmetric cipher algorithms, stresses on the internet security protocols and user authentication methods.

PREREQUISITE

Network architecture, TCP/IP Model.

Participatory Assessment

Quiz on basics of Data and Information Security

Problem Solving in Cryptography

Problem Solving in Symmetric Ciphers

Problem Solving in Asymmetric Ciphers

Discussions on Internet Security Protocols

Discussions on User Authentication Methods

Course Content

1. ATTACKS ON COMPUTERS AND COMPUTER SECURITY

Concepts of Security: Need for Security, Security Approaches, Principles of Security, Types of Attacks - Cryptography: Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption.

2. SYMMETRIC KEY ALGORITHMS

Algorithm Types and Modes, Data Encryption Standard (DES) - Asymmetric Key Algorithms: The RSA Algorithm – Diffie-Hellman Key Exchange Algorithm.

3. DIGITAL SIGNATURES AND DIGITAL CERTIFICATES

Digital Signatures, Attacks on Digital Signature - Public Key Infrastructure (PKI): Digital Certificates, Private Key Management, PKIX Model.

4. INTERNET SECURITY PROTOCOLS

Basic Concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP) , Secure Electronic Transaction (SET).

5. USER AUTHENTICATION AND KERBEROS

Authentication Basics, Passwords, Authentication Tokens, Certificate-based Authentication, Key Distribution Center (KDC).

TEXT

A. Kahate, “Cryptography and Network Security”, Third Edition, Tata McGraw Hill, New Delhi, 2013.

REFERENCE

1. B.A. Foronzan, “Cryptography & Network Security”, Tata McGraw Hill, New Delhi, 2007.
2. S. Stalling, “Cryptography and Network Security”, Pearson Education, New Delhi, 2006.

CADC112

DATA COMMUNICATION AND NETWORKING 4-0-0:100

Introduction

Data communications refers to the transmission of this digital data between two or more computers and a computer network or data network is a telecommunications network that allows computers to exchange data.

The course focuses the basics of Data Communication and Computer Network (DCN) and will also point through the various layers concept and its protocol set.

Prerequisite

Computer fundamentals.

Data signaling mechanism.

Graph concept

Participatory Assessment

Paper work to be prepared in related to layer model, transmission media and network devices.

Using packet tracer emulator tool network models can be prepared.

MCQ can be practiced.

Course Content

Unit I

Introduction to Data communication and Networking Fundamentals of data communication and networking Network Reference Models: OSI and TCP/IP Models - Transmission media and network devices

Unit II

Physical layer functionalities: Analog and Digital Signals – Encoding, Multiplexing and Switching: FDM,TDM,WDM,SDM, Message Switching, Circuit Switching and Packet Switching.

Unit III

Data Link Control Protocols: Token Passing, CSMA, CSMA/CD, CSMA/CA.

Unit IV

Network Layer: Internetworking, and IP addressing, ARP, RARP, ICMP, IGMP - Transport Layer protocols: TCP& UDP.

Unit V

Application Layer protocols: HTTP, HTTPs, SMTP, POP, DNS, TELNET, FTP - Internet and its Services: Intranet, Extranet, www, Email

TEXT

Forouzan, “Data Communications and Networking”, Pearson, 2017

REFERENCE

William Stallings, “Data and Computer Communications” , Pearson, 2017

CADC113 - VULNERABILITY ANALYSIS, PENETRATION TESTING, AND INCIDENT HANDLING

4-0-0:100

OBJECTIVES

- To Learn the core concepts of Vulnerability Analysis.
- To understand the process of penetration testing.
- To learn about incident handling technique.

Unit I

Vulnerability Analysis – Introduction – Hardware and Software defects – Unsecured Networks – Vulnerability management programs – Maintaining an Asset Inventory

Unit II

Vulnerability Analysis – Establishing Secure Connections – Maintaining awareness and Detecting vulnerabilities – Mitigating and remediating identified vulnerabilities – Continuously monitoring the organizations IT environment.

Unit III

Penetration Testing – introduction – method – penetration testing vs vulnerability analysis – types – Manual – Automated – Tools – Infrastructure – Testers – Limitations – Remediation – Legal Issues.

Unit IV

Incident Handling – Preparing for a cyber security incident – Detecting and Identifying potential cyber security incidents – categories of incidents – methods to detect incidents.

Unit V

Incident Handling - Handling and actual incident – contain , eradicate and recover – Communication during a cyber security incident – Incident follow-up and closure.

TEXT

1. <http://www.amazon.com/dp/0470170778>.
2. <http://www.amazon.com/The-Tangled-Web-Securing-Applications/dp/1593273886>.

Introduction

The course introduces the concept of security in operating systems and software. The main subjects are software vulnerabilities and malicious software, and techniques for mitigating these threats.

Prerequisite

It is recommended with basic knowledge in mathematics and programming

Course Content

Unit I

Introduction-Information Security-Models for discussing security-Attacks-Defense in depth-Identification-Authentication-Additional resources.

Unit II

Introduction – Authorization and Access Control-Authorization–Access control-Access control methodologies-Auditing and Accountability-Security benefits of accountability-Auditing-Logging-Monitoring-Assessments.

Unit III

Operations Security-Origins of operations security-Additional resources-operations security process-Haas’ Laws of operations security.

Unit IV

Operating System Security-Operating system hardening-Operating system hardening-Anti-malware tools-Executable space protection-Software firewalls-Host intrusion detection-Operating system security tools.

Unit V

Laws and Regulations-Regulatory compliance-Industry compliance-Privacy-Human Element Security-Security awareness-Effectively reaching users.

TEXT

1. Jason Andress “The Basics of Information Security”, Second Edition, Syngress,2014

II SEMESTER

CADC211 - NETWORK CYBER SECURITY

4-0-0:100

Introduction:

Cyber security is the practice of defending computers, servers, mobile devices, electronic systems, networks, and data from malicious attacks. The term applies in a variety of contexts, from business to mobile computing. Network security is the practice of securing a computer network from intruders, whether targeted attackers or opportunistic malware.

This course provides the basics of cybersecurity and an in-depth knowledge about various intrusion detection mechanisms. It explores various cyber-attacks and cyber defense mechanisms.

Prerequisites:

Basic understanding of computer networks.

Participatory Assessment

Online Quiz

Assignments on firewalls, Public cryptography.

Case studies.

Course Content

Unit I

Cyber Security Overview – Introduction – Trends in types of Attacks and Malware - Vulnerability Naming Schemes and Security Configuration Settings - Obfuscation and Mutations in Malware - Network and Information Infrastructure Defense Overview.

Unit II

Firewalls - Unified Threat Management - Firewalls - Stateful/Session Filtering - Application-Level Gateways - Circuit-Level Gateways - A Comparison of Four Types of Firewalls - The Architecture for a Primary-Backup Firewall - Emerging Firewall Technology.

Unit III

Intrusion Detection/Prevention System - IDS/IPS Building Blocks - Anomaly-Based Detection Methods - Network-Based IDS/IPS - Distributed Intrusion Detection Systems and Standards – SNORT.

Unit IV

Public Key Cryptography – The Diffie-Hellman (DH) Protocol – Rivest, Shamir and Adleman (RSA) Public-Key Cryptography – Handshake Protocol – Attacks on the Handshake Protocol.

Unit V

Cyber Threats and Their Defense - Domain Name System (DNS) Protection - A Cache Poisoning Attack – Router Security - The Sender Policy Framework (SPF) – Uniform Resource Locator (URL) Filtering – Botnet Attacks.

TEXT

1. Chwan – Hwa(John) Wu, J, David Irwin, “Introduction to Computer Networks and Cyber Security”, CRC Press, 2013.

CADC212

CYBER FORENSICS

4-0-0:100

Introduction

Cyber forensics is the application of investigation and analysis techniques to gather and preserve evidence from a particular computing device in a way that is suitable for presentation in a court of law. The goal of cyber forensics is to perform a structured investigation and maintain a documented chain of evidence to find out exactly what happened on a computing device and who was responsible for it.

This course aims to provide the basics of cyber forensics, evidence collection, analysis, validation and cyber forensic tools.

Prerequisite

Fundamentals in computer security.

Participatory Assessment

Quiz in basics of cyber forensics.

Problem Solving in Data Acquisition, evidence collection, analysis and validation.

Course Content

Unit 1

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation.

Unit II

Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

Unit III

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.

Unit IV

Analysis and validation – introduction - Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition.

Unit V

Network Forensics – Introduction – need for Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics.

TEXT

1. Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, —Computer Forensics and Investigations, Cengage Learning, India Edition, 2016.

REFERENCES

1. John R.Vacca, Computer Forensics, Cengage Learning, 2005.
2. MarjieT.Britz, Computer Forensics and Cyber Crime: An Introduction, 3rd Edition, Prentice Hall, 2013.

CADC213

APPLICATION CYBER SECURITY

3-1-0:100

OBJECTIVES

- To learn the concepts in application level cyber security.
- To understand the concepts of ethical hacking and cyber laws.

Unit I

System Security - Desktop Security - Programming Bugs and Malicious code - Database Security

Unit II

Operating System Security – Designing Secure Operating System – OS Security Vulnerabilities – Security Management – Disaster recovery – Digital signature

Unit III

Ethical Hacking – Penetration testing – Computer Forensics

Unit IV

Cyber Laws and Standards - ISO 27001, Cyber Law (Information Technology Act, 2000)- International Standards maintained for Cyber Security

Unit V

Security Audit ,Investigation by Investing Agency - Cyber Security Solutions

TEXT

1. Andrew Honig and Michael Sikorski “Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software”, , Pearson, 2019

CADC214

BIG DATA & IOT SECURITY

3-1-0:100

Introduction

IoT security is the family of techniques, strategies and tools used to protect these devices from becoming compromised. Ironically, it is the connectivity inherent to IoT that makes these devices increasingly vulnerable to cyber-attacks, because IoT is so broad and IoT security is even broader.

The course focuses on the basics of why we need security in IoT and the related mechanisms. Next in the flow it elaborates the idea on its architecture and the various threats in the main IoT layers such as Perception layer, Networking layer, and Processing layer.

Prerequisite

Any programming skill.

Role of security in any domains or in computer discipline.

Participatory Assessment

Paper work to be prepared in related to IoT security techniques and the regulation.

Identifying any free tool which can used to test or analyze the security process.

MCQ can be practiced

Course Content

Unit I

Techniques and applications of IoT-The Components of IoT System –Security and privacy issues in IoT- Architectures of the IoT: Three layer Architecture of IoT - IoT Architecture based on IoT Devices-Four layer-Five layer-Six layer architecture of IoT.

Unit II

IoT Security Architecture: Layer IoT Security Architecture - IoT Perception Layer Security Mechanisms – IoT perception layers Security- IoT Network Layer Security Mechanisms- IoT Processing Layer Mechanism – Security Layer Mechanism – Establishment of Trust and Key management- Operational Supervision and Security evaluation.

Unit III

Security Threats in IoT Perception Layer- Security threat and countermeasures against Eavesdropping attack, Traffic analysis attack, Impersonation attack, data modification attack, Laboratory analysis, cloning attack, Sybil attack, Energy Exhaustion Attack, Reply Attack, Botnet Control.

Unit IV

IoT Network Layer Security- Security Threats in IoT Network Layer- Network Security- Security Techniques in Mobile Communications- Security Techniques in LPWAN.

Unit V

IoT Processing Layer Security- Security Threats in IoT Processing Layer- Database for IoT Processing Layer- Access Control Policies Applicable to IoT Processing Layer- Security Mechanisms in Cloud computing.

TEXT

Chuan-Kun Wu, “Internet of Things Security: Architectures and Security Measures (Advances in Computer Science and Technology)” 1st ed. 2021 Edition.

REFERENCE

1. Harley Hahn, “Internet Complete Reference”, Second Edition, Osborne/McGrawHill 1996,
2. Ramesh Bangia Firewall Media, “Internet and Web Design”, (An imprint of Lakshmi Publications Pvt. Ltd.). Second Edition 2006

CADC215

ETHICAL HACKING

3-1-0:100

Introduction

Ethical hacking course is for network security officers and practitioners, site administrators, IS/IT specialists and analysts, IS/IT auditors, IT operations managers, IT security officers, network specialists, technical support engineers, senior systems engineers, and systems analysts.

Prerequisite

Cyber Laws

Participatory Assessment

Paper work to be prepared in related to IoT security techniques and the regulation.

Identifying any free tool which can be used to test or analyze the security process.
MCQ can be practiced

Course Content

Unit I

Ethics of Ethical Hacking- Recognizing the Gray Areas in Security- Vulnerability Assessment- Penetration Testing- The Dual Nature of Tools- Emulating the Attack- The Rise of Cyberlaw- Understanding Individual Cyberlaws- Cyber Security Enhancement Act of 2002- Securely Protect Yourself Against Cyber Trespass Act (SPY Act)- Organization for Internet Safety (OIS).

Unit II

Physical Penetration Attacks- Conducting a Physical Penetration- Common Ways into a Building- Defending Against Physical Penetrations-Insider Attacks- Simulating an Insider Attack- Conducting an Insider Attack- Defending Against Insider Attacks.

Unit III

Windows Exploits- Compiling and Debugging Windows Programs- Writing Windows Exploits- Structured Exception Handling- Windows Memory Protections- Bypassing Windows Memory Protections.

Unit IV

VoIP Attacks- Protocols Used by VoIP- Types of VoIP Attacks- Protect Against VoIP Attacks.

Unit V

SCADA Attacks- Protocols Does SCADA Use- SCADA Fuzzing- Stuxnet Malware- Protect Against SCADA Attacks.

TEXT

1. Allen Harper, Shon Harris, Jonathan Ness,Chris Eagle, Gideon Lenkey, and Terron Williams “Gray Hat Hacking The Ethical Hacker’s Handbook” 3rd Edition. The McGraw-Hill 2017.

PG DIPLOMA IN DATA SCIENCE

I SEMESTER

CADD111 - INTRODUCTION TO PYTHON 4-0-0:100

Introduction

Data Analytics using Python has become the most preferred and popular mode of data analysis since python provides a range of libraries making data analytics simple. Several packages like Numpy and Pandas makes data analytics applicable in python.

This course aims to deliver the necessary skills to perform data analytics in python.

Prerequisite

Python and Data Mining concepts.

Participatory Assessment

- Quiz
- Problem Solving

Course Content

Unit I

Features of Python - How to Run Python DATA TYPES AND OPERATIONS: Numbers-Strings-List-Tuple-Set-Dictionary. FUNCTIONS: Function Definition-Function Calling - Function Arguments - Anonymous Functions.

Unit II

Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - dir() function - reload() function - Packages in Python - Date and Time Modules.

Unit III

Class Definition - Creating Objects - Built-in Attribute Methods - Built-in Class Attributes - Destructors in Python-Encapsulation - Data Hiding-Inheritance - Method Overriding-Polymorphism.

Unit IV

match() function - search() function - Search and Replace - Regular Expression Modifiers: Option Flags - Regular Expression Patterns - find all() method - compile() method.

Unit V

Connecting to a Database – Creating Tables – Insert, Update, Delete and Read Operation – Disconnecting from a Database

TEXT

1. Jeeva Jose and P. Sojan Lal, “Introduction to Computing and Problem Solving with PYTHON”, Khanna Book Publishing Co. (P) Ltd., 2016.
2. Jake Vander Plas, “Python Data Science Handbook: Essential Tools for Working with Data”, 1st Edition, O’Reilly Media, 2016

REFERENCE

1. Wesley J. Chun, “Core Python Programming”, Second Edition, Prentice Hall Publication, 2006.
2. Timothy A Budd, “Exploring Python”, Tata McGraw Hill, New Delhi, 2011
3. Alberto Boschetti and Luca Massaron, “Python Data Science Essentials”, Packt publishing, 3rd Edition, 2018

CADD112 INTRODUCTION TO DATA SCIENCE 4-0-0:100

Introduction

Data science is the domain of study that deals with vast volumes of data using modern tools and techniques to find unseen patterns, derive meaningful information, and make business decisions. Data science uses complex machine learning algorithms to build predictive models. The course on Introduction to Data Science provides an overview of Data Science, covering a broad selection of key challenges in and methodologies for working with big data.

This course is integrative across the core disciplines of Data Science, including databases, data warehousing, statistics, data mining, data visualization, high performance computing, Artificial Intelligence and Machine Learning.

Prerequisite

A basic background in computer programming and statistics

Participatory Assessment

- Learn data collection techniques and data pre-processing from various domains.

- Problem Solving in BFS, DFS and Searching algorithms.
- Construct and formulate Natural Language Statements into syntax and semantics using Propositional logic.
- Practice and analyze real time problems using Machine Learning Algorithms.

Course Content

Unit I

Foundation of Data science, Area and Scope of Data Science, Steps of Data Science Process: Data collection, Preprocessing, training, and testing. Use cases in various domain such Image, Natural Language, Audio and Video.

Unit II

Introduction to Artificial Intelligence: Introduction Artificial Intelligence, The Foundations of AI, AI Technique, Production system characteristics, Production systems: 8-puzzle problem. Searching: Uniformed search strategies – Breadth first search, depth first search.

Unit III

Searching Algorithms and Learning : Local Search Algorithms: Generate and Test, Hill climbing, simulated annealing search, Constraint satisfaction problems, Greedy best first search, A* search, AO* search.

Unit IV

Learning Algorithms : Propositional logic - syntax & semantics Game Playing: Overview, Minimax algorithm, Alpha-Beta pruning, Additional Refinements.

Unit V

Metadata - Submission of Data - Access and Reuse of Data - Preservation of Data. Case Studies: GitHub, UCI Repository.

TEXT

1. Rachel Schutt, Cathy O'Neil, "Doing Data Science: Straight Talk from the Frontline", Schroff/O'Reilly, 2013.
2. S. Russell and P. Norvig, "Artificial Intelligence A Modern Approach", Second Edition. Pearson Education, 2007.

Note: Unit 5 notes will be compiled by course teacher.

CADD113 INTRODUCTION TO DATA WAREHOUSE AND DATA MINING 4-0-0:100

Introduction

Data mining is the analysis of data and the use of software techniques for finding patterns and regularities in sets of data.

This course is designed to expand students' knowledge and skills gained in database management courses and look in depth at data warehousing and data mining methods. The course examines the database architecture and technologies required for solving complex problems of data and information management, information retrieval, and knowledge discovery facing modern organizations.

Prerequisites

Database Architecture and Statistics.

Participatory Assessment

- Problem Solving in Association, classification and Clustering algorithms.
- Online Quiz
- Apply the KDD process for a specific problem.
- Case studies of various domains using these technologies to support business intelligence gathering and decision making are examined.

Course Content

Unit I

Data Warehouse – Definition – Multidimensional Data model – Data Cube – Dimensional Modelling – Lattice of Cuboids – Summary Measures – OLAP Operations – Slicing – Dicing – Drilling – Data Warehousing Architecture

Unit II

Data Mining – Definitions – KDD Vs Data Mining – Stages of KDD – Selection – Preprocessing – Transformation – Data Mining – Interpretation and Evaluation – Data Visualization Data Mining Techniques – Verification Model – Discovery Model – Discovery of Association Rules –

Clustering – Discovery of Classification rules – Frequent Episodes – Deviation Detection – Issues and Challenges in Data Mining.

Unit III

Introduction – Association rules - Definitions – Support- Association rule – Methods to discover association rules – Problem decomposition – Frequent set – Maximal Frequent set – Border set – A Priori Algorithm – Candidate generation – Pruning – Example of APriori.

Unit IV

Introduction – Clustering Paradigms, Clustering Methods – Partitioning Algorithms – K-means, Hierarchical clustering - DBSCAN, Agglomerative clustering – AGNES, Divisive clustering – DIANA, Categorical Clustering Algorithms – STIRR.

Unit V

Classification – Basic Concepts – Decision Tree Induction – Attribute Selection Measures – Bayes' Classification methods – bayes' theorem – Rule Based Classification – Using IF_THEN rules for classification – Rule extraction from a decision tree.

TEXT

1. Data Mining Techniques, Arun K Pujari, University Press, 2001
2. Jiawei Han, Micheline Kamber and Jian Pei, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2011.

CADD114

APPLIED STATISTICS USING R

4-1-0:100

Introduction

This course introduces R, programming language and software environment for statistical computing with RStudio, an integrated development environment for R. Topics include introduction to R, data and programming, summarizing data, probability and statistics in R, simple and multiple linear regression, categorical predictors and interactions, model diagnostics, variable selection and model building, selected data analyses.

Prerequisites

- Statistics.

Participatory Assessment

- Problem Solving.
- Online Quiz

Course Content

Unit I

Introduction to R: Getting Started, Basic Calculations, Getting Help, Installing Packages - Data and Programming: Types, Data Structures, Programming Basics - Summarizing Data: Summary Statistics, Plotting

Unit II

Probability and Statistics in R : Probability in R, Hypothesis Tests in R, Simulation – Simple Linear Regression : Modelling, Least Squares Approach, Decomposition of Variation, The lm Function, Maximum Likelihood Estimation (MLE) Approach

Unit III

Multiple Linear Regressions: Matrix Approach to Regression, Sampling Distribution, Significance of Regression, Simulation

Unit IV

Model Building: Family, Form, and Fit, Explanation versus Prediction – Categorical predictors and Interactions: Dummy Variables, Interactions, Factor Variables, and Parameterization

Unit V

Analysis of Variance: Experiments, Two-Sample T-Test, One-Way ANOVA, Post-Hoc Testing, Two-Way ANOVA

TEXT

1. David Dalpiaz, “Applied Statistics With R”

REFERENCE

1. Mathias Kohl, “Introduction to statistical data analysis with R”, bookboon.com, The eBook company
2. Matloff, Norman. The art of R programming: A tour of statistical software design. No Starch Press, 2011.

II SEMESTER

CADD211

DATA ANALYTICS USING PYTHON

4-0-0:100

Introduction

Data Analytics using Python has become the most preferred and popular mode of data analysis since python provides a range of libraries making data analytics simple. Several packages like Numpy and Pandas makes data analytics applicable in python.

This course aims to deliver the necessary skills to perform data analytics in python.

Prerequisite

Python, Data Mining concepts.

Participatory Assessment

- Quiz in basics of numpy and pandas.
- Problem Solving in data manipulation, hierarchical indexing and visualization.
- Designing programs performing data analytics.

Course Content

Unit I

Introduction to Numpy - Basics of NumPy Array – Computation on NumPy Array – Aggregations – Broadcasting – Comparisons, Masks and Boolean Logic – Sorting Arrays – NumPy Structured Array.

Unit II

Introducing Panda Objects – Data Indexing and Selection - Operating Data on Pandas – Handling Missing Data

Unit III

Combining Data Sets – Vectorized String Operations – Working with Time Series.

Unit IV

Simple Line Plots – Simple Scatter Plots – Density and Contour Plots – Histograms, Binnings and Density

Unit V

Customising Color bars – Multiple Subplots – Text and Annotation – Three Dimension Plotting in Matplotlib – Geographic Data with Base Map – Visualization with Seaborn

TEXT

1. Jeeva Jose and P. Sojan Lal, “Introduction to Computing and Problem Solving with PYTHON”, Khanna Book Publishing Co. (P) Ltd., 2016.
2. Jake Vander Plas, “Python Data Science Handbook: Essential Tools for Working with Data”, 1st Edition, O'Reilly Media, 2016

REFERENCE

1. Wesley J. Chun, “Core Python Programming”, Second Edition, Prentice Hall Publication, 2006.
2. Timothy A Budd, “Exploring Python”, Tata McGraw Hill, New Delhi, 2011
3. Alberto Boschetti and Luca Massaron, “Python Data Science Essentials”, Packt publishing, 3rd Edition, 2018

CADD212

MACHINE LEARNING

3-1-0:100

Introduction

The objective of this course is to introduce the fundamentals of Machine Learning and Algorithms in computing environment. It enables the learner to develop machine learning techniques associated with the computing for the classification and clustering. It also covers the supervised and unsupervised algorithms.

Prerequisite

Python, Data Mining concepts.

Unit I

Introduction: Machine learning – Examples and Applications - Perspectives and Issues in Machine learning - Input: Concepts, Instances, and Attributes - Output: Knowledge Representation - Training and Testing – Predicting Performance

Unit II

Decision Tree Learning: Decision tree representation – Decision tree learning – Random forest - Bayesian Learning: Naïve Bayes classifier - k- nearest neighbour Learning - Case based reasoning

Unit III

Artificial Neural Network - Introduction – Neural Network Representation - Multilayer Networks and Back propagation Algorithm - Linear models for Regression- PCA

Unit IV

SVM : Introduction – Kernel methods - formulation and computation- SVM Linear classifier – SVM with two variables – Clustering Methods.- Introduction – K- Means - Hierarchical Clustering - Choosing the Number of Clusters

Unit V

Deep Learning – Convolutional neural network– Auto encoders – Recurrent Neural Network - Use Cases: Finding similar users in Twitter (Mahout), Email marketing system (Mahout)

TEXT

1. Shalev-Shwartz, Shai, and Shai Ben-David, “Understanding machine learning: From theory to algorithms”, Cambridge university press, 2014.
2. Duda, Richard O., Peter E. Hart, and David G. Stork, “Pattern classification”, John Wiley & Sons, 2012.
3. Witten, Ian H., et al, “Data Mining: Practical machine learning tools and techniques”, Morgan Kaufmann, 2016.

CADD213 DEEP LEARNING 4-0-0:100

Introduction

Deep learning is a subset of machine learning, which is essentially a neural network with three or more layers. These neural networks attempt to simulate the behavior of the human brain. Deep Learning uses mathematical functions to map the input to the output. These functions can extract non-redundant information or patterns from the data, which enables them to form a relationship between the input and the output.

This Course aims to deliver the basic concepts of deep learning, Deep Feed forward networks, learning and optimization algorithms, regularization patterns, convolutional networks and applications of deep learning.

Prerequisite

- Optimization Techniques
- Graph Theory
- Data Analytics

Participatory Assessment

- Paper work has to be carried out in Applied Mathematics .
- Problem solving in applied mathematics.
- Problem solving using deep learning methods or algorithms.
- MCQ

Course Content

Unit I

Deep Feed forward Networks: Learning XOR – Gradient Based Learning – Architecture Design – Back Propagation and other Differentiation Algorithms.

Unit II

Regularization for Deep Learning: Dataset Augmentation – Noise Robustness – Semi Supervised Learning – Multi Task Learning – Early Stopping.

Unit III

Optimization for Training Deep Models: How Learning Differs from Pure Optimization – Challenges in Neural Network Optimization – Basic Algorithms – Parameter Initialization Strategies – Algorithms with Adaptive Learning Rates.

Unit IV

Convolutional Networks: Convolution Operation – Motivation – Pooling – Convolution and Pooling as an Infinitely Strong Prior – Variants of the Basic Convolution Function.

Unit V

Applications: Large Scale Deep Learning – Computer Visions – Speech Recognition –Natural Language Processing – Other Applications.

TEXT

Ian Goodfellow, Yoshua Bengio, and Aaron Courville, “Deep Learning-Adaptive Computation and Machine Learning”, 2015

REFERENCE

1. Ethem Alpaydin, "Introduction to Machine Learning" Second Edition, The MIT Press, 2009.
2. Tom M. Mitchell, "Machine Learning", First Edition, Tata McGraw-Hill Education, 2013.
3. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2007.
4. Mevin P. Murphy, "Machine Learning: A Probabilistic Perspective", The MIT Press, 2012.

Data science uses techniques such as machine learning and artificial intelligence to extract meaningful information and to predict future patterns and behaviors. This course will cover the various technologies using in data science and installation of HIVE, SQOOP and PIG tools.

Prerequisite

Basics of Data Science

Participatory Assessment

- HIVE installation and commands.
- SQOOP installation and commands.
- PIG installation and commands

Course Content

Unit I

Big Data and Hadoop : Hadoop architecture, Hadoop Versioning and configuration, Single node & Multi-node Hadoop, Hadoop commands, Models in Hadoop, Hadoop daemon, Task instance, illustrations.

Unit II

Map-Reduce : Framework, Developing Map-Reduce course, Life cycle method, Serialization, Running Map Reduce in local and pseudo-distributed mode, illustrations.

Unit III

HIVE : Installation, data types and commands, illustration.

Unit IV

SQOOP: Installation, importing data, Exporting data, Running, illustrations

Unit V

PIG : Installation, Schema, Commands, illustrations.

Text

1. Chuck Lam, “Hadoop in Action”, 2010, ISBN: 9781935182191

2. Jimmy Lin and Chris Dyer, “Data- intensive Text Processing with Map Reduce”, Morgan & Claypool Publishers, 2010.

CADD215

BIG DATA AND INTERNET OF THINGS

3-1-0:100

Introduction

Big Data is a collection of data that is huge in volume, yet growing exponentially with time. It is a data with so large size and complexity that none of traditional data management tools can store it or process it efficiently. Big data is also a data but with huge size.

The Internet of Things (IoT) is the ability to have devices communicate with one another via the internet or other networks, remotely tracking information to provide feedback to assist with decision making for commercial, industrial and residential purposes.

This course is for those new to data science and interested in understanding why the Big Data Era has come to be. It is for those who want to become conversant with the terminology and the core concepts behind big data problems, applications, and systems and to understand the architecture of IoT devices and deals with the basics of electronics and programming.

Prerequisite

Data Structures, Data Mining, Computer Networks.

Participatory Assessment

- Paper work to be prepared in related to Big data and IoT.
- MCQ can be practiced

Course Content

Unit I

Big Data Science-Historical Review of Big Data-Historical Interpretation of Big Data-Defining Big Data From 3Vs to 32Vs-Big Data Analytics and Machine Learning-Big Data Analytics and Cloud Computing-Hadoop, HDFS, mapreduce, Spark, and Flink-Database Techniques for Big Data-nosql Movement-nosql Solutions for Big Data Management-nosql Data Models-Future Directions.

Unit II

Resource Management in Big Data Processing Systems-Types of Resource Management-Big Data Processing Systems and Platforms Single-Resource Management in the Cloud-Multiresource Management in the Cloud-Related Work on Resource Management-Open Problems-Local Resource Consumption Shaping: A Case for MapReduce-Motivation-Local Resource Shaper-Evaluation.

Unit III

IoT Architectures – IoT Functional Stack, Sensors, and Actuators Layer, Communications Network Layer, Applications and Analytics Layer – IoT Data Management and computer Sack, Fog Computing, Edge Computing, Cloud Computing - Smart Objects, Sensor Networks.

Unit IV

Design Methodology – Case study – Basic blocks of IoT device – Arduino – Raspberry Pi – Board, Interfaces, Setting up, Programming – Other IoT Devices.

Unit V

Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

TEXT

1. Rajkumar Buyya, Rodrigo N. Calheiros, Amir Vahid Dastjerdi “Big Data Principles and Paradigms”, Elsevier 2016.
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.

| S.No | Department |
|-------------|---------------------------------|
| 1 | Life Education & Skill Elective |
| 2 | Tamil |
| 3 | English |
| 4 | Economics |
| 5 | Commerce |
| 6 | BBA |
| 7 | Commerce (Comp. Applications) |
| 8 | Mathematics |
| 9 | Physics |
| 10 | Chemistry |
| 11 | Computer Science |
| 12 | Biochemistry |
| 13 | BCA |
| 18 | Microbiology |
| 19 | NCC |

Department of English (UG)

Restructured UG Syllabus – English Major

| Sem | Part | Genre | Title of the Paper | Hrs | Cre | CIA | Sem | Total |
|--------------|------|------------------------------|--|-----------|----------------|-----|-----|-------|
| I | I | Lang | Tamil – I | 5 | 3 | 30 | 70 | 100 |
| | II | GE | English – I | 5 | 3 | 30 | 70 | 100 |
| | II | GE | English – II | 5 | 3 | 30 | 70 | 100 |
| | II | GE | English – III | 5 | 3 | 30 | 70 | 100 |
| | II | GE | English – IV | 6 | 3 | 30 | 70 | 100 |
| | IV | FC | Foundation Course | 2 | 1 | | | 50 |
| | IV | ET/RE | Ethics/Religion | 2 | 1 | | | |
| | I | GE-CE | Communicative English | | 1 | | | |
| Total | | | | 30 | 17+1 | | | |
| II | I | Lang | Tamil – II | 5 | 3 | 30 | 70 | 100 |
| | III | MC | Chaucer and Elizabethan Age | 5 | 5 | 30 | 70 | 100 |
| | III | MC | 18 th Century Literature | 5 | 5 | 30 | 70 | 100 |
| | III | MC | Literary Forms | 5 | 5 | 30 | 70 | 100 |
| | III | AR | History of English Literature | 6 | 4 | 30 | 70 | 100 |
| | IV | FC | Foundation Course | 2 | 1 | | 50 | 50 |
| | IV | ET/RE | Ethics/Religion | 2 | 1 | | | |
| | I | GE-CE | Communicative English | | 1 | | | |
| Total | | | | 30 | 24+1 | | | |
| III | I | Lang | Tamil – III | 5 | 3 | 30 | 70 | 100 |
| | III | MC | Romantic Age | 5 | 5 | 30 | 70 | 100 |
| | III | MC | Epics in English | 5 | 5 | 30 | 70 | 100 |
| | III | AR | Social History of England | 6 | 4 | 30 | 70 | 100 |
| | III | AO | History of English Language | 5 | 4 | 30 | 70 | 100 |
| | IV | FC | Foundation Course | 2 | 1 | | | |
| | IV | HR | Human Rights | 2 | 1 | | | |
| | | | DEEDS/SHELTERS | | 2 | | | |
| Total | | | | 30 | 25 | | | |
| IV | I | Lang | Tamil – IV | 5 | 3 | 30 | 70 | 100 |
| | III | MC | Major English Tragedies | 5 | 5 | 30 | 70 | 100 |
| | III | MC | Victorian Age I | 5 | 5 | 30 | 70 | 100 |
| | III | MC | Indian Writing in Translation | 5 | 5 | 30 | 70 | 100 |
| | III | AO | Phonetics | 6 | 4 | 30 | 70 | 100 |
| | IV | FC | Foundation Course | 2 | 1 | | | 50 |
| | IV | EVS | Environmental Studies | 2 | 1 | | | |
| | | | DEEDS/SHELTERS | | 2 | | | |
| | | Internship* | | 2* | | | | |
| Total | | | | 30 | 26 + 2* | | | |
| V | III | MC | Victorian Age II | 5 | 5 | 30 | 70 | 100 |
| | III | MC | 20 th Century English Literature | 6 | 6 | 30 | 70 | 100 |
| | III | MC | Literary Criticism – I | 6 | 6 | 30 | 70 | 100 |
| | III | MC | Indian Literature in English | 5 | 5 | 30 | 70 | 100 |
| | III | ME | Anglo-American Writing | 6 | 4 | 30 | 70 | 100 |
| | | | Common Wealth Literature | | | 30 | 70 | |
| | | | Women's Writing in the 19 th and 20 th Cent. | | | 30 | 70 | |
| IV | NME | English for Competitive Exam | 2 | 1 | 30 | 70 | 100 | |
| Total | | | | 30 | 27 | | | |
| VI | III | MC | Literary Criticism – II | 6 | 6 | 30 | 70 | 100 |
| | III | MC | English Language Teaching | 6 | 6 | 30 | 70 | 100 |
| | III | MC | 20 th Century English Novels | 6 | 6 | 30 | 70 | 100 |
| | III | SS | Translation : Theory and Practice | 5 | 4 | 30 | 70 | 100 |
| | III | SS | Journalism/Project | 5 | 4 | 30 | 70 | 100 |

| | | | | | | | | |
|--|----|-----|-----------------------|------------|---------------|--|--|--|
| | IV | NME | Written Communication | 2 | 1 | | | |
| | | | Total | 30 | 27 | | | |
| | | | | 180 | 148+2* | | | |

Indian Writing in Translation

Semester: V

Hours: 5

Sub.Code:

Credits: 4

Objectives

To introduce the students to the works of translation from the various regions of India and to highlight the distinctive nature of each region.

Unit - I

A.K. Mehrotra The concise History of Indian Literature in English

- Concept of Sahitya
- Indian Concept of Translation
- Tradition-Modernity
- Progressive writers movement
- Indian Dramatic Tradition
- Dalit Aesthetics
- Recent Trends in Indian Writing in Translation

Unit - II

Kural

Selections from Porul (tr). G. U. Pope

Akam&Puram

Selections from (tr)A.K. Ramanujan

Faiz Ahmed Faiz

Pain will come

KaifiAzmi

Vagrant Worship

Yatri

Two Poems (Maithili)

Unit - III

Ismat Chughtai
Anees Jung

Quit India (Lifting the Veil)
Mothers and Children (Unveiling India)

Unit - IV

Indira Parthasarathy
K. N. Panikkar

Nandan Kathera
The Lone Tusker

Unit - V

Asha Purna Debi
P. Sivakami

Subarnalatha
Grip of Change

Reference Books:

1. *An Anthology of Indian literature*. Alphonso-Karkala, John B., Ed. Harmondsworth: Penguin, 1971.
2. *The Interior Landscape: Love Poems from a Classical Tamil Anthology*. Trans. A.K Ramanujan. Oxford India Paperbacks, 1967.
3. *Women Writing In India*. 2 vols. Ed. Susie Tharu & K. Lalita, New Delhi: Oxford Univ. Press, 1997.
4. *Our Favourite Indian Stories*. Khushwant Singh and Neelam Kumar (Eds). Delhi: Jaico, 2002.
5. *Short Fiction from South India*. Eds. Subashree Krishnaswamy, K. Srilata Oxford Paperbacks, 2007.
6. *Folk Tales From India*. A.K. Ramanujan. New Delhi: Penguin Books India, 1994.
7. A.K. Mehrotra, *The concise History of Indian Literature in English*. Delhi: Permanent Black. 2008.
8. Limbale, Sharankumar. *Towards an Aesthetics of Dalit Literature*. Hyderabad: Orient Longman, 2002.
9. Kapoor, Kapil. *Literary Theory: Indian Conceptual Framework*. New Delhi: West Press, 1998.
10. Iyengar, K.R. Srinivasa. *History of Indian Writing in English*. Sterling Publication, New Delhi, 1962.
11. *Texts and Their Worlds I* Ed., Anna Kurien—Foundation Books
12. William Walsh, *Indian Literature in English*, Longman, London. 1990.

20th Century Indian Writing in English

Semester: V

Hour: 6

Sub.Code:

Credits: 4

Objectives

- To introduce learners to the various phases of evolution in Indian Writing in English
- To sensitize them to the value system of Indian literature
- To enable the students understand the history and the growth of Indian writing in English
- To introduce the learners to rich literary tradition in Indian writing in English
- To help the learners understand and appreciate Indian ethos, aesthetics and values

- To introduce the students to Indian writing in English in its various genres.

Unit - I

K.R.SrinivasaIyengarHistory of Indian Writing in English

- An overview of the history of Indian Writing in English
- Introducing the different phases in its evolution
- British Raj
- The emergence of Indian writing in English
- The National movement and its impacts
- Independence and post independence periods
- The new voices and trends.

L.V. Derozio
Sarojini Naidu
Tagore

Freedom to the Slave, The Orphan Girl
The Quest
Breezy April

Unit - II

Kamala Das
Nissim Ezekiel
A. K. Ramanujan
Agha Shahid Ali

In Love
Good bye Party to Miss Pushpa T.S.
Looking for a Cousin on a Swing
Postcard from Kashmir

Unit - II

Raja Ram Mohan Roy
Swami Vivekananda
R.K. Narayan
Premchand
S.H. Manto

Letters to Lord Amherst on Western Education
The Ideal of Universal Religion
The M.C.C
The Holy Panchayat
The Assignment

Unit - IV

GrishKarnad

Hayavardana

Unit - V

Amitav Ghosh

The Shadow Lines

Reference Books:

1. *Modern Indian Poets: A Critical study* by Shakti Batra, Surjeet publications, Delhi.
2. *Poetry Down the ages* Orient Blackswan Revised Edition
3. SaleemPeeradina (ed.): *Contemporary Indian Poetry in English*, Macmillan Publishers India Ltd.
4. Amitav Ghosh *The Shadow Lines*. Delhi: Ravi Dayal, 1988.
5. Brinda Bose. *Amitav Ghosh: Critical Perspectives*. Delhi: Pencraft International, 2005.
6. Naik, M.K., S.K.Desai et al. *Critical Essays on Indian Writing in English*
7. Jussawalla, Adil. *A New Writing in India*
8. *Mottled Dawn*, 1997, Penguin Books India, ISBN 0-14-027212-7
9. *An Anthology of Commonwealth Poetry* – Ed., C. D. Narasimhaiah
10. *Twenty Five Indian Poets in English* - Ed., K. S. Ramamurthy
11. *Contemporary Indian Poetry in English* -Ed. SaleemPeeradina
12. Iyengar, K.R.Srinivasa. *History of Indian Writing in English*. Sterling Publication, New Delhi, 1962.

Phonetics

Semester:IV

Hours: 6

Sub. Code:

Credits: 4

Objectives

- To help the students to understand all the sounds of English and the organs of Speech
- To provide students an overview of vowels, Consonants, and word Accent, intonation.
- To acquire an understanding of speech as the international phonetic transcription
- To give a systematic, conscious consideration of how speech sounds are made, what they sound like, and how they compare with each other.

Unit - I

1. Introductory Remarks
2. Components of Linguistics
3. The Organs of Speech
4. The Air-Stream Mechanism

Unit - II

1. The Classifications and Description of Speech, Sounds I: Consonants
2. The Consonants of English

Unit - III

1. The Classification and Description of Speech, Sounds II: Vowels
2. The Vowels of English

Unit - IV

1. Intonation
2. Syllable
3. Word-Accent
4. Accent and Rhythm in Connected Speech

Unit - V

1. Phonology
2. Phonemic Transcription of Individual Words

Reference Books

1. T. Balasubramanian – A Text book of English Phonetics for Indian Students; Macmillan. Chennai. Chapters: 1,2,3,4,5,8,10,11,14,15, and 16 and Trinity publications Second Edition Chapter 3.
2. Verma S.K. Krishnaswamy N. Modern Linguistics An introduction, New Delhi; Oxford, 1989.
3. Bansal R.k. An Outline of General Phonetics. Bombay: OUP, 1971
4. Sinha, Thakur. Better English Pronunciation, Chennai: Vijay Nicole Imprints, 20005.
5. Ogden. Richard. An Introduction to English Phonetics (Edinburgh Textbooks on the English Language) 1st ed. 2009.
6. English Phonetics for Indian Student – Work Book, Trinity Publications, Jan. 2012.

English Literature-Victorian Age-II

Semester: V

Hours: 5

Sub.Code:

Credits: 5

Objectives:

- To inculcate a sense of appreciation of English poetry in Students
- To train the students to read and appreciate the novels of Victorian age
- To raise the awareness of relevant cultural and/or social contexts, and a sense of what that awareness contributes to the understanding of the text(s)
- To develop a clearer understanding of the period - its tensions, enthusiasms, hopes, fears, and sometimes contradictory moral and intellectual principles through reading, discussion, and writing.

Unit - I

| | |
|------------------|----------------------------|
| G.M. Hopkins | Andromeda |
| Francis Thompson | The Hound of Heaven |
| William Morris | The Haystack in the Floods |

Unit - II

| | |
|------------------|---|
| G.K. Chesterton | On running after one's Hat |
| Bertrand Russell | Knowledge and Wisdom |
| Arnold Toynbee | India's Contribution to the World's Unity |
| John Ruskin | Roots of Honour (Unto This Lost – Book) |

Unit - III

| | |
|--------------|-----------------------|
| Oscar Wilde | Lady Windermere's Fan |
| Bernard Shaw | Arms and the Man |

Unit - IV

| | |
|------------------|-----------|
| Charlotte Bronte | Jane Eyre |
|------------------|-----------|

Unit - V

| | |
|--------------|-------------|
| George Eliot | Middlemarch |
|--------------|-------------|

Reference Books:

1. Buckley, Jerome H. *The Words of Victorian Fiction* – London: Harvard University.
2. Sethuraman V.S. and Indra C.T. ed – *Victorian prose*.
3. Wright, Austin – Victorian Literature: Modern Essay in Criticism – London: Oxford University Press, 1961.
4. Bronte, Charlotte. *Jane Eyre*. London, England: Smith , Elder and Co.P .105 Random House Publishing, 1983.
5. Eliot, George. *Middlemarch*, London, Macmillan ,1972 Penguin Books Limited, 2012. Paperback.
6. Pelican Guide To English Literature - Introduction – Boris Ford – Vol III, IV, V,VI,VII
7. *Modern Essays* – Ed. Board of Editors, Orient Longman.

8. Bernard Bergongzi *The Turn of A Century: Essays On Victorian and Modern English Literature*.
9. Compton Rickett *History Of English Literature*
10. S. Hynes, *The Auden Generation: Literature and Politics in England in the 1930's* (London, 1976)
11. D. Perkins, *A History of Modern Poetry: From the 1890's to the High Modernist Mode* (Cambridge, Mass, 1976)

20th Century English Literature

Semester - V

Hours: 6

Sub.Code:

Credits: 6

Objectives

- To introduce the essential characteristics, major trends and techniques of 20th Century English Literature
- To familiarize them to the works of modern writers.

Unit - I

W.B. Yeats
Wilfred Owen
Philip Larkin

The Second Coming
Strange Meeting
Church Going

Unit - II

W.H. Auden
Ted Hughes
Dylan Thomas

Lay Your Sleeping Head My Love
Thought Fox
On The Marriage of a Virgin

Unit - III

Samuel Beckett
John Osborne

Waiting for Godot
Look Back in Anger

Unit - IV

T. S. Eliot
D.H Lawrence

Tradition and the Individual Talent
Why the novel Matters?

Unit - V

Albert Camus
E. M. Forster
Raymond Williams

Absurdity and Suicide and The Myth of Sisyphus, from *The Myth of Sisyphus* (Penguin), pp.11- 17, 107-111.
'Art for Art's Sake.' from *Two Cheers for Democracy*, in Ellmann and Feidelson, pp. 198-202.
'Introduction' in *The English Novel from Dickens to Lawrence* (London: Hogarth, 1984), pp. 9-27.

Reference Books

1. David A, Ross. *Critical Companion to William Butler Yeats: A Literary Reference to His Life and Work*. 1st Edition
2. Yeats, W.B. *The Collected Poems of W. B. Yeats*, Wordsworth Editions, 2000.

3. Russell, Murphy *Critical Companion to T. S. Eliot: A Literary Reference to His Life and Work*
4. Hutchings, William *Samuel Beckett's "Waiting for Godot": A Reference Guide*
5. Farrar, Hugh Kenner. *A Reader's Guide to Samuel Beckett* .Straus and Giroux, 1973.
6. Sharma, Raja *Ready Reference Treatise: Look Back In Anger*.
7. Ellmann, Richard and Charles Feidelson, Jr, eds. *The Modern Tradition*
8. Ellmann, Richard and Charles Feidelson, Jr, eds. *Two Cheers for Democracy* (London: Edward Arnold), 1972.
9. Camus, Albert. *The Myth of Sisyphus* (Penguin Great Ideas)
10. Raymond Williams. *The English Novel from Dickens to Lawrence* (London: Hogarth) 1984.

Literary Criticism - I

Semester -V
Sub. Code:

Hours:6
Credits:6

Unit - I

Plato The Ion

Unit - II

Aristotle Poetics (Chapter 1 & 6)
Longinus On the Sublime

Unit - III

Philip Sidney Apology for Poetry

Unit - IV

Alexander Pope Essay on Criticism
Francis Bacon Advancement of Learning (Book-I)

Unit - V

William Wordsworth Preface to Lyrical Ballads

Reference Books:

1. Aiken Conrad- Collective criticism- New York and London, Oxford University Press, 1968.
2. Das and Kumar, Bijay-Twentieth Century Literary Criticism-Atlantic Publishing, 2005.
3. Lodge, David, ed. Modern Criticism and Theory-II edition, New Delhi; Pearson Education, 1998.
4. Waugh, Patricia. Literary Theory and Criticism-New Delhi: Oxford University Press, 2006.
5. Bacon, Francis. Advancement of Learning: Standard Publications, 2007.

20th Indian Literature in English-II

Semester: V
Sub.Code:

Hours: 5
Credits: 5

Objectives

- To introduce learners to the various phases of evolution in Indian Writing in English
- To sensitize them to the value system of Indian literature
- To enable the students understand the history and the growth of Indian writing in English
- To introduce the learners to rich literary tradition in Indian writing in English
- To help the learners understand and appreciate Indian ethos, aesthetics and values
- To introduce the students to Indian writing in English in its various genres.

Unit - I

Jibanananda Das

Before Dying

Windy Night

I Shall return to this Bengal

A.K. Ramanujan

Love Poem for a Wife

The River

Unit - II

Gieve Patel

Squirrels In Washington

Forensic Medicine

Keki N. Daruwala

The Unrest Of Desire

The Poseidonians

Migrations

Unit - III

Jayanta Mahapatra

‘Hunger’, ‘Dhaulti’, ‘Grandfather’, ‘A Country’.

Unit - IV

Vijay Tendulkar

Kanyadaan

Mahesh Dattani

Seven Steps around the Fire

Unit - V

Amitav Ghosh

The Shadow Lines

Reference Books:

1. Modern Indian Poets: A Critical study by Shakti Batra, Surjeet publications, Delhi.
2. Poetry Down the ages Orient Blackswan Revised Edition
3. Saleem Peeradina (ed.): Contemporary Indian Poetry in English, Macmillan Publishers India Ltd.
4. Amitav Ghosh The Shadow Lines. Delhi: Ravi Dayal, 1988.
5. Brinda Bose. Amitav Ghosh: Critical Perspectives. Delhi: Pencraft International, 2005.
6. Vijay Tendulkar. Collected Plays in Translation: Vijay Tendulkar, New Delhi: Oxford University Press, 2004. Print
7. Naik, M.K., S.K.Desai et al. *Critical Essays on Indian Writing in English*
8. Jussawalla, Adil. *A New Writing in India*

Anglo- American Writing-I

Semester - V

Hours: 6

Sub.Code:

Credits: 4

Objectives

- To introduce students to a variety of Anglo-American writing in different genres
- To familiarize student with the major Anglo-American writers to understand their contribution to the shaping of contemporary thought.
- To provide the global perspective.

Unit - I

Graham Greene

The Heart of the Matter

Unit - II

William Faulkner

Dry September

F. Scott Fitzgerald

The Crack-up

Ernest Hemingway

A Clean Well-Lighted Place

Unit - III

Somerset Maugham

The Door of Opportunity

John Updike

Density and Doubt

John Cheever

The Swimmer

Salman Rushdie

The Courter

Unit - IV

1. Salman Rushdie, Imaginary Homelands, from *Imaginary Homelands*.
2. George Orwell, Politics and the English Language.
3. Seamus Heaney, The Redress of Poetry, from the *The Redress of Poetry* (London : Faber, 1995).

Unit - V

1. Adrienne Rich, When We Dead Awaken: Writing as Revision, from Adrienne Rich's Poetry (Norton Critical Edition).
2. Denys Thompson and E.R. Leavis, Advertising Types of Appeal, from *Culture and Environment*.
3. *Topics*: Social Realism and the Contemporary Novel; Folklore and the Contemporary Novel; Black Women's Writing; Identity in Contemporary Poetry; Tragicomedy in Contemporary Theatre.

Reference Books

1. DeRitter, J. (2001). Empirical evidence: Anglo-American race, literature, and history. *Journal for Early Modern Cultural Studies* 1(2), 124-133. University of Pennsylvania Press. Accessed from project MUSE database.
2. Fatima, E. D. (1991). Unspeakable Things (un)spoken in Toni Morrison's *Beloved* (unpublished master's thesis). University of Federal do Parana. Accessed from <http://dspace.c3sl.ufpr.br:8080>
3. Hack, D. (2008). The Novel of Purpose: Literature and Social Reform in the Anglo-American World. *Victorian Studies*, 50(2), 353-355
4. Iftikhar, S. (2013). An Analysis of the Themes of Death, Decline and Disappointment In Philip Larkin's Poetry. *Language in India*, 13(7)
5. Istvan, R. (2011). Philip Larkin's Poetics: Theory and Practice. Accessed from http://real-d.mtak.hu/482/4/dc_243_11_doktori_mu.pdf

6. Miller, A. (n.d.). The Crucible. Retrieved from <http://www.hatborohorsham.org/cms/lib2/PA01000027/Centricity/Domain/339/TheCrucibleArthurMiller.pdf>.

Common Wealth Literature

Semester -V

Hours: 6

Sub. Code:

Credits: 4

Objectives:

- To sensitize the history of Common Wealth Nations
- To familiarize the students with the recent works of writers from different pockets of the world with an open mind, to understand and appreciate them
- To weigh the claims of universalism made on behalf of canonical texts in juxtaposition to the elements of heredity, marginality, plurality and ‘otherness’, by examining these texts
- To demonstrate knowledge and awareness of some components of Commonwealth Nations’ cultural heritage such as artistic, historical, linguistics, literary, and philosophical foundations.

Unit - I: Poetry

Australia - A.D. Hope
 New Zealand - Jessie Mackay
 Africa - Abioseh Nicol
 Nigeria - Gabriel Okara

The Death of the Bird
 The Noosing of the sun-god
 The Continent that lies within us
 Once Upon a Time

Unit - II : Novel

Pakistan- Bapsi Sidhwa

Pakistani Bride

Unit - III: Prose

Sri Lanka - Ananda Coomaraswami
 Nigeria- Chinua Achebe

The Dance of Shiva (1&2)
 Novelist as a Teacher

Unit - IV: Drama

Nigeria - Wole Soyinka

The Kongi’s Harvest

Unit - V: Fiction

Canada - Margaret Atwood
 Australia - Patrick White

Surfacing
 Voss

Reference Books:

1. Bapsi Sidhwa: The Pakistani Bride, Penguin India, 2000
2. Ananda Coomaraswamy: The Dance of Shiva, Rupa Publications, 2013
3. Wole Soyinka: The Kongi’s Harvest, Oxford University Press, 1967
4. Margaret Atwood: Surfacing, Little Brown Book Group, 1997
5. Patrick White: Voss, RHUK Publisher, 1994

Women’s Writings in the 19th and 20th Centuries-II

Semester - V

Hours: 6

Sub. Code:

Credits: 4

Objectives:

- To initiate an interest in the learners for the women writers in English
- To enable students to approach the thought and expression of women writers who displayed their perception on the world, culture and gender – bias with novelty in attitude and innovation in techniques
- To know the underlying themes expressed by women writers
- To understand and appreciate the inner and deeper aspirations of the women writers.

Unit – I

Emily Dickinson

Because I could not stop for Death

I Felt a funeral in my Brain

Sylvia Plath

Soliloquy of a Solipsist

Mirror

Unit – II

Alice Walker

The Colour Purple

Unit - III

Rassundari Debi

Excerpts from Amar Jiban in Susie Tharu and K. Latha, ed., *Women's Writing in India* (Delhi: Oxford, 1989),

Pandita Ramabai

Excerpts from Tharu and Lalita, ed. *Women's Writing in India* vol. 1, pp.247-53.

Unit - IV

Meena Kandasamy

The Gypse Goddesses

Unit - V

Virginia Woolf

Chapter I and selection from Chapter 3 of *A Room of One's Own* (pp 3- 24, 48-59)
Newyork: Harvest HGJ, 1957

Sigmund Feud

'Female Sexuality' in the collected works of Sigmund Freud , Vol5 (London Hogarth Press , 1957) pp 252- 272

Reference Books:

1. Lessing, Doris. *The Golden Note Book*. UK: Perennial Modern Classics, 1962.
2. Walker, Alice. *The Color Purple*. US: Mariner Books, 1982.
3. Tharu Susie, Lalitha. *Women Writing in India*. Delhi: OUP, 1991.
4. Dickinson, Emily. *The complete Poems of Emily*. Boston: 1924
5. Plath, Sylvia, *Ariel*. London: Faber and Faber, 1999.

Non Major Elective: English for Competitive Examinations

Semester - V

Hours: 2

Sub.Code:

Credits:1

Objectives

- To equip the learners with knowledge and skills to clear competitive exams
- To provide the basic knowledge of English language

- To enable the learners to use error free English

Unit - I

Basics of English
 Errors and how to avoid them
 Spotting Errors

Unit - II

Sentence Completion
 Reconstructing passages
 How to write a précis
 Reading comprehension

Unit - III

Composition
 Letter writing for various occasions

Unit- IV

Report writing
 Spellings
 Vocabulary

Unit- V

Some notions, conventional and idiomatic expressions
 Phrasal verbs
 Spoken English

Reference Books

1. English for Competitive Examinations- R. P. Bhatnagar, Rajul Bhargava. Pub: Macmillan Pvt. Limited.
2. Learner's English Grammar and Composition by N.D.V.Prasada Rao (S. Chand & Company Ltd.)
3. English Grammar, Composition & Usage by J.C.Nesfield (Macmillan India Ltd.)
4. General English for All Competitive Examinations (Old Edition) by S.C. Gupta
5. Objective English for Competitive Examination by Hari Mohan Prasad , Uma Sinha .

Literary Criticism - II

Semester - VI

Hours: 6

Sub.Code:

Credits: 6

Unit - I

I.A. Richards Two Uses of Language

Unit - II

T.S. Eliot Hamlet and his problems

Unit - III

Frantz Fanon Black Skin and White Mask

Unit - IV

Kamau Brathwaite The History of the Voice

Unit - V

Bertolt Brecht The Three Penny Opera

Reference Books

1. Chandra, Joseph & Samy, Antony K.S., Classical to Contemporary Literary Theory – A Demystified Approach. New Delhi: Atlantic Publishers. 2011.
2. Connors, Clare. *Literary Theory: Beginners Guide*. Chennai: Chennai Micro Print. 2011.
3. Waugh, Patricia-Literary theory and Criticism – New Delhi: Oxford University Press, 2006 (To know the literary theory).
4. M.H. Abrams-A Glossary Of Literary Terms Macmillan publishers India Ltd.
5. Das and Kumar, Bijay-Twentieth century literary criticism-Atlantic Publishing, 2005.
6. Aiken Conrad- Collective criticism- New York and London, Oxford University Press, 1968.
7. Lodge, David, ed. Modern Criticism and Theory-II edition, New Delhi; Pearson Education, 1998
8. Eagleton, Terry- The English Novel, An Introduction-Uk: Blackwell Publishing
9. Seturaman, ed.-Indian Aesthetic: An Introduction- New Delhi: Macmillan, 2005.
10. Panja, Shomishtha. Ed. *Critical Theory: Textual Application*. New Delhi: Worldview Publications, 2002.
11. Fanon, Frantz. *Black Skin and white Mask*. Tr. Richard Philcox, Perseus Books Group .2007.
12. Eliot, T.S. *The Sacred Wood: Essays on poetry and Criticism*. Dolo Press. 2009.
13. Brathwaite, Kamau. *The History of the Voice*. New Beacon Book Limited. 1984.

English Language Teaching

Semester - VI

Hours: 6

Sub.Code:

Credits: 6

Objectives:

- To provide the history of English Language Teaching
- To understand the historical need that called for an innovation in teaching methods
- To equip the learners with a knowledge of various methods both evolving and being used in ELT
- To help the students to understand the current trends and curriculum styles in ELT
- To enable students to train themselves to be good English Teachers

Unit - I

Major Trends in Twentieth-Century Language Teaching

A Brief History of Language Teaching, The Oral Approach and Situational Language Teaching, The Audiolingual Method.

Unit - II

Current Approaches and Methods

Communicative Language Teaching, Content-Based Instruction and Content and Language Integrated Learning (CLIL), Competency-Based Language Teaching.

Unit - III

Current Approaches and Methods

Task-Based Language Teaching, Text-Based Instruction, The Lexical Approach, Multiple Intelligences.

Unit - IV

Alternative Twentieth-Century Approaches and Methods

The Natural Approach, Total Physical Response, The Silent Way, Suggestopedia

Unit - V

The Teaching and Learning Environment

Approaches, Methods, and the Curriculum, CALL

Reference Books:

1. Jack C. Richards and Theodore S. Rodgers. *Approaches and Methods in Language Teaching*. Third Edition, India: Cambridge University Press, 2016.
2. Larsen-Freeman, Diane. *Techniques and Principles in Language Teaching*. Oxford: OUP, 2000.
3. Scrivener, Jim. *Learning Teaching*. 3rd Ed. MacMillan Books for Teachers
4. Thornbury, Scott. *About Language – Tasks for Teachers of English*. Cambridge: Cambridge University Press
5. Saville-Troike, Muriel. *Introducing Second Language Acquisition*. Cambridge: Cambridge University Press, 2006.
6. Davies, Paul. and Pearse, Eric. *Success in English Teaching*. Oxford: Oxford University Press, 2000.
7. Lightbown, Patsy and Spada, Nina. *How Languages Are Learned*. 4th Ed. Oxford: Oxford University Press, 2000.
8. Hedge, Tricia. *Teaching and Learning in the Language Classroom*. Oxford: Oxford University Press.
9. Srivastava, A. *English Language Teaching Methods Tools and Techniques ELT*. Book Enclave: 2012.

20th Century British Novels

Semester - VI

Hours: 6

Sub. Code:

Credits: 6

Objectives:

- To introduce students the novel as a literary form, its origins, history and continued popularity
- To introduce students to the different trends in the history of English Novels.
- To focus novel as a medium for social change.

Unit - I

Joseph Conrad

Heart of Darkness

Unit - II

D.H. Lawrence

The Plumed Serpent

Unit - III

Virginia Woolf

Mrs. Dalloway

Unit - IV

Unit - V

James Joyce

A Portrait of the Artist as a Young Man

Reference Books:

1. Karl, Frederick R.; Davies, Laurence, eds. (1986). *The Collected Letters of Joseph Conrad – Volume 2: 1898 – 1902*. Cambridge University Press. ISBN 0-521-25748-4.
2. Moore, Gene M. (2004). *Joseph Conrad's Heart of Darkness: A Casebook*. Oxford University Press. ISBN 0195159969.
3. Paul Poplawski, John Worthen *D.H. Lawrence: A Reference Companion*
4. Woolf, Virginia. "Mrs Dalloway." Oxford University Press. 2009. Print.
5. Joyes, Kaley. "Failed Witnessing in Virginia Woolf's Mrs. Dalloway." *Woolf Studies Annual* vol 14 (2008) pp. 69–87
6. Guth, Deborah. "What A Lark! What a Plunge! Fiction as Self-Evasion in Mrs Dalloway." University of Tel Aviv 19–25.
7. *The Power and the Glory* New York: Viking, 1990. Introduction by John Updike.
8. Belanger, Jacqueline (2001). "Introduction". *A Portrait of the Artist as a Young Man*. Wordsworth Editions. pp. i–xxxii. ISBN 978-1-85326-006-3.
9. Bulson, Eric (2006). "3". *The Cambridge Introduction to James Joyce*. Cambridge University Press. pp. 47–62. ISBN 0-521-84037-6.

Translation: Theory and Practice**Semester - VI****Hours:5****Sub.Code:****Credits:4****Objectives:**

- To help the students understand how translation has shaped the knowledge of the world in the past and equip for the future.
- To develop practical skills in translation
- To develop an understanding of difference in the text type.

Unit - I:

History of Translation Theory- Translation of Religious Texts

Unit - II: Theory- Central Issues

Language and culture- Types of Translation- Decoding and Recoding- Problems of Equivalence- Loss and Gain- Untranslatability.

Unit - III: Special Types of Translation

Administrative translation- Commercial translation -Computer translation – Economic translation – Literary translation

Unit - IV: Translation Problems

General problems- The Problems of Untranslatability- The Problem of Common words.

Unit - V: Trends in Translation

Machine Translation- Computer –Assisted translation-Cultural translation.

Reference Books

1. Bassnett, Susan, Translation Studies, 3rd Edition- Routledge , New Delhi, 2005
2. Newmark, P. Approaches to Translation. Oxford. Pergaman Press, 1982.
3. Nida, E. The theory and of Practice of Tanslation. Leiden: E. J.Brill. 1969
4. Steiner, G. After Babel; Aspect of Language and Tanslation. Oxford: Oxford University Press, 1978.

Project- Journalism

Semester - VI

Hours: 5

Sub. Code:

Credits: 4

Objectives

- To enable students to understand that writing for media is an art
- To offer hands-on experience to the learners by empowering them to do real time projects
- To familiarize students with the nuances of Journalism.

Unit - I: Journalism and Mass Communication: Book Review, proof reading, Report writing, News report, Editing, Photography, Advertising and film studies.

Unit - II: Technical Writing: Preparing user's manual, Technical description, and Business/ technical letters and flow charts, and tables, style for readability, writing with a computer, writing instructions, descriptions and explanations, minutes and reports.

Unit III: Essay in the area of Specialization – Advertising – Preparation of Newsletter (campus Journal), Film Review.

Unit IV & V: Project

Reference Books:

1. 1.RangasamyParthasarathy: *Basic Journalism, Macmillan*
2. Krishna Mohan &Meera Banerjee: *Developing Communication Skills, Macmillan.*
3. Keval J. Kumar, *Mass Communication in India – Jaico Publishers, 2004.*
4. M.V. Kamath. *Professional Journalism, New Delhi: Vikas Publications*
5. Jagadish Chakravarthy. *Journalism. Changing Society Emerging Trends. Author Press, 2005*
6. Puri, Manohar. *Art of Reporting.*

Non Major Elective: Written Communication

Semester - VI

Hours: 2

Sub.Code:

Credits: 1

Objectives:

- To equip the learners with good written communication skills
- To train students in writing
- To familiarize the learners with the mechanics of writing
- To enable the learners to use the appropriate functions and means of writing
- To equip the learners with info-gathering steps for better writing.

Unit - I

Communicating by letter

Unit - II

Different ways of presenting information

Unit - III

Description and narration

Unit - IV

Note-taking

Unit - V

Reporting

Reference Books:

1. Written Communication in English- Sarah Freeman. Pub: Orient Longman.
2. Business Communication Process and Product; 6th ed
3. Communication Matters, Porter, et al
4. Examine your English: Margaret M. Maison(Orient Longman)
5. English for Practical Purposes by Patil, Valke, Thorat& Merchant (Macmillan)
6. Macmillan Foundation English By R.K. Dwivedi& A. Kumar (Macmillan)

Question Paper Pattern**Written Exam: 70 Marks**

The question paper shall have three divisions (Section A, Section B and Section C) with a maximum of 75 Marks with the following break-up.

Section – A (10 x 2 = 20 Marks)

This section contains 10 short answer questions, 2 questions from each unit. The candidate is expected to answer all the questions. Each question carries 2 Marks.

Section – B (5 x 4 = 20 Marks)

This section contains 5 questions with internal choice, 2 questions from each unit. The candidate is expected to answer all 5 questions. Each question carries 4 Marks.

Section – C (3 x 10 = 30 Marks)

This section contains 5 questions, 1 question from each unit. The candidate is expected to answer any 3 questions. Each question carries 10 Marks.

SELF-STUDY PAPERS (SSP) – 2 Credits Each

1. Computing skills for English literature students
2. Shakespeare
3. Popular Writings in English

Self-Study Paper (SSP)- 1

Computer Application for English Literature Students

Sub. Code:

Credits: 2

Objectives

- To introduce the students to the emerging field of information technology
- To familiarize the students with the basics of computer system
- To enable the students to work with Open Office Suite (Word processor, presentation software, and spreadsheet, etc...)
- To plunge the students into the world of innumerable possibilities of internet and to use them to find online resources for language, literature and research
- To encourage students to create e-content and publish online.

Unit - I

Computer Fundamentals

Unit - II

Microsoft Office: MS Word, MS Excel, MS PowerPoint, Visio

Unit - III

Networking Fundamentals, Internet, Internet Applications

Unit - IV

Network Security and System Maintenance

Unit - V

Internet and English, Internet resources for English Language Teaching, Blogs, Wikis, Podcasts, Online Interactive help sites, Job opportunities for English language learners on Internet.

Books for Reference

1. Pradeep K. Sinha Priti Sinha, "Computer Fundamentals", BPB Publications, Sixth Ed., 2011.
2. V.Rajaraman Neeharika Adabala, "Fundamentals of computers", Sixth ed.
3. Tom Alexander-Joe Mathews, "Fundamentals of Computer", Neha Publishers & Distributors, 2012
4. Kogent Solutions Inc, "Office 2007 in Simple Steps," Dreamtech Press, 2010
5. Sanjay Saxena, "A First Course in Computers", Vikas Pub House, New Delhi, 2003 Ed.
6. Ron Mansfield, "The Compact Guide to Microsoft Office Professional", BPB Pub, New Delhi.
7. Alexis Leon & Mathews Leon, "Internet for Everyone", Third Edition, Leon Press & Vikat Publishing House. Pvt. Ltd, Chennai.
8. Margaret Levine Young, "The Complete Reference Internet", Second Ed, Tata McGraw-Hill Publishing Company. Ltd, New Delhi.

Web References:

<http://my.safaribooksonline.com/book/information-technology-and-software-development/9788131733097/basics-of-computer/ch01>

http://en.wikibooks.org/wiki/Computers_for_Beginners/The_Basics

Self-Study Paper (SSP) - 2

Shakespeare

Sub. Code:

Credits: 2

Sonnets

18, 24, 29, 98, 104, 106, 116, 130, 134, 138

Tragedies

Hamlet, Prince of Denmark
Othello, the Moor of Venice
Romeo and Juliet

Comedies

Much Ado About Nothing
Twelfth Night
A Midsummer Night's Dream

Histories

Henry IV – Part - I
Henry V
Richard II

Reference Books:

1. Bradley, A. C.- Oxford Lectures on Poetry, Macmillan, 1965.
2. Gibson, Rex- Perspectives: Teaching Shakespeare-Cambridge University Press.
3. Guerin, Wilfred L.- A Handbook of Critical Approaches- New York,OUP, 2003.
4. Spurgeon, Caroline F. E- Shakespeare Imagery and what it tells us- Boston: Bacon Press, 1958.
5. Wells, Stanley and Lena Cowen Orlin- Shakespeare, An Oxford Guide- New York; OUP,2003.
6. Knight, Wilson- The Crown of Life- Essays in interpretation of shakespeare's final Plays Methuen & Co Ltd.,1969.
7. Studies in Shakespeare-Oxford Paperback
8. J.LStyan-Shakespeare's Stagecraft-Cambridge University Press, 1967
9. Egan, Gabriel- Shakespeare- Edinburgh University Press, Edinburgh, 2007.

Web source:

<http://shakespeare.mit.edu/>

Self-Study Paper (SSP) - 3

Popular Writing in English

Sub. Code:

Credits: 2

Objectives

- To inculcate the skill of reading literature
- To enable the students to be acquainted with the recent trends in literature
- To know the themes of pulp fictions

Unit-I

Chetan Bhagat-One Indian Girl

Unit-II

Savi Sharma- Everyone has a Story

Unit-III

V.S Naipaul- A House for Mr. Biswas

Unit-IV

Amitav Ghosh-The Hungry Tide

Unit- V

Jhumpa Lahiri -Interpreter of Maladies

Reference Books

1. Choudhury, **Bibhash.** *Ghosh Amitav: Critical Essays* 2009. Web
2. Nandan, Kavita. V.S. Naipaul: A Diasporic Vision
3. Densingh, and L. D. Easter Raj Jhumpa Lahiri's Interpreter of Maladies: An Exploration of the Diasporic Realities. *Language in India*; May2012, Vol. 12 Issue 5, p60
4. A Rajina. "Prospect of Globalisation and Its Impact on India:" A Critique of Chetan Bhagat's Novels. Issue XV, April 2016

Department of English
Sacred Heart College (Autonomous), Tirupattur
From 2017 - 2018

Certificate Programmes to be offered for Students

| S.No. | Certificate Programme Title | UG/ PG | No. of Units | No. of Hours | No. of Credits |
|-------|---|-----------|-----------------|-----------------|-------------------|
| 1 | Certificate in Creative Writing | UG/PG | 5 | 30 | 2 |
| 2 | Certificate in Professional Communication Skills | UG/PG | 5 | 30 | 2 |
| 3 | Certificate in English for Competitive Exams | UG/PG | 5 | 30 | 2 |
| 4 | Certificate in Advanced Academic Writing | PG | 5 | 30 | 2 |
| 5 | Certificate in Journalism | UG/PG | 5 | 30 | 2 |
| 6 | Certificate in Competitive Exams (NET – Paper I) | UG/PG | 5 | 30 | 2 |
| 7 | Certificate in Competitive Exams (NET – Paper II & III) | PG | 5 | 30 | 2 |
| 8 | Certificate in Translation Studies (Tamil & English) | UG/PG | 5 | 30 | 2 |
| 9 | Certificate in Copy-Editing | UG/PG | 5 | 30 | 2 |

1. Certificate in Creative Writing

Semester:

Hours: 30

Credits: 2

Objectives

- To enable the students with the literature background to write and express their ideas creatively and innovatively in his or her unique style
- To help the students to learn the techniques of other eminent writers and help them to draft their own

Unit - I: Poetry

Rhythm – Rhyme – Imagery – Diction – Stanza-Making the students to write poetry.

Unit - II: Drama

Plot-Character-Dialogue-Stage/Setting/Music/Props/Lights-The Use of Stage areas

Unit - III: Fiction, Short Story and Essay

Plot-Characterization-Narrative Technique-Theme-Climax and Anti-Climax- Construction and Description-Point of View

Unit - IV: Effective Writing and Reading

Writing Style-Letter Writing-Report Writing-Major Reports-Reading Skills-Interactive Writing-The Discovery of Meaning-Understanding Meaning-The Communication of Meaning

Unit - V: Summary Writing

Tools for summarizing-Summarizing Paragraphs-Types of Summaries-Summarizing longer Passages-Summarizing Stories-Summarizing Spoken Texts - Summarizing Speeches

Books for References

1. Best, Wilfred D- The Students Companion- London, Rupa Paper Back, 1984.
2. Dawson S W- Drama and Dramatic: The Critical Idion Series- London, Methuen & Co, 1984.
3. Doubtfire, Dianne-Creative Writing- London and New York, Staples Press 1949.
4. Hall Donald and Sven Birkerts- Writing Well- New York, harper Collins Publishers,1991.

5. Khan John Ellison (ED)-Reader's Digest: How to write and Speak Better? New York-Reader's Digest, 1993.
6. Millward Celia-Handbook for writers,2nd edition-New York, Holt Rhinehart&Winston,1980.
7. Scott Bill- The Skills of communicating- Mumbai, Jaico Publishing House,1995.
8. Rai Ajay- Mark your Words-New Delhi: Crest Publishing House,2003.
9. Reid Ian- The Short Story: the Critical Idiom Series-London,Methuen& Co,1986.

2. Certificate in Professional Communication Skills

Semester:

Hours: 30

Credits: 2

Objective

- This course attempts to impart the basics of communication in English through written exercises and spoken activities not only to improve the general communication abilities of students but also to enhance their employability.

Unit - I: Basics of Communication

Forms of Communication; Elements of Communication; Communication Process; Models of Communication; Frames of Reference; Barriers to Communication; Listening Skills

Unit- II: Reading and Writing

General and Technical Comprehension; Essential Grammar; Vocabulary; Basic Phonetics

Unit- III: Written Communication

Business Letters; Job Applications; Resumes

Unit- IV: Speaking

Public Speaking; Seminars and Presentations; Group Discussions; Interviews

Unit- V: Personality Development

Self-assessment; SWOT Analysis; Emotional Quotient; Body Language; Leadership Qualities; Time and Stress Management; Professional Ethics

Suggested Reading

1. Effective Communication for Science and Technology by Joan van Emden
2. Developing Communication Skills by Krishna Mohan
3. Objective English by Edgar Thorpe
4. Mastering Public Speaking by Anne Nicholls
5. Cambridge English Pronouncing Dictionary by Daniel Jones
6. How to Prepare for Group Discussion and Interview by H.M. Prasad

3. Certificate in English for Competitive Examinations

Semester:

Hours: 30

Credits: 2

Aims and Objectives:

- To prepare the students to face competitive examinations in future
- To make them aware of the various components in competitive examinations
- To create confidence in the students to face competitive examinations

Unit- I:

Basics of English: Sentence, clause, phrase, word, morpheme

Tenses: Importance – Uses – Kinds of tenses

Voices: Passive voice – Active voice – Interpersonal passive voice

Degrees of comparison – 4 types

Transformation of sentences

Punctuation: Meanings – Importance – Marks of punctuation – Use of punctuation –

Use of capital letters

Unit- II:

Précis writing – Note making

Paragraph writing – Essay writing

Unit- III:

Comprehension - Letter writing – Report writing

Unit- IV:

Words often confused – Abbreviations – Use of appropriate tense forms – Use of one word substitution – Use of correct spelling

Synonyms and antonyms – Match words with their meanings – Spotting common errors in English grammar – Appropriate use of proposition

Unit- V:

Conversion of diagrams into literal language – Word formation – Idioms and phrases – Intelligence test

Booksfor Reference

1. English for Competitive Examinations- R. P. Bhatnagar, Rajul Bhargava. Pub: Macmillam Pvt. Limited.
2. Bank Probationary Officers Competitive Examinations, Rose Publications.
3. Learner's English Grammar and Composition by N.D.V.Prasada Rao (S. Chand & Company Ltd.)
4. English Grammar, Composition & Usage by J.C.Nesfield (Macmillan India Ltd.)
5. General English for All Competitive Examinations (Old Edition) by S.C. Gupta
6. Objective English for Competitive Examination by Hari Mohan Prasad, Uma Sinha .

4. Certificate in Advanced Academic Writing

Semester:

Hours: 30

Credits: 2

Objective

- The overall aim of this course is to develop the proficiency of the learners in writing English for academic purposes. As these students have already had the basics of English structure and pronunciation with them, this course intends to integrate the various skills and sub-skills into meaningful writing activities.

Unit - I:

Paragraphs with explicit unity

Descriptions: Objects, people, places, scenes, situations and processes

Narrations: Events, stories etc.

Unit - II:

Letters: Formal and informal: Personal, official business etc.

Projects: Proposals and reports

Unit - III:

Study skills: Listening and note-taking, Reading and note-making

Unit - IV:

Reference skills: Use of dictionaries, directories, encyclopedias etc.

Unit - V:

Information transfer: Transfer from non-verbal to verbal and vice versa.

Books prescribed

1. Raymond Murphy: Murphy's English Grammar (CUP)
2. Tickoo & Sasikumar: Writing with a Purpose (OUP)
3. Narayanaswami: Strengthen Your Writing (Longman)
4. Pillai, Rajeevan & Nair: Written English for You (Emerald)
5. Coe, Rycroft & Ernest: Writing Skills (CUP)
6. Tricia Hedge: Writing (CUP)
7. David Jolly: Writing Tasks (CUP)
8. Michael Swan: Practical English Usage (CUP)

5. Certificate in Journalism

Semester:

Hours: 30

Credits: 2

Aims and Objectives:

- To expose the students to the field of Journalism
- To propose this vibrant field as an option for the aspiring students
- To give a hands-on-experience to the students to produce artifacts of journalistic writings.

Unit - I:

Journalism and Mass Communication: Book Review, proof reading, Report writing, News report, Editing, Photography, Advertising and film studies.

Unit - II:

Technical Writing: Preparing user's manual, Technical description, and Business/ technical letters and flow charts, and tables, style for readability, writing with a computer, writing instructions, descriptions and explanations, minutes and reports.

Unit - III:

Essay in the area of Specialization – Advertising – Preparation of Newsletter (campus Journal), Film Review.

Unit IV & V: Project.**Books for Reference:**

1. Mass Communication in Indiaby Keval J. Kumar
2. Professional Journalists: John Hohenberg
3. Into The Newsroom: Leonard Ray
4. Professional Journalism: M.V. Kamath
5. Reporting Manual: Sourin Banerjee
6. Reporting: M.V. Charnley
7. Guide Line for News Reporters: Sol Robinson
8. Reporting Methods: S. Kundra
9. Outline of Reporting: M.K. Joseph
10. Handbook of Reporting and Editing: R.K. Ravindran.
11. Basic Journalism: Rangaswamy Parthasarathi
12. News Reporting and Editing: K.M. Srivastava
13. News Editing: Bruce Westley
14. Editing and Design: Harold Evans
15. Editing in the Electronic Era: M.L. Gibson
16. Editing Manual: Sourin Banerjee
17. Journalism Update: Sourin Banerjee
18. Professional Journalist: John Hohenberg
19. History of Indian Journalism: J. Natarajan
20. History of Indian Press: S. Natarajan
21. Romance of Indian Journalism: J.N. Basu
22. Journalism in India: Rangaswamy Parthasarathi
23. Bengal Renaissance and Other Essays: Susobhan Sarkar
24. Critique of Colonial India: Sumit Sarkar
25. The Press: Chalapati Rao
26. Report of the First Press Commission

6. Certificate in Copy-Editing

Semester:**Hours: 30****Credits: 2****Objectives**

- To make students learn how to effectively use references and Associated Press style guide
- To make students learn how to edit more heavily for creating sharp leads, tight prose, clear text and organized copy, along with how to discern when this level of editing is necessary.
- To make students develop a sensitivity to and recognition of weak leads, faulty transition, poor story structure, inadequacy of stories, redundancies, sensationalism and appropriate treatment of material in stories.

- To help students develop speed with accuracy, involving quick evaluation of articles, cutting to specified length, fast editing without reviewing, and fast headline writing while avoiding faults.
- To train students to learn to develop quick judgment of photo and graphic values and the basics of communicating information visually.
- To give training to students to learn how to select and cut wire copy.
- To make students learn the style conventions of newspapers and magazines and the web.

Unit - I

The role of the copy editor

- What copy editors do and what they look out for
- The difference between copyediting and proofreading
- An overview of standard copyediting symbols
- A guide to common style manuals and how to use them

Unit - II

Fact-checking and creating a style guide

- Fact-checking and how much a copy editor is required to do
- When to query and what kind of questions to ask
- What “house style” means and how to create a house style guide
- How to effectively edit a manuscript
- Copyediting for the web and for a global audience

Unit - III

Awareness training and how to write great headlines

- Punctuation basics and common mistakes
- Spelling and grammar errors to avoid
- Headlines and how to craft them

Unit - IV

Getting your foot in the door and marketing yourself

- How to prepare for a copy test
- Tips for a standout resume and cover letter
- Networking and making contact
- Full-time vs. freelance gigs

Books for Reference

1. *FabJob Guide to Become a Book Editor* (e-book edition)
2. *The Editor's Companion: An Indispensable Guide to Editing Books, Magazines, Online Publications, and More* by Steve Dunham *Editing Today* by Marydasan John
3. *The Copyeditor's Handbook: A Guide for Book Publishing and Corporate Communications, with Exercises and Answer Keys* by Amy Einsohn
4. *The Oxford Essential Guide to Writing* (Essential Resource Library) (Essential Resource Library) by Thomas S. Kane
5. *The Chicago Manual of Style* (Hardcover) by University of Chicago Press
6. *The McGraw-Hill Handbook of English Grammar and Usage*
7. *The Little, Brown Handbook*
8. *A Practical English Grammar*
9. *Copyediting and Proofreading For Dummies 2007* by Suzanne Gilad

PG & Research Department of Economics
Course Structure for BA. Economics: 2017-18

| Sem | Course | Subject Title | Hrs | Credit | CIA | Sem |
|-----|--------|--|-----|-----------|-----|-----|
| I | I | Tamil | 5 | 3 | 30 | 70 |
| | II | English | 5 | 3 | 30 | 70 |
| | III | Core: Economic Thought | 5 | 5 | 30 | 70 |
| | | Core: Statistics for Economics | 5 | 5 | 30 | 70 |
| | | Allied History | 6 | 6 | 30 | 70 |
| | IV | Foundation course | 2 | 1 | | |
| | IV | Religion / Ethics | 2 | 1 | | |
| | | Total | | 24 | | |
| II | I | Tamil | 5 | 3 | 30 | 70 |
| | II | English | 5 | 3 | 30 | 70 |
| | III | Core: Micro Economics-1 | 5 | 5 | 30 | 70 |
| | | Core: Mathematics for Economics | 5 | 5 | 30 | 70 |
| | | Allied History | 6 | 6 | 30 | 70 |
| | IV | Foundation Course | 2 | 1 | | |
| | IV | Religion / Ethics | 2 | 1 | | |
| | | Total | | 24 | | |
| III | I | Tamil | 5 | 3 | 30 | 70 |
| | II | English | 5 | 3 | 30 | 70 |
| | III | Core: Micro Economics - II | 5 | 5 | 30 | 70 |
| | | Core: Macro Economics - I | 5 | 5 | 30 | 70 |
| | | Allied (Optional) | 6 | 4 | 30 | 70 |
| | IV | Foundation Courses | 2 | 1 | | |
| | IV | Environmental Studies (EVS) | 2 | 1 | | |
| | | Total | | 22 | | |
| IV | I | Tamil | 5 | 3 | 30 | 70 |
| | II | English | 5 | 3 | 30 | 70 |
| | III | Core: Macro Economics -II | 5 | 5 | 30 | 70 |
| | | Core: Industrial Economics | 5 | 5 | 30 | 70 |
| | | Allied (Optional) | 6 | 6 | 30 | 70 |
| | IV | Foundation courses | 2 | 1 | | |
| | IV | Human Rights | 2 | 1 | | |
| | | Total | | 24 | | |
| V | III | Core: International Economics | 6 | 6 | 30 | 70 |
| | | Core: Fiscal Economics - I | 5 | 5 | 30 | 70 |
| | | Core: Indian Economy | 6 | 6 | 30 | 70 |
| | | Core: Monetary Economics - I | 5 | 5 | 30 | 70 |
| | | Elective:1.Managerial Economics | 6 | 4 | 30 | 70 |
| | | Elective:2.Basic Econometrics | | | | |
| | | Elective:3.Human Resource Management Non-Major Elective: Basic Economics SSP *: Social Economics | 2 | 1 | | |
| | | Total | | 28 | | |

| Sem | Course | Subject Title | Hrs | Credit | CIA | Sem |
|-----|--------|--|-----|--------|-----|-----|
| VI | III | Core: Environmental Economics | 6 | 6 | 30 | 70 |
| | | Core: Monetary Economics-II | 6 | 6 | 30 | 70 |
| | | Core: Fiscal Economics-II | 6 | 6 | 30 | 70 |
| | | Core: Financial Economics –SS*(subjective skill) | 5 | 4 | 30 | 70 |
| | | Core: Basic Computer and its Application - SS* | 5 | 4 | 30 | 70 |
| | | Non-Major Elective: Indian Economy :Basic Issues SSP* : Economics for Competitive Examination | 2 | 1 | | |
| | | Total | | 28 | | |

Course Structure for U.G. Commerce -2017-18

B.Com (Commerce) (Allied Subject)

| Sem | Course | Subject | Hours per week | Credit | CIA | Sem |
|-----|--------|------------------------------|----------------|--------|-----|-----|
| I | B.Com | Principles of Economics - I | 6 | 4 | 30 | 70 |
| | | Principles of Economics - II | 6 | 4 | 30 | 70 |
| II | B.Com | Managerial Economics - III | 6 | 4 | 30 | 70 |
| | | International Economics - IV | 6 | 4 | 30 | 70 |

Semester - V

International Economics

6 Hours /6 Credits

Objective

- To help the students to familiarize theories, policies and international financial institutions.

Unit - I: Concept of International Trade

Nature and scope of International Trade - Inter-regional and International Trade: difference - similarities – Theories: Smith’s Theory of absolute Costs, Ricardo’s Theory of Comparative Costs, Heckscher-Ohlin Theory.

Unit - II: Terms of Trade and Tariffs

Terms of trade: Classification - Factors affecting terms of Trade - Tariffs: Types - Dumping: Types and Objectives – Cartel: types, advantages and disadvantages.

Unit - III: Foreign Exchange Control and Balance of Payments

Exchange Control: Features, Objectives, Methods, Merits and Demerits - Balance of Trade and Balance of Payments – Disequilibrium in Balance of Payments, Measures to correct Balance of payments.

Unit - IV: Foreign Exchange Market and Foreign Capital

Foreign Exchange Market, Methods of Foreign payments, Spot and Forward Exchange markets – Types of International Capital movement – Flow of FDI and FII– Foreign Capital in India: Impact of Foreign Capital on India’s Economic Development.

Unit - V: International Financial Institutions

IMF: Origin, Objectives, Functions, Organization and Structure, Working of the Fund, Special Drawing Rights (SDR). **Asian Development Bank:** Functions, Organization, India and ADB. **WTO:** Its structure, objectives, Functions.

Text Book

Jhingan M.L “International Economics”, Vrindha Publication, New Delhi.2011.

References

1. Cherunilam, Francis ‘International Economics’, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.1998.
2. Dana M. S ‘International Economics: Study, Guide and Work Book’ (5th Edition). Routledge Publishers. London. 2000.
3. Dunn, R.M. and J.H. Mutti ‘International Economics’, Routledge Publishers. London.2000.
4. Soderston, ‘International Economics’, Macmillan, London.2002.
5. Mithani G.M, Essence of International Economics, Himalaya Publishing House, New Delhi. 2001.
6. Paul Krugman and Maurice Obstfeld– “International Economics: Theory and Policy”, 2005.

Websites:

1. <http://www.tradeget.com/partners.html>
2. <http://commin.nic.in>
3. <http://ipindia.nic.in/ipr/patent/patents.htm>
4. <http://dgft.delhi.nic.in>
5. <http://dipp.nic.in/>
6. http://dipp.nic.in/intellectual_property_dipp.htm
7. <http://imf.org>
8. <http://wto.org>
9. <http://economagic.com>
10. <http://www.emginkts.com/>

Fiscal Economics – I

Semester –V

5 Hours / 5 Credits

Objective

- Public economics is the study of government policy from the point of view of economic efficiency and equity. The paper deals with the nature of government intervention and its implications for allocation, distribution and stabilization.

Unit – I: Nature and scope of Fiscal Economics

Origin, Definition, Meaning and Scope of fiscal finance – Distinction between private and fiscal finance – Public goods verses private goods – Role of fiscal finance in under-developed countries - Principle of maximum social advantage (Musgrave).

Unit – II: Public Expenditure

Meaning, Scope, Difference between public and private expenditures – Aims and Principles of public expenditure – Classification – Reasons for the growth of public expenditure - Causes and effects of public expenditure with reference to India.

Unit – III: Public Revenue and Taxation

Sources of public revenue – Distinction between tax revenue and non tax revenue – Trend in revenue – Taxation – Meaning – Characteristics of a good tax system - Sources of taxation – Classification of taxes – Canons –Incidence and Shifting of taxation – Effects of taxation.

Unit – IV: Taxes and Duties

Individual taxes (with reference to India) – Income tax – Expenditure tax – wealth tax – Property tax- Estate duty – Gift tax – Death duty – Customs duty – Excise duty – Sales tax – Value added tax – Goods and Services Tax (GST): Importance, merits and demerits.

Unit – V: Taxable Capacity

Meaning, Definition, Absolute and Relative taxable capacity – Significance - Factors determining taxable capacity – Limits – Measurement of taxable capacity – Taxable capacity and Ability to pay – Burden of taxation.

Text Book

1. Tyagi.B.P., Public Finance, Jai Prakash Nath Co. Meerut, 2008.

References:

1. Musgrave, R.A., and P.B.Musgrave, Public Finance Theory and Practice, Tata McGraw Hill, New Delhi, 2015.
2. Philip. E. Taylor, Economics of Public Finance, Oxford University Press, New Delhi, 2015.
3. Lekhi.R.L., Public Finance, Kalyani Publishers, Chennai, 2015.

Semester – V

Indian Economy

6 Hours / 6 Credits

Objective: To understand the nature and characteristics of Indian Economy and its Policies and issues.

Unit – I: Structure of the Indian Economy

Underdeveloped economy – Meaning – Characteristics of the Indian economy – Major issues of development – Occupational distribution – Human development index in India – Sectoral composition of national Income in India.

Unit – II: Economic Planning and Development

Economic development Vs Growth: Determinants – Planning: Definition – Scope – Objectives– Mixed Economy model of Development strategy – LPG model of development Strategy – Planning Commission: NITY YOG: Roles & functions.

Unit – III: Agricultural Sector in the National Economy

The role of Agriculture in the Economy – Progress of Agriculture under the five year plans – Green Revolution –Contract farming.

Unit – IV: Industrial and Service Sector

The role of Industrialization in Indian Economy –Classifications of Industry – Large Scale – Small Scale – the role of SSIs in Indian Economy – Service Sector: Transport and Communication, Banking, Insurance and Tourism.

Unit – V: Emerging Issues in Indian Economy

The Concept of Poverty – Poverty Alleviation Programmes – Farmer’s Suicides - Black Money: meaning – Impact and factors responsible for black money, Health and Education challenges – Unemployment: types –Recent Employment Programme – MGREGP - Inequality, Rural Infrastructure in India.

Text Book:

1. Ruddardutt & Sundharam. K. P. M, “Indian Economy”, Sultan Chand and Company, Ram Nagar, New Delhi.2010.

References:

1. Dhingra.I.C, The Indian Economy, Environment and Policy, Sultan Chand & company, Ram Nagar, New Delhi.2001.
2. Mongia.J.N, “Indian Economic Policies”, Allied publishers, New Delhi.2000.
3. Sankaran.S, “Indian Economy”, Margham Publication, Chennai.2005.
4. Agarwal.A.N, Indian Economy Problems and Development Planning, VishwaPrabhakaran Publishers, New Delhi.2002.
5. Planning Commission Report, Government of India Publication, New Delhi.
6. Annual Report, Reserve Bank Bulletin, Government of India Publication, New Delhi

Websites:

1. <http://dare.nic.in>
2. <http://ari.gov.in>
3. <http://aquaculture.tn.nic.in>
4. <http://agricoop.nic.in>
5. <http://drdpat.bih.nic.in>
6. <http://www.nddb.org>
7. <http://dahd.nic.in>
8. <http://www.niam.gov.in>
9. <http://www.manage.gov.in>
10. <http://planningcommission.gov.in>

Semester – V

Monetary Economics - I

5 Hours / 5 Credits

Objective

- To know the functions of money and the working of a monetary system in an economy.

Unit - I: Functions and Circular Flow of money.

Evolution – functions and significance of money – Barter system – classification – role of money in capitalist, socialist and mixed economy – Evils of money – circular flow of money.

Unit – II: Monetary Standards

Meaning and types of monetary standard – Gold standard: rules – types – working – merits and demerits – breakdown of gold standard.

Paper standard: types - merits and demerits – characteristics of sound note issue – principles management of note issue.

Unit-III: Indian Currency System.

Indian currency system – Chakravarty committee report on India’s monetary system- supply and demand for money – new monetary equations.

Unit – IV: Supply and Demand for Money

Supply of money: Definition – determinants of money supply – concept of velocity of money.

Demand for money: Classical approach – Liquidity preference – Post Keynesian approach – value of money: measurement of value of money – importance of index number.

Unit –V Quantity Theory of Money

Fisher’s Transaction Approach – Cambridge Cash Balance Approach – Keynesian theory of money – Friedman’s Restatement of Quantity Theory of Money.

Text Book:

1. Jhingan.M.L, Monetary Theory, Delhi, Konark, publication, 2004.

References:

1. Growth.G, An Outline of money, London, Longman\$Green, 1900.
2. Vaish.M.C, Monetary Economics,New Delhi, Vikaspub., 1968.
3. Gosh.B.N, and Rama Gosh, Fundamentals of Monetary Economics, Bombay, Himalaya, Publication,1989.
4. Gibson.W.E, and George G Kaufman, Monetary Economics,Delhi, Tata Mac Hill, 1975.
5. Friedman.M, Studies in Quantity Theory of Money, Chicago, Chicago Univ. Press2011.
6. Sankaran.S, Monetary Economics, Margam, Chennai, 2013

Semester-V

Elective-I: Managerial Economics

6 Hours /4 Credits

Objective

- To familiarize with the students the importance of economic approaches in managerial decision making.

Unit – I: Nature and scope of Managerial Economics

Definition, Meaning, Characteristics of managerial economics – Nature and scope of managerial economics - Importance of managerial economics - Basic economic tools in managerial economics - managerial economist role and responsibility.

Unit – II: Cost and Revenue Analysis

Concepts of Cost – Role of cost in Managerial decision making-Concepts of revenue: TR – AR – MR – Economies of scale – An evaluation of Break Even Analysis.

Unit – III: Pricing Strategies

Pricing methods – objectives and control – Marginal cost pricing – Full cost pricing – Cost plus pricing – Administrative Pricing – Zero Pricing – Dual Pricing.

Unit – IV: Demand forecasting

Demand forecasting- purpose and steps involved in demand forecasting –determinants of demand forecasting- methods of demand forecasting- An evaluation of different methods of demand forecasting.

Unit – V: Capital Budgeting

Capital expenditure decisions and capital budgeting – capital budgeting techniques – discounted cash flow methods and its advantages and limitations – cost of capital.

Text Book

1. Dominic Salvatore (1993) Managerial Economics McGraw Hills New York.
2. Varshney,R.L and Maheshwari, K.L - Managerial Economics , Sultan Chand, New Delhi, 2009

References:

1. Baumol, William J., Economic Theory and Operation Analysis, Prentice Hall of India Pvt. Ltd., New Delhi. 1995.
2. Dean, Joel, Managerial Economics, Prentice Hall of Inc., New Jercoy. 1977.
3. D.N. Dwivedi, Managerial Economics, Vikas Publishing House Pvt. Ltd., New Delhi. 2000.
4. H. Graig Peterson, WCRIS Lewis, Managerial Economics, Maxwell Macmillan International Edition. 1990.
5. Mehta, P.L - Managerial Economics, Sultan Chand Sons, New Delhi, 1997.
6. Lekhi R.K. Managerial Economics, Kalyani Publications, New Delhi, 2008.
7. Jhingan M.L & Stephen J.K, Managerial Economics, Vrinda Publications Ltd, Delhi, 2005.
8. Sankaran. S, Managerial Economics, Marghum Publications, Chennai, 2006.
9. Singh S.P, Managerial Economics, AITBS Publishers and Distributors, Delhi, 2005.

Websites:

1. <http://economics.about.com/od/pricing>
2. www.studyfinance.com
3. <http://www.economicwebinstitute.org/glossary/costs.htm>
4. www.netmba.com
5. www.nationalanalysts.com

Semester-V

Elective - II: Basic Econometrics

6 Hours /4 Credits

Objective

- To get acquainted with the tools of Econometrics for applied research in Economics.

Unit - I: Nature and scope of Econometrics

The econometric approach– economic theory - Statistics and econometrics – Nature and use of econometric models.

Unit - II: Linear Regression

Two variable regression – Multiple regression – Correlation coefficient – Multicollinearity – Extensions of linear regression – functional forms – dummy variables – Analysis of variance.

Unit - III: Generalized Least Squares

Heteroscedastic errors – Auto correlation – Errors in variables – Methods of instrumental variable – grouping of observations and grouping of equations.

Unit - IV: Simultaneous Equation Methods

The problem of identification – Estimation – Two stage least squares – introduction to limited information and full information – maximum likelihood and three stage least squares.

Unit - V: Application of Econometric Models

Application of single equation technique in demand analysis — Aggression problem, Engle’s Law, Slutsky’s theorem, the consumer’s allocation problem — model in relative prices, aggregation over consumers. Estimation of demand function under different conditions, properties of the estimators — static and dynamic analysis. Estimation of consumption function — Cross section and time series. Estimation of Production functions: Cobb Douglas.

Text Book:

1. Gujarati, Damodar. Basic Econometrics. Singapore, McGraw Hill Inc., 1995.

References:

1. Johnstron.J. Econometric Methods. Singapore, McGraw Hill Inc., 1994.
2. Johnson, Aaron.CJr et al. Econometrics: Basic and Applied. New York, Macmillan Publishing Co, 1987.
3. Maddala.G.S. Econometrics.New York, McGraw Hill, 1997.

Semester - V

Elective - III: Human Resource Management 6 Hours /4 Credits

Objective:

1. To develop an understanding of the management of human resource.

Unit – I: Basis of HRM

HRM: Meaning – Definition- Characteristics – Objectives – Importance – Functions and scope of HRM – Qualities of HR Manager.

Unit – II: Planning

Human Resource Planning – Objectives – Need and importance – Problems in HRP – **Job Analysis:** Concept – Objectives – Uses – Process – **Job Design:** Meaning – Methods – Recent trends in job redesign.

Unit – III: Recruitment

Recruitment: Meaning – Process – Sources – Techniques – Considerations in recruitment – **Selection:** Meaning – Steps in selection process – selection interviewing – **Placement:** Meaning – **Motivation:** Meaning.

Unit – IV: Training

Training: Meaning – Need for training – Importance – Types – Evaluating training effectiveness – **Induction:** Concept of induction and orientation – Objectives of induction – Advantages of formal induction – Effectiveness of induction – **Socialization:** Meaning.

Unit – V: Emerging Horizons in HRM

Virtual Organization: Meaning – Distinction between traditional and virtual organization – Types – Technology of Virtual Organization.

Text Book:

1. Gupta C. B., “Human Resources Management”, Sultan Chand & Sons Publication, New Delhi, 2015.

References:

1. SubbaRao., “Personnel & Human Resource Management”, Himalaya Publishing House, New Delhi, 2015.
2. Aswathappa K., “Human Resource and Personnel Management”, Tata McGraw Hill Publishing Co. Ltd, New Delhi, 2015.
3. VenkataRathnam C.S., & Srivastava B.K., “Personnel Management & Human Resources”, Tata McGraw Hill Publishing Co. Ltd, New Delhi, 2015.
4. Jaishanker, “Fundamentals of Human Resource Management”, Margam Publications, New Delhi, 2015.

Semester- V **Non Major Elective: Basic Economics** **2 Hours / 1Credits**

Objective:

- To make the students to understand basic economic concepts.

Unit – I: Basic Economics

Economics: Meaning, Definitions – Nature, Scope and Central Problems of the Economics – Scarcity and Choice – Demand: Types – Elasticity of Demand: Types – Supply: factor affecting Supply of Commodity – Cost and its Types – Revenue and its Types.

Unit – II: Macro Economics

Macro Economics: Scope and Nature – National Income: Concepts, Methods of Calculating National Income – Inflation: Types, Classification – Deflation – Consumption Function: Determination – Investment Function – Savings – Unemployment: Types.

Unit – III: Managerial Economics

Managerial Economics: Nature and Scope – Objectives of the Firm – Risk and Uncertainty – Demand Forecasting: Meaning, Methods – Inventory: Meaning, Types, Objectives and Methods of Inventory Control – Pricing Strategies: Types.

Unit – IV: Monetary Economics

Monetary Economics: Definition and its Scope – Money: Definitions, Functions of Money – Demand for Money – Supply of Money – Factors determining Demand and Supply of Money – Components of Money Supply.

Unit – V: Banking and Fiscal Economics

Bank: Types – Commercial Banks: Functions – Central Bank: Functions – Fiscal Policy: Objectives – Public Expenditure: Components – Public Revenue: Components – Public Debt: Components – Budget: Definition, Types.

Text Book:

1. Robert H. Frank Bew S. Bernanke ‘Principles of Economics’, Tata McGraw-Hill edition, New Delhi, 2007.

References:

1. Agarwala S.K, 'Principles of Economics', Anurag Jain for Excell Books, New Delhi, 2009.
2. D.Wivedi,D.N. 'Principles of Economics',Vikaspublishing House Pvt Ltd, New Delhi,1985
3. Prasad K.N. 'Foundations of Modern Economics', Sterling Publishers PVT.Ltd, New Delhi, 1986.
4. Howard L. Hurwitz and Frederick Show, 'Mastering Basic Economics', Oxford Book Company, New York, 1965.
5. Lokanathan V. 'Principles of Economics', Chand and Company Ltd, New Delhi,1999.
6. Dictionary of Economics.2014.

Semester-V

SSP* Social Economics

Credit - 1

Objective: to discover the ways to resolve social problems.

Unit - I: Introduction

Social economics: definition- equality in human societies (employment)- principles of social doctrines, Gandhi, Marx and Pope.

Unit - II: Poverty

The world poverty situation- causes and consequences- requisites of economic growth- role of government – social security- subsidies- social banking- refugees, slavery and beggary.

Unit - III: Human Capital

Problems in education and health services- energy crisis and related issues

Unit - IV: Discrimination

Sources, kinds and costs – consumerism- provision of information-protection from business manipulation- Caste and Gender discrimination.

Unit-V: Economic Crimes

Causes and consequences- remedial course of action- Economic crimes, Cybercrime, Corruption and their prevention- violation of human rights- Need to control terrorism.

Text Book

1. Dreze, Jean and Amartya Sen, Hunger and public Action, Clarendon Press, Oxford. 1989.

Reference:

1. Culyer, A.J, The Economics of Social Policy, Martin Robertson and Co. Ltd, London. 1973.
2. Douglass, C. North and Roger Leroy Miller, The Economics of Public Issues, Harper and Row, New York. 1971.
3. Indira Gandhi Memorial Trust, Redefining the Good Society, Wiley Eastern Ltd, New Delhi. ,1995.
4. Harbison, Frederick and Charles .A. Meyers, Education, Manpower and Economic Growth: Strategies of Human Resource Development, McGraw-Hill book Co. New York. 1964.

Semester-VI**Environmental Economics****6 Hours / 6 Credits****Objective**

- To explore the fundamental theories of environmental economics, the environmental problems and policy measures.

Unit – I: Scope of Environmental Economics

Scope of environmental economics – Types of environmental resources: renewable and non-renewable – inter-linkage between the economy and environment – Sustainable development.

Unit – II: Externalities

Meaning of Externalities, Types of goods – Classification of environmental resources public, private and common property – Institutional failure, market, government and other institutions – Tragedy of commons – pollution control policies – command and control Vs market based approaches.

Unit – III: Economic Valuation Techniques

Taxes, Permits subsidies, Revealed Preference methods: Travel Cost Method, Coase's Theorem, Household production function approach, State Preference Methods; Benefit/Cost Analysis; Contingent Valuation Method, Technology versus Environment.

Unit – IV: Macro Economics of Environment

Economic growth and environment – Environmental Kuznet's Curve-trade and environment – Global environmental problems global warming: cause and effects – Climate change and their implications.

Unit – V: Environmental Problems and Regulation in India

Environmental Problems in India: Water pollution, air pollution, land degradation, Waste Management, deforestation, pollution and health problems, Environmental policies in India – Environmental Impact Assessment (EIA); Institutions for environmental protection in India – environmental federalism.

Text Book:

1. Hanley Nick, Jason F. Shogren and Ben White, Environmental Economics in Theory and Practice, N.Y. Macmillan, 1997.

References:

1. Kostald Charles D, Environmental Economics, Oxford University Press, 2002
2. Perman R. May, McGilvary M. Common Natural Resources and Environmental Economics (3rd ed.) Pearson Addison Wesley, 2003
3. Cunnigham, Environmental Economics, Raintree Publishers, Chennai, 2001
4. Karpakam, Environmental Economics, Kalyani publications, Chennai 2000

Semester-VI**Monetary Economics - II****6 Hours /6 Credits****Objective:**

- To know the working of the both national and international banking systems.

Unit - I: Commercial Banking.

History of banking – branch and unit banking - credit creation – commercial bank and economic development – nationalization of banks with reference to India.

Unit – II: Central Banking.

Definition – need – nature and functions – central bank in a developed money market – central in an undeveloped money market – methods of credit control-Demonetization and its impact.

Unit - III: Money market and Stock exchange.

Money market: composition – institution and significance of money market. Stock Exchange: Functions – importance of stock exchange – Governmental control of stock exchange – operation of stock exchange –Stock Exchange Board of India (SEBI).

Unit – IV: Indian Banking System.

The Reserve Bank of India : organization and management – functions – RBI and industrial development – industrial financial institutions (IDBI, IFCI, SFCI, UTI). Non-Bank financial Institutions (NBI) – financial sectoral reforms in India.

Unit –V: International Monetary Institutions.

International Monetary Fund (IMF): purpose – organization- operation – India and the Fund – International liquidity and the Fund. International Bank for Reconstruction and Development (IBRD): Functions – organization – operation – India and IBRD.

Text Book:

1. Jhingan.M.L, Monetary Theory, Delhi, Konark, publication, 2004.

References:

1. Growther.G, An Outline of money, London, Longman\$Green, 1900.
2. Vaish.M.C, Monetary Economics, New Delhi, Vikaspub., 1968.
3. Gosh.B.N, and Rama Gosh, Fundamentals of Monetary Economics, Bombay, Himalayapub., 1989.
4. Gibson.W.E, and George G Kaufman, Monetary Economics, Delhi, Tata Macgraw Hill, 1975.
5. Friedman.M, Studies in Quantity Theory of Money, Chicago, Chicago University Press, 1900.
6. Gurusamy.S,Banking Theory Law and Practice,Vijay Nicole, Chennai,2005.

Semester –VI

Fiscal Economics – II

6 Hours/ 6 Credit

Objective:

- Public economics is the study of government policy from the point of view of economic efficiency and equity. The paper deals with the nature of government intervention and its implications for allocation, distribution and stabilization.

Unit – I: Public Debt

Meaning and Difference between Public debt and private debt – Objectives and Importance of Public Debt - Sources of Public Borrowings – Effects of public debt – Public debt of Central and State Government – Redemption and management of Public Debt.

Unit – II: Federal and Local Finance

Federal Finance: Principles – Analysis of division of revenue, expenditure other powers between Union, State and Local Governments – Finance commission – Recommendations of recent finance commission.

Local Finance: Local Bodies: Village panchayats – Municipalities – Corporations – Functions and sources of finance to local bodies – Limitations of local finance.

Unit – III: Deficit Financing

Meaning - Objectives - Role of deficit financing – Effects on prices, production and distribution – Causes, Uses, Evils and Limits of Deficit financing.

Unit – IV: Public Budget

Meaning – Purpose – Budget Framing – Classification of Budget - Presentation of Budget – Balanced Budget and Multiplier Effect – Budget as an instrument of economic policy.

Unit – V: Fiscal Policy

Meaning – Objectives and instruments of fiscal policy in a developing economy – Role of Multiplier in Determination of fiscal policy – Limitations of Fiscal Policy - Recent central budget.

Text Book:

1. Tyagi.B.P., Public Finance, Jai PrakashNathCo. Meerut, 2008.

References:

1. Musgrave, R.A., and P.B.Musgrave, Public Finance Theory and Practice, Tata McGraw Hill, New Delhi, 2015.
2. Philip. E. Taylor, Economics of Public Finance, Oxford University Press, New Delhi, 2015.
3. Lekhi.R.L., Public Finance, Kalyani Publishers, Chennai, 2015.

Semester- VI

Financial Economics (UGC – SS*)

5 Hours / 4 Credits

Objective:

- This paper helps the students to understand different concepts in financial management and its application.

Unit - I: Organizational Structure of Financial Economics

Meaning and scope of financial economics - Relationship of finance to economics and accounting - significance of finance in economic development – Role and functions of Financial Manager – Organization of finance function – sources of financial information.

Unit - II: Different Sources of Finance

Short and long term finance, Self-Financing, Retained Earning, Equity, Debentures, term loans from banking and non- banking institutions. Company deposits, Depreciation, Importance, practices and Determinants of Dividend Policy – kinds of Dividend Policy.

Unit - III: Capital Market and Stock Exchange

Meaning of capital market, role of capital market in economic development – Types: Primary New Issue Market (NIM) and secondary market (stock exchange) – their functions and recent development –SEBI as regulating authority of financial market.

Unit - IV: Capital Budgeting

Meaning and significance of capital budgeting – process of capital budgeting – methods of investment appraisal – Pay Back Period (PBP), Average Rate of Return (ARR), Net present value & Internal Rate of Return – risk and uncertainty– types and causes of business risk.

Unit - V: Index Models, CAPM & APT

Models of asset returns, Multi Index Models, Single Index Model, systematic and specific risk, Equilibrium models, Capital Asset Pricing Model, Capital Market Line, Security Market Line, Estimation of Beta, Arbitrage Pricing Theory.

Text Book

1. Avadhani V.A, Financial Economics: Theory and Practice, Himalaya Publishing House, New Delhi. 2014.

Reference

1. Erickson K.H, Financial Economics: A Simple Introduction, Create Space Independent Publishing Platform.2014.
2. Stephen F. Laroy, Principles of Financial Economics, Cambridge University Press, England. 2014.
3. Frank J. Fabozzi, Edwin H. Neave and Guofu Zhon, Financial Economics, John wiley& Sons Publications, USA.2012.
4. Bharati V. Pathak, Indian Financial System, Pearson Education, Delhi,2014.
5. Khan M.Y, Indian Financial System, McGraw Hill Education, New Delhi.2015.

Websites for References

1. <http://financialmanagement-strategy.com>
2. <http://financialmanagementguide.investmentzone.com>
3. www.safaribooksonline.com
4. www.bizmore.com/books/financialmanagement
5. www.course.sdu.edu.en

Semester- VI Basic Computer and Its Application (UGC – SS*) 5 Hours / 4 Credits

Objective

- To make the students familiarize in processing and usage of MS Office tools and understanding internet.

Unit - I: MS Word

Word Processing Basics - Opening Word Processing Package - Opening and closing Documents - Save and Save as - Page Setup - Print Preview -Printing of Documents. Text Creation and manipulation -Editing Text -Formatting the Text – formatting the table.

Unit - II: MS Excel

Opening of Spread Sheet – entering data - Saving workbooks - Printing of Spread Sheet- Managing of Cells - Using Formulas and Functions-Statistical analysis.

Unit - III: MS Power Point

Opening a PowerPoint Presentation - Creation of Presentation - Saving a Presentation - Entering and Editing Text - Inserting and Deleting Slides in a Presentation - Preparation of Slides - Inserting Word Table or an Excel Worksheet - Presentation of Slides - Slide Show.

Unit - IV: Internet Fundamentals

Concept of Internet - Applications of Internet - Connecting to the Internet - Troubleshooting - World Wide Web (WWW) - Web Browsing Software - Search Engines - Downloading and uploading - Printing Web Pages - Understanding URL - Surfing the web.

Unit –V: SPSS

Introduction to SPSS - Data analysis with SPSS: general aspects, workflow, critical issues - SPSS: general description, functions, menus, commands - SPSS file management.

Defining variables - Manual input of data - Automated input of data and file import Data manipulation - Data Transformation - Syntax files and scripts- Output management

Text Book

1. Mishra A.K. “Handbook on SPSS for Research Work”, Himalaya Publication, 2014.
2. Shrivatsava S.S, MS Office, Laxmi Publications, New Delhi.2015.

Reference

1. Bittu Kumar, MS Office 2010, V&S Books Publication, 2010.
2. Greg Perry, ‘Microsoft Office 2010’, Sam Teach yourself, Pearson Education, Delhi, 2007.
3. Greg Perry, Microsoft Office 2010, Sam Teach yourself, Pearson Education, 2010.
4. Vikas Gupta, Comdex Computer Course Kit, Office 2010, Dreamtech Press, Wiley-India, 2010.
5. Chris Bates - Web Programming – Building Internet Applications, , Third Edition, Wiley Student, Edition, 2006
6. Greg Perry, ‘Microsoft Office 2007’, Sam Teach yourself, Pearson Education, Delhi, 2007.
7. Rutkosy, Segain and Rutkosky. ‘Office 2007’, BPB Publishers, New Delhi, 2009.

Websites

1. www.office.com
2. www.microsoft.com
3. www.products.office.com
4. www.microsoftstore.com

Semester-VI Non-Major Elective: Indian Economy Basic Issues 2 Hours /1 Credit

Objective:

- To know the basic Issues and Policies of Indian Economy.

Unit – I: Economic Systems

Economic System: Components – Capitalism: Features – Communism: Features – Mixed Economy: Features – Gandhian Thought – Nehru Thought of Economics.

Unit – II: Issues in Agriculture

Agricultural Credit and Debt – Water Scarcity – Irrigation – Need of Nationalization of Indian Rivers – Mechanization of Agriculture – Commercialization of Agriculture.

Unit – III: Issues in Industry

Industrialization and Urbanization: Causes and Effects – Role of FDI in Indian Economy – New Economic Policy on Industrialization.

Unit – IV: Issues in Service Sector

LPG – Issues and Impact on Infrastructure: Energy, Transport, Communication, Banking, Insurance and Education.

Unit – V: Other Issues in Indian Economy

Poverty: Types – Recent Poverty Alleviation Programmes in India – Black Money – Impact of Black Money on Economy – Problems of Unemployment in India – Corruption.

Text Book:

1. Ruddardutt & Sundharam. K. P. M, “Indian Economy”, Sultan Chand and Company, Ram Nagar, New Delhi.2016.

References:

1. Dhingra.I.C, The Indian Economy, Environment and Policy, Sultan Chand & Company, Ram Nagar, New Delhi.2010.
2. Mongia.J.N, “Indian Economic Policies”, Allied publishers, New Delhi.2000.
3. Sankaran.S, “Indian Economy”, Margham Publication, Chennai.2005.
4. Agarwal.A.N, Indian Economy Problems and Development Planning, VishwaPrabhakaran Publishers, New Delhi.2002.
5. Planning Commission Report, Government of India Publication, New Delhi.
6. Annual Report, Reserve Bank Bulletin, Government of India Publication, New Delhi.

Semester-VI (SSP*) Economics for Competitive Examination 1 Credit

Objective: to understand the basic concepts in economics required for competitive exams.

Unit - I Basics of Micro and Macro

Basic of Micro: Theory of Demand, Production, Market Structure.

Basics of Macro: National Income, Aggregates of money, inflation, unemployment.

Unit - II Role of Banking

Role of Banking- types of functions, financial institutions (RBI&SEBI)in economic development banking rates and terms-CRR,SLR, Raporate. Foreign Exchange Management: FERA, FEMA, Current News on banking sector –India and Global

Unit - III International Economics

Tariffs- International Economic Institution- From GATT to IMF, World Bank, ADB,WTO. EXIM Policy, BOP (with respect to India).

Unit - IV Growth and Development

Factors influencing growth and development- unemployment and poverty, measurement of HDI

Unit - V Indian Scene

Planning- economic reforms-LPG, Poverty and Unemployment schemes in India- Health and Education. Agriculture- Green Revolution and Price policy, Current Affairs in India over the last 6 months.

Text Book

1. Appleyard,et.al, International Economics. McGraw Hill, New York.2009.

Reference:

1. Dewet,K.K, Modern Economic Theory,S.Chand, New Delhi. 2006.

Journals

1. Business Magazines- The Economist, Business Weekly,
2. RBI, UNDP Report, Malayalam Manorama Year Book
3. Competition Success.

Web Resources

1. <http://www.jagranjosh.com/economy-pdf-ids-preliminary-st-1359711724>
2. <http://www.gktoday.in/gk/current-affairs-questions-answers/>

B.Com (Commerce) Allied Subject

Semester: I

Principle of Economics – I

6 Hours/4 Credit

Objective:

- To know the fundamental Principles in Economics.

Unit – I: Nature and Scope of Economics

Economics: Definitions, Nature and Scope – Central Problems of Economy – Divisions of Economics – Production Possibility Curve (PPC) and Allocation of Economic Resources – Difference between Micro and Macro Economics.

Unit – II: Utility and Demand Analysis

Utility – Cardinal and Ordinal Utility – Total Utility and Marginal Utility – Law of Diminishing Marginal Utility – Consumer’s Surplus – Demand; Meaning, Definition, Types – Factor affecting demand – Law of Demand – Elasticity of Demand: Types.

Unit – III: Consumer Behaviour

Indifference Curve: Definition – Indifference Scheduled and Curve – Characteristics – Budget Line – Consumer’s Equilibrium and its Conditions.

Unit – IV: Producer Behaviour

Production – Production Function: Factors of Production: Land, Labour and Capital and its Characteristics – Organization: Functions of Entrepreneur – Law of Variable Proportion – Law of Returns of Scale – Producer’s Equilibrium – Cost and Revenue Analysis.

Unit – V: Market Structure and Product Pricing

Market: Meaning – Classification – Market Equilibrium: Equilibrium between Market Demand and Supply – Equilibrium of Firm and Industry under Perfect Competition – Importance of Time Element in Price determination – Imperfect Competition: Monopoly, Monopolistic Competition, Oligopoly and Duopoly: Meaning and its Features.

Text Book:

Sankaran. S, “Business Economics”, Margham Publishers, T.Nagar, Chennai.2010.

References:

1. Ahuja.H.L, “Business Economics”, Sulthan Chand & Co, New Delhi, 2005.
2. Nelli and Parker, “The Essence of Business Economics”, Partia Hall, New Delhi, 2005.
3. Ferguson.P.R, Rothschild.R., and Ferguson.G.J., “Business Economics”, Mac Millan Hampshive, 2003.
4. Cauvery.R, “Business Economics”, Sterling Publishers Pvt.ltd, New Delhi, 2003.

Semester: II

Principles of Economics – II

6 Hours / 4 Credit

Objective:

- To develop the knowledge in Economics and to find solution for the Business problems.

Unit – I: Demand Forecasting

Meaning – Steps involved in Demand Forecasting – Characteristics and Importance of Demand Forecasting – Methods of Demand Forecasting; Survey Method, Consumer Survey Method – Sales Force Opinion Method – Expert Opinion Method – Statistical Methods.

Unit – II: National Income, Inflation and Business Cycle

Meaning – definition – Related concepts – Measurement of national income. Inflation: definitions – classifications – types – causes – controlling measures. Business Cycle: definitions – phases – Causes - controlling measures.

Unit – III: Public Finance

Fiscal Policy: Objectives – Public Finance and its Components – Public Revenue – Public Expenditure – Public Debt – Fiscal Sector Reforms in India – Causes for increasing deficit at the Central and State levels – Budget: Types.

Unit – IV: Monetary Economics

Money: Definitions and its Functions – Monetary Policy: Objectives - RBI and its Functions
Commercial: Meaning – Functions – structure of banking system – Credit Creation – Nationalization of Banks – Performance of Public Sector Banks in India.

Unit – V: Indian Economic Issues

Sectors in Indian Economy – Primary, Secondary and Service Sectors – Distribution of National Income Sector wise (recent estimate) – Occupational Structure sector wise (recent estimate) - Indian planning: Objectives–Unemployment: Types - Inequality – reduction of Poverty –Foreign Direct Investment (FDI) in India.

Text Book:

1. Sankaran.S, “Business Economics”, Margham Publishers, T. Nagar, Chennai.2012

References:

1. Ahuja.H.L, “Business Economics”, Sulthan Chand & Co, New Delhi, 2005.
2. Nelli and Parker,“The Essence of Business Economics”, Partia Hall, New Delhi, 2005.
3. Ferguson.P.R, Rothschild.R., and Ferguson.G.J., “Business Economics”, Mac Millan
4. Hampshive, 2003.
5. Cauvery.R, “Business Economics”, Sterling Publishers Pvt.ltd, New Delhi, 2003.

Semester- III

Managerial Economics

6 Hours /4 Credits

Objective

- To familiarize with the students the importance of economic approaches in managerial decision making.

Unit – I: Nature and scope of Managerial Economics

Definition, Meaning, Characteristics of managerial economics – Nature and scope of managerial economics - Importance of managerial economics - Basic economic tools in managerial economics - managerial economist role and responsibility.

Unit – II: Cost and Revenue Analysis

Concepts of Cost – short run costs: TFC and TVC – Average cost curve – AFC – AVC – Marginal cost – relationship between MC and AC – long run cost analysis – Concepts of revenue: TR – AR – MR – Economies of scale – Break Even Analysis.

Unit – III: Pricing Strategies

Pricing methods – objectives and control – Marginal cost pricing – Full cost pricing – Cost plus pricing – Administrative Pricing – Zero Pricing – Dual Pricing.

Unit – IV: Production Analysis

Factors of Production: meaning – Classification and Characteristics of factors of production – concepts of TP, AP and MP – Law of Variable proportions – Law of Returns to Scale – ISO Quants and Producer's equilibrium.

Unit – V: Capital Budgeting

Capital expenditure decisions and capital budgeting – capital budgeting techniques – discounted cash flow methods and its advantages and limitations – cost of capital.

Text Book

1. Varshney, R.L and Maheshwari, K.L - Managerial Economics, Sultan Chand, New Delhi, 2009.

References:

1. Baumol, William J., Economic Theory and Operation Analysis, Prentice Hall of India Pvt. Ltd., New Delhi. 1995.
2. Dean, Joel, Managerial Economics, Prentice Hall of Inc., New Jercey. 1977.
3. D.N. Dwivedi, Managerial Economics, Vikas Publishing House Pvt. Ltd., New Delhi. 2000.
4. H. Graig Peterson, WCRIS Lewis, Managerial Economics, Maxwell Macmillan International Edition. 1990.
5. Mehta, P.L, Managerial Economics, Sultan Chand Sons, New Delhi, 1997.
6. Lekhi R.K. Managerial Economics, Kalyani Publications, New Delhi, 2008.
7. Jhingan M.L & Stephen J.K, Managerial Economics, Vrinda Publications Ltd, Delhi, 2005.
8. Sankaran. S, Managerial Economics, Marghum Publications, Chennai, 2006.
9. Singh S.P, Managerial Economics, AITBS Publishers and Distributors, Delhi, 2005.

Websites:

1. <http://economics.about.com/od/pricing>
2. www.studyfinance.com
3. <http://www.economicwebinstitute.org/glossary/costs.htm>
4. www.netmba.com
5. www.nationalanalysts.com

Semester - IV

International Economics

6 Hours /4 Credits

Objective:

- To help the students to familiarize theories, policies and international financial institutions.

Unit - I: Concept of International Trade

Nature and scope of International Trade - Inter-regional and International Trade: difference - similarities – Theories: Smith's Theory of absolute Costs, Ricardo's Theory of Comparative Costs, Heckscher - Ohlin Theory.

Unit - II: Terms of Trade and Tariffs

Terms of trade: Classification - Factors affecting terms of Trade - Tariffs: Types - Dumping: Types and Objectives – Cartel: types, advantages and disadvantages.

Unit - III: Foreign Exchange Control and Balance of Payments

Exchange Control: Features, Objectives, Methods, Merits and Demerits - Balance of Trade and Balance of Payments – Disequilibrium in Balance of Payments, Measures to correct Balance of payments.

Unit - IV: Foreign Exchange Market and Foreign Capital

Foreign Exchange Market, Methods of Foreign payments, Spot and Forward Exchange markets – Types of International Capital movement – Flow of FDI and FII– Foreign Capital in India: Impact of Foreign Capital on India's Economic Development.

Unit - V: International Financial Institutions

IMF: Origin, Objectives, Functions, Organization and Structure, Working of the Fund, Special Drawing Rights (SDR). **Asian Development Bank:** Functions, Organization, India and ADB. **WTO:** Its structure, objectives, Functions.

Text Book:

1. Jhingan M.L “International Economics”, Vrindha Publication, New Delhi.2011.

References:

1. Cherunilam, Francis ‘International Economics’, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.1998.
2. Dana M. S ‘International Economics: Study, Guide and Work Book’ (5th Edition). Routledge Publishers. London. 2000.
3. Dunn, R.M. and J.H. Mutti ‘International Economics’, Routledge Publishers. London.2000.
4. Soderston, ‘International Economics’, Macmillan, London.2002.
5. Mithani G.M, Essence of International Economics, Himalaya Publishing House, New Delhi. 2001.
6. Paul Krugman and Maurice Obstfeld– “International Economics: Theory and Policy”, 2005.

Websites:

1. <http://www.tradeget.com/partners.html>
2. <http://commin.nic.in>
3. <http://ipindia.nic.in/ipr/patent/patents.htm>
4. <http://dgft.delhi.nic.in>
5. <http://dipp.nic.in/>
6. http://dipp.nic.in/intellectual_property_dipp.htm
7. <http://imf.org>
8. <http://wto.org>
9. <http://economagic.com>
10. <http://www.emginkts.com/>

Question Paper Pattern for CA

Maximum Marks: 50

Section - A ($5 \times 3 = 15$ Marks) Answer ALL the questions. Two questions from each unit.

Section - B ($3 \times 5 = 15$ Marks) Either OR Type of questions

Section - C ($2 \times 10 = 20$ Marks) Answer ANY TWO from THREE questions

CA Components

| | | |
|--------------|---|-----------------|
| 2 CA Test | - | 20 Marks |
| Attendance | - | 5 Marks |
| Assignment | - | 5 Marks |
| Total | | 30 Marks |

Question Paper Pattern for Semester Examinations

Maximum Marks 70

Section - A ($10 \times 2 = 20$ Marks) Answer ALL the Questions. Two questions from each unit.

Section - B ($5 \times 4 = 20$ Marks) Either OR Type of Questions. One question from each unit.

Section - C ($3 \times 10 = 30$ Marks) Answer ANY THREE questions from FIVE questions. One question from each unit.

Department of Commerce
B.Com CBCS Pattern
(Academic Year – 2017 - 18 Onwards)

| S. No | Course Code | Course | Credits | Hours | CIA | SE | Total |
|----------------------|-------------|---|-----------|-----------|-----|----|-------|
| Semester - I | | | | | | | |
| 1 | | Part I Language I – Tamil 1 | 3 | 5 | 30 | 70 | 100 |
| 2 | | Part II English I | 3 | 5 | 30 | 70 | 100 |
| 3 | | Part III MC – Principles of Accountancy | 5 | 5 | 30 | 70 | 100 |
| 4 | | <i>MC – Business Organization</i> | 5 | 5 | 30 | 70 | 100 |
| 5 | | Allied I Principles of Economics | 4 | 6 | 30 | 70 | 100 |
| 6 | | Part IV Foundation Course | 1 | 2 | | | |
| 7 | | Environmental Studies | 1 | 2 | | | |
| 8 | | Communicative English | 1 | | | | |
| 9 | | Part V Co-Curricular Activity | | | | | |
| | | Total | 23 | 30 | | | |
| Semester - II | | | | | | | |
| 1 | | Part I Language II | 3 | 5 | 30 | 70 | 100 |
| 2 | | Part II English II | 3 | 5 | 30 | 70 | 100 |
| 3 | | Part III MC – Financial Accounting - I | 5 | 5 | 30 | 70 | 100 |
| 4 | | <i>MC – Banking and Insurance</i> | 5 | 5 | 30 | 70 | 100 |
| 5 | | Allied I Indian Economy | 4 | 6 | 30 | 70 | 100 |
| 6 | | Part IV Foundation Course | 1 | 2 | | | |
| 7 | | Ethics / Religion | 1 | 2 | | | |
| 8 | | Communicative English | 1 | | | | |
| 8 | | Part V Co-Curricular Activity | 2 | | | | |
| | | Total | 25 | 30 | | | |

| S. No | Course Code | Course | Credits | Hours | CIA | SE | Total |
|-----------------------|-------------|---|-----------|-----------|-----|----|-------|
| Semester - III | | | | | | | |
| 1 | | Part III MC – Financial Accounting - II | 5 | 5 | 30 | 70 | 100 |
| 2 | | MC – Principles of Marketing | 5 | 5 | 30 | 70 | 100 |
| 3 | | MC – Company Law | 5 | 5 | 30 | 70 | 100 |
| 4 | | Allied I International Economics | 4 | 6 | 30 | 70 | 100 |
| 5 | | <i>Allied II</i> Business Mathematics | 3 | 5 | 30 | 70 | 100 |
| 6 | | Part IV Foundation Course | 1 | 2 | | | |
| 7 | | Human Rights | 1 | 2 | | | |
| 8 | | Part V Out Reach Activity | | | | | |
| | | Total | 24 | 30 | | | |
| Semester - IV | | | | | | | |
| 1 | | Part III MC – Corporate Accounting - I | 5 | 5 | 30 | 70 | 100 |
| 2 | | MC – Cost Accounting | 5 | 5 | 30 | 70 | 100 |
| 3 | | MC – Business Management | 5 | 5 | 30 | 70 | 100 |
| 4 | | Allied I Managerial Economics | 4 | 6 | 30 | 70 | 100 |
| 5 | | <i>Allied II</i> Business Statistics | 3 | 5 | 30 | 70 | 100 |
| 6 | | Part IV Foundation Course | 1 | 2 | | | |
| 7 | | EVS | 1 | 2 | | | |
| 8 | | Part V Out Reach Activity | 2 | | | | |
| | | Total | 26 | 30 | | | |

| S. No | Course Code | Course | Credits | Hours | CIA | SE | Total |
|----------------------|-------------|---|----------------|-----------|-----|----|-------|
| Semester - V | | | | | | | |
| 1 | | Part III MC – Advanced Cost Accounting | 6 | 6 | 30 | 70 | 100 |
| 2 | | MC – Income Tax Law and Practice I | 5 | 5 | 30 | 70 | 100 |
| 3 | | MC – Financial Management | 5 | 5 | 30 | 70 | 100 |
| 4 | | ME 1 1. Human Resource Management 2. Advanced Corporate Accounting 3. Business Logistics | 4 | 6 | 30 | 70 | 100 |
| 5 | | SS 1 1. Computer Fundamentals and E-Commerce 2. Entrepreneurship | 4 | 6 | 30 | 70 | 100 |
| 6 | | Self-Study Paper 1. Rural Banking 2. Office Management 3. Customer Relationship Management | 1* | | | | |
| 7 | | Part IV Non Major Elective I | 1 | 2 | | | |
| | | Total | 25 + 1* | 30 | | | |
| Semester - VI | | | | | | | |
| 1 | | Part III MC – Management Accounting | 6 | 6 | 30 | 70 | 100 |
| 2 | | MC – Income Tax Law and Practice II | 5 | 5 | 30 | 70 | 100 |
| 3 | | MC – Business Law | 5 | 5 | 30 | 70 | 100 |
| 4 | | ME 2 1. Practical Auditing 2. Indirect Taxation 3. Industrial Relations and Labour Laws | 4 | 6 | 30 | 70 | 100 |
| 5 | | SS 2 1. Computerized Accounting 2. Personal Selling and Salesmanship | 4 | 6 | 30 | 70 | 100 |
| 6 | | Self-Study Paper 1. Retail Marketing Management 2. Knowledge Management 3. Fundamentals of Investment | 1* | | | | |
| | | Part IV Non Major Elective II | 1 | 2 | | | |
| | | Total | 25 + 1* | 30 | | | |

Distribution of Credit for B Com Programme

| Part | Course | No. of Courses | Total No. of Hours | Total No. of Credits |
|-------------------------|----------------------------------|----------------|--------------------|---|
| I (Language) | Tamil | 02 | 10 | 06 |
| II (General English) | English | 02 | 10 | 06 |
| III (Allied) | Allied I - Economics | 04 | 24 | 16 |
| | Allied II - Mathematics | 02 | 10 | 06 |
| III (Major Core) | Theory | 20 | 106 | 98 |
| IV (Life Education) | Non-Major Elective | 02 | 04 | 02 |
| | Foundation Course | 04 | 08 | 04 |
| | Environmental Studies | 01 | 02 | 01 |
| | Human Rights | 01 | 02 | 01 |
| | Ethics / Religion | 02 | 04 | 02 |
| | Communicative English | 02 | | 02 |
| V (Extension) | Co-Curricular Activities (DEEDS) | - | - | 02 |
| | Out-Reach Activities (SHELTERS) | - | - | 02 |
| VI (Optional) | SSP – Self Study Paper | 02 | - | 02 [@] |
| | Certificate Courses | 04 | - | 08 [#] |
| Total | | 48 | 180 | 148 +(2[@]/8[#]) |

Non-Major Elective Courses

| Sem. | Part | Subject Title | Hours | Credits |
|------|------|--|-------|---------|
| V | IV | Basic Accounting and its Computer Applications | 2 | 2 |
| VI | IV | Advertising and Salesmanship | 2 | 2 |

Allied Courses for BA Economics

| Sem. | Part | Subject Title | Hours | Credits |
|------|------|-----------------------------|-------|---------|
| III | III | Principles of Accountancy | 5 | 4 |
| IV | III | Elements of Cost Accounting | 5 | 4 |

Self-Study Courses

| Sem. | Part | Subject Title | Hours | Credits |
|------|------|--|-------|---------|
| V | VI | 1. Rural Banking 2. Office Management 3. Customer Relationship Management | - | 1 |
| VI | VI | 1. Retail Marketing Management 2. Knowledge Management 3. Fundamentals of Investment | - | 1 |

Certificate Courses

| S. No | Part | Subject Title | Hours | Credits |
|-------|------|--------------------------------------|-------|---------|
| 1 | VI | Income Tax – Filing Practices | 30 | 2 |
| 2 | VI | Indirect Tax – Filing Practices | 30 | 2 |
| 3 | VI | Creativity and Innovation Management | 30 | 2 |
| 4 | VI | Soft and Entrepreneurial Skills | 30 | 2 |

Regulations for Theory Courses

(ii) Question paper pattern for Continuous Internal Assessment Tests

CA Test - 20 Marks (CA I – 10 Marks & CA II – 10 Marks)

Assignment - 5 Marks

Attendance - 5 Marks

Total - 30 Marks

The Board agreed to adapt the following pattern for CA exams.

Maximum Marks: 50

Section – A (5 x 3 = 15 Marks) Answer all the questions

Section – B (3 x 5 = 15 Marks) Either or Type questions

Section – C (2 x 10 = 20 Marks) Answer any Two out of Three questions

(iii) Question Paper Pattern for Semester Examinations

Maximum Marks 70

Section - A (10 x 2 = 20 Marks) Answer ALL the Questions. Two questions from each unit.

Section - B (5 x 4 = 20 Marks) Either OR Type of Questions. One question from each unit.

Section - C (3 x 10 = 30 Marks) Answer ANY THREE questions from FIVE questions. One question from each unit.

**Guidelines for Question Paper Setters
For Theory Papers**

| Section | Description Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
|---------------------------|--|--------------------------------|--------------------------|---------|----------|---------|--------|-----------------|
| | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| A | Short Answer Questions No Choice | Each Question Carries 2 Marks | 2 | 2 | 2 | 2 | 2 | 10 |
| B | Medium Answer Questions Either Or Type | Each Question Carries 5 Marks | 2 | 2 | 2 | 2 | 2 | 5 |
| C | Long Answer Questions Any Three | Each Question Carries 10 Marks | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 |

**For Accountancy Papers
(Except Financial Management and Income Tax Law & Practice)**

| Section | Description Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
|---------------------------|--|--------------------------------|--------------------------|---------|----------|---------|--------|---|
| | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| A | Short Answer Questions No Choice | Each Question Carries 2 Marks | 2 | 2 | 2 | 2 | 2 | 10 (Max. 3 theory questions) |
| B | Medium Answer Questions Either Or Type | Each Question Carries 5 Marks | 2 | 2 | 2 | 2 | 2 | 5 (Max. 2 theory questions in the combination of one theory and one problem) |
| C | Long Answer Questions Any Three | Each Question Carries 10 Marks | 1 | 1 | 1 | 1 | 1 | 5 (All Problems) |
| Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 |

For Financial Management and Income Tax Law & Practice

| Section | Description Type and Choice | Marks | Number of Questions from | | | | | Total Questions |
|---------------------------|--|--------------------------------|--------------------------|---------|----------|---------|--------|---|
| | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| A | Short Answer Questions No Choice | Each Question Carries 2 Marks | 2 | 2 | 2 | 2 | 2 | 10 (5 Theory and 5 Problems) |
| B | Medium Answer Questions Either Or Type | Each Question Carries 5 Marks | 2 | 2 | 2 | 2 | 2 | 5 (either or type) (Max. 2 theory questions in the combination of one theory and one problem) |
| C | Long Answer Questions Any Three | Each Question Carries 10 Marks | 1 | 1 | 1 | 1 | 1 | 5 (1 Theory and 4 Problems) |
| Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 |

Semester - V
Part III- Major Core: Advanced Cost Accounting

| | | | |
|-----------------------------------|--|----------------|----------|
| Course Code | | Credits | 6 |
| Instruction Hours per Week | 6 | Marks | |
| Course Objectives | <ul style="list-style-type: none"> • To impart knowledge on techniques of cost Accounting. • To develop the skills in process, marginal and standard costing | | |

Unit - I: Job, Batch and Contract Costing

Job Costing – Features – Preparation of Job Cost Sheet; Batch Costing – Economic Batch Costing; Contract Costing - Work certified and uncertified – Profit or loss on contract – Valuation of Plant - Preparation of Contract Account and Balance Sheet.

Unit - II: Operating Costing and Reconciliation of Cost and Financial Accounts

Operating Costing - Definition – Cost unit - Cost Classification - Transport Costing - Preparation of Operating Cost Sheet. Reconciliation of Cost and Financial Accounts - Need – Preparation of reconciliation statement.

Unit – III Process Costing

Features - Job Vs Process Costing – Normal and Abnormal losses – Inter Process Profit - Joint Product Costing – Methods of Apportionment of joint cost – By-Product Costing – Preparation of Process cost account.

Unit – IV Marginal Costing

Features –Marginal Costing and Absorption costing- Advantages –Limitations – Application of Marginal Costing - Cost-Volume-Profit Analysis – Break Even Analysis – Margin of Safety – Key Factor – Make or Buy Decisions – Product Mix decision.

Unit - V: Standard Costing and Variance Analysis

Standard Costing – Advantages and Limitations – applicability - Computation of variances: Material, Labour and overhead variances.

Text Book

- **Reddy T.S & Hari Prasad Reddy. Y**, Cost Accounting, Margham Publications, Chennai.

Reference Books

1. Maheswari S.N, Advanced Cost Accounting, Sultan Chand & Sons, New Delhi.
2. Jain & Narang, Advanced Cost Accounting, Kalyani Publishers, Ludhiyana
3. Ravi M. Kishore, Cost Management, Taxmann’s Publication.
4. Murthy and Gurusamy, Cost Accounting, Vijay Nichole, Chennai.
5. Charles T. Horngren, Srikant M. Datar, Madhav V. Rajan. Cost Accounting: A Managerial Emphasis, Person Education.

Note: Latest Edition of Text Books may be used.

Semester - V
Part III- Major Core: Income Tax Law and Practice – I

| | | | |
|-----------------------------------|---|----------------|----------|
| Course Code | | Credits | 5 |
| Instruction Hours per Week | 5 | Marks | |
| Course Objectives | <ul style="list-style-type: none"> • To provide basic knowledge of Income Tax Law • To equip students with application of principles and provisions of Income Tax Act, 1961 | | |

Unit - I: Basic Concepts

Introduction to Income Tax Act, Income – features, agricultural income, person, assessee, assessment year, previous year, gross total income, total income, maximum marginal rate of tax; Capital receipt and revenue receipts, Capital expenditure and revenue expenditure, Capital loss and revenue loss. (Theory only)

Unit - II: Residential Status

Residential status of an Individual, Hindu Undivided Family, Firm, Association of Persons, Body of Individuals and Company – Scope of total income on the basis of residential status – Exempted Income U/S 10. (Both Theory and Problem)

Unit - III: IT Authorities under Income Tax Act and Assessment Procedure

Income tax authorities: CBDT – Powers, Assessing Officer: Appointment – Jurisdiction, Powers relating to search and seizure. Procedure for assessment – Due dates - Types of assessment – PAN. (Theory only)

Unit - IV: Income from Salaries

Definition: Allowances – Perquisites – Profit in lieu of salary – Provident fund – Deduction u/s 16 Gratuity – Computation of income from salary. (Both Theory and Problem)

Unit - V: Income from House Property

Annual value – Let out House property – Self occupied property – Deemed to be let out house property – Arrears of rent received – Realization of unrealized rent - Deduction u/s 24 – Computation of income from house property - Exempted income from House property. (Both Theory and Problem)

Text Book

- Gaur, V.P and D.B. Narang, Income Tax Law and Practice, Kalayani Publications, New Delhi.

Reference Books

- Singhania, Vinod K. and Monica Singhania. Students' Guide to Income Tax, University Edition. Taxmann Publications Pvt. Ltd., New Delhi.
- Ahuja, Girish and Ravi Gupta, Systematic Approach to Income Tax. Bharat Law House, Delhi.
- Mehrotra. H.C, Income Tax Law and Practice with Tax Planning, Sahitya Bhawan Publications, New Delhi.
- Hariharan. N, Income Tax Law and Practice, Vijay Nicole Imprints Private Ltd. New Delhi.

Note: Latest Edition of Text Books may be used.

Semester - V
Part III- Major Core: Financial Management

| | | | |
|-----------------------------------|--|----------------|----------|
| Course Code | | Credits | 5 |
| Instruction Hours per Week | 5 | Marks | |
| Course Objectives | <ul style="list-style-type: none"> • To help the students understand the importance of finance function in an organization and the important decisions taken by a finance manager • To impart the basic practical knowledge of various financial management concepts namely capital structure, cost of capital, working capital management and dividend policies | | |

Unit – I: Introduction to Financial Management

Objectives and Scope – Risk and return – Concept of time value of money – Important Financial Decisions – Role of finance manager in a corporate organization.

Unit – II: Capital structure decisions

Factors influencing Capital Structure – EBIT – EBT – EPS Analysis – Point of financial indifference – Implications – Concept of Leverages – Operating, Financial and Combined leverages – Financial breakeven point.

Unit – III: Cost of Capital

Importance and difficulties in estimating cost of capital – Computation of specific sources of capital - Cost of various sources of Capital – Equity, Debt, Preference shares and Retained Earnings – Computation of Weighted Average Cost of Capital.

Unit – IV: Dividend Decisions

Dividend policy – Determinants and types – Forms of dividend – Theories (Walter and Gordon Model only).

Unit – V: Working Capital Management

Operating cycle - Importance of adequate working capital – Excess or inadequate working capital – Factors determining working capital – Estimation of working capital requirements.

Text Book

- **Vyuptakesh Sharan** Fundamentals of Financial Management, (2012) 3rd Edition, Pearson Education, New Delhi

Reference Books

- S.N. Maheswari – Elements of Financial Management, Sultan Chand & Sons, New Delhi.
- I.M. Pandey – Fundamentals of Management, Vikas Publishers, New Delhi.
- P.V. Kulkarni – Financial Management, Himalaya Publishing House, Mumbai.
- Prasanna Chandra – Financial Management, Tata McGraw Hill, New Delhi.

Note: Latest Edition of Text Books may be used.

Semester - V
Part III- Major Elective – I
1. Human Resource Management

| | | | |
|-----------------------------------|---|----------------|----------|
| Course Code | | Credits | 4 |
| Instruction Hours per Week | 6 | Marks | |
| Course Objectives | <ul style="list-style-type: none"> • To highlight the importance of HRM in an organization • To familiarize the students with the processes and mechanism of managing human resources | | |

Unit - I: Introduction to HRM

HRM – importance – Characteristics – Operational area of HRM – Qualities of a good HR Manager – Changing roles of HR Managers – Difficulties and challenges faced by HR managers – recent trends in HRM.

Unit - II: Human Resource Planning

Concept – Characteristics – Steps – HR Capital - Job Analysis – Succession Planning – Auditing of HR resources - ERP technologies - Preparation of HR plan –Dealing with surplus and deficit human resource – Attrition management & retention management.

Unit - III: Recruitment Process

Objectives – Factors affecting recruitment – internal and external source of recruitment – Selection Process –Types of Testing – Kinds of employment interview – Medical Screening – Appointment Order.

Unit - IV: Training and Development

Purpose of training – Distinction between training and development – Assessing training needs – Steps in training – On the job and Off the job training methods – Evaluation of training effectiveness. Competency: Development and Management – Mentoring and Coaching.

Unit - V: Performance Appraisal

Objectives – Steps - Traditional and Non-traditional methods of performance appraisals - Managing grievances redressal.

Text Book:

- Gupta C.B, Human Resource Management, Sultan Chand and Sons, 14th Edition, New Delhi, 2012

Reference Books

- Mamoria C.B, & Rao V. S. P, Personnel Management (Text and Cases), Himalayan Publications, New Delhi, 2012
- Aswathappa K, Human Resource Management, 6th Edition, Tata McGraw-Hill Education Pvt. Ltd, 2010

Note: Latest Edition of Text Books may be used.

Semester - V
Part III- Major Elective – I

2. Advanced Corporate Accounting

| | | | |
|-----------------------------------|--|----------------|----------|
| Course Code | | Credits | 4 |
| Instruction Hours per Week | 6 | Marks | |
| Course Objectives | <ul style="list-style-type: none">• To familiarize the students of the methods of valuing goodwill and shares of a company and the liquidation procedure of companies• To make the students aware of preparing the accounts of holding companies, banking companies and insurance companies | | |

Unit – I: Valuation of Goodwill and Shares

Need – Factors affecting the valuation of goodwill – methods of Valuation – Average profit – weighted average profit – super profit – annuity and capitalization method.

Valuation of Shares: Need – Factors affecting the valuation – Methods – Net Asset Method – Yield Method and Fair Value Method.

Unit – II: Liquidation of Companies

Legal procedure – Preparation of Statement of Affairs and Deficiency / Surplus Account - Adjustment of rights of contributories – Order of Payment – Preparation of Liquidators Final Statement of Account.

Unit – III: Holding Company Accounts

Holding company Vs. other forms of consolidations – Adjustments required at the time of consolidation of accounts - Preparation of Consolidated Balance Sheet (Consolidated Profit and Loss Account and intercompany holdings are excluded).

Unit – IV: Banking Company Accounts

System of accounting in banks – Treatment of special items: Rebate on Bills Discounted – Provisioning for Non-performing assets - Preparation of profit and loss account and Balance Sheet with relevant schedules.

Unit – V: Insurance Company Accounts

System of accounting in life and general insurance companies – Calculation of profit in life insurance business – Ascertainment of net liability and valuation balance sheet – Reserve for unexpired risk in general insurance business - Preparation of Revenue Accounts and Balance Sheet with relevant schedules.

Text Book

- Jain & K.L. Narang, Advanced Accounting, Kalyani Publications, Ludhiana

Reference Books

- Gupta & Radhasamy, Corporate Accounting, Sultan Chand, New Delhi
- Shukla, T.S. Grewal and S.C. Gupta, Advanced Accounting, Sultan Chand, New Delhi
- Maheshwari. S.N. Corporate Accounting, Vikas, Noida
- Reddy & Murthy, Advanced Corporate Accounting, Margham Publications, Chennai

Semester - V
Part III- Major Elective – I

3. Business Logistics

| | | | |
|-----------------------------------|--|----------------|----------|
| Course Code | | Credits | 4 |
| Instruction Hours per Week | 6 | Marks | |
| Course Objectives | <ul style="list-style-type: none"> • To understand and use the basic concepts of logistics and supply chain management and the contemporary theoretical and practical developments therein • To understand the complex and interactive nature of participants, functions, and flows of international logistics and supply chain management | | |

Unit - I: Basics of Logistics

Logistics - Importance and Evolution of Logistics and Supply Chain Management – Objectives of Logistics - Outsourcing logistical Activities - 3rd and 4th party Logistics - Logistics Information System.

Unit - II: Supply Chain Management

Basic concept of Supply Chain Management- Comparison between Logistics and SCM - Supply chain participants - SC Relationship Management - Logistics Strategy - Supply Chain Organization structure - Global Supply Chain.

Unit - III: Customer Service

Scope - Objectives - Importance - Elements of Customer Service, Rights of customers - Customer Service Audit, Customer Service Strategy – Inventory management - Essence of logistics in marketing – marketing trends.

Unit - IV: Warehouse Management

Evolution of Concept of Warehousing; Importance - Benefits; Warehouse Operating Principles; Developing the Warehouse Resource.

Unit - V: Transportation and Multimodal Transport

Transport Functionality and Principles; Product Movement; Product Storage; Relationship between the Shipper, the Consignee, and the Public - Multimode Transport concepts and features- Advantages of Multimodal Transport; Suppliers of Transportation Services; Typical Carrier Ancillary Services.

Text Book

- Agrawal D. K., *Logistics and Supply Chain Management*, Macmillan, 2009

Reference Books

- Ronald H. Ballou & Samir K. Srivastava, *Business Logistics / Supply Chain Management*, Pearson Publication, 2010
- Sunil Chopra, Peter Meind & D.V. Kalra, *Supply Chain Management – Strategy, Planning and Operation*, Pearson Publication, 2013

Note: Latest Edition of Text Books may be used.

Semester - V
Part III- Subject Skill – I
1. Computer Fundamentals and E-Commerce

| | | | |
|-----------------------------------|--|----------------|----------|
| Course Code | | Credits | 4 |
| Instruction Hours per Week | 6 | Marks | |
| Course Objectives | <ul style="list-style-type: none"> • To make the students to understand the importance of computers in business applications and learn the fundamental aspects of hardware and software components • To equip the students with the basic skills needed for creating and managing spreadsheets and help them to understand the basic applications of internet and E-Commerce | | |

Unit - I: Introduction to Computers and Information Technology

Computer: Characteristics, Advantages, Limitations, Types and applications; Components of Computer: Humanware, Hardware, Firmware, Liveware, Software. Role of information in business - Types of information and information systems; Users of information system and information technology - Limitations of Information Technology.

Unit - II: Application and System Software

Application Software: General Purpose Packaged Software and Tailor-made Software; Utility Software – Virus, Worms and antivirus software: System Software: Operating system - Overview, Operating System: Functions, Types, advantages and disadvantages.

Unit - III: Spreadsheets and its Business Applications

Spreadsheet: Basic Operations; Formula Copying, Moving data from selected cells, Handling operations in formulae, Rearranging Worksheet. Organizing Charts and graphs, Graphical representation of data.

Unit - IV: Introduction to Internet

Growth of internet, Owner of Internet, Anatomy of Internet, Basic Internet Terminology, Net Etiquette, World Wide Web, Internet Protocols, Usage of Internet to society - Search Engines.

Unit - V: E-Commerce Fundamentals

E-Commerce: Introduction, Business Models for E-Commerce; E-Marketing: Online Marketing, E-Advertising, Marketing Analysis and issues; E-Payment System: Fundamentals.

Text Book:

- Leon, (2006), Introduction to computers, Vikas Publishing House Pvt. Ltd., New Delhi.
- Alexis Leon and Mathew Leon, (2005), Introduction to computers with Ms Office 2000, TMH, New Delhi.

Reference Books:

- SrinivasaVallaban SV, (2005), Computers in Business, Sultan Chand and Sons, New Delhi.
- Sanjay Saxena, (2005), MS Office for Everyone, Vikas Publishing House Pvt Ltd, New Delhi.

Note: Latest Edition of Text Books may be used.

Semester - V
Part III- Subject Skill – I

2. Entrepreneurship

| | | | |
|-----------------------------------|--|----------------|----------|
| Course Code | | Credits | 4 |
| Instruction Hours per Week | 6 | Marks | |
| Course Objectives | <ul style="list-style-type: none"> • To enable the students to learn the concept and importance of Entrepreneurship • To make the students aware of the various institutions that help the entrepreneurs in different ways | | |

Unit - I: Concept of Entrepreneurship

Entrepreneurship: Features, Factors affecting entrepreneurship – Barriers. Entrepreneur: Characteristics, Functions and Types. EDP – Meaning – Need – Objectives, Phases, Role and Problems – EDP Curriculum.

Unit - II: Institutional Support to Entrepreneurs

Institutional service: DIC, SIDO, NSIC, SISI and KVIC.

Institutional finance: Commercial Banks, IFCI, SFC, IDBI, ICICI, UTI, SIDBI, LIC and GIC.

Unit - III: Business Idea and Business Opportunities

Business Idea – Sources – Methods of generating Idea and its Evaluation.

Business Opportunity – Sources of Entrepreneurial Opportunity – Opportunity Analysis – Steps in Opportunity Analysis – Feasibility Study – Phases – Marketing – Finance – Technical – location and legal Feasibilities.

Unit - IV: Project Formulation and Project Report

Project – Stages, Classifications – Project Appraisal – methods. Project Report (Business Plan) – Purpose – Criticism – Formulation of a Business Plan.

Unit - V: Small Scale Entrepreneurs and Women Entrepreneurs

Small Scale Industries – Importance – Problems – Role of Small Scale Industries in the Indian Economy – Incentives offered by the State and Central Government to SSI's. Franchising – Definition – Types – Advantages and Disadvantages.

Women Entrepreneurs – Concept – Functions – Problems – Schemes for women entrepreneurs.

Text Book:

- Entrepreneurial Development- C.B.Gupta, S.S.Khanka, 5th Edition, 2014, Sulthan Chand, New Delhi.

Reference Books:

- Entrepreneurial Development- P. Saravanel, 5th Edition – 2002, Prasanna Publishers, Chennai.
- Entrepreneurial Development- C.B. Gupta and N.P. Srinivasan, 6th Edition – 2012, Sultan Chand & Company Ltd, New Delhi.

Note: Latest Edition of Text Books may be used.

Semester - VI
Part III- Major Core

Management Accounting

| | | | |
|-----------------------------------|--|----------------|----------|
| Course Code | | Credits | 6 |
| Instruction Hours per Week | 6 | Marks | |
| Course Objectives | <ul style="list-style-type: none">• To impart the knowledge of the various tools of financial statement analysis• To create an understanding about the preparation of budgets and capital budgeting methods | | |

Unit – I: Introduction

Management Accounting – Definition – objectives – functions – limitations – Comparison with financial and cost accounting - Financial Statement Analysis – Tools - Comparative Statements – Common size Statements – Trend Analysis.

Unit – II: Ratio Analysis

Definition – nature – significance – limitations – classification of ratios –Solvency, Turnover and Profitability ratios – Computation of ratios from financial statements – Preparation of financial statements from ratios – Inter-firm and Intra-firm comparison.

Unit – III: Fund Flow and Cash Flow Analysis

Concept of Funds – Sources and uses of funds – Preparation of Fund Flow Statement – Preparation of Cash Flow Statement as per AS-3 – Fund Flow statement s. Cash Flow statement.

Unit – IV: Budget and Budgetary Control

Definition – objectives – uses and limitations – essentials of good budgetary control – Preparation of Materials, Production, Sales, Cash and Flexible Budgets – Master Budget and Zero Base Budgeting.

Unit – V: Capital Budgeting

Definition – Features and Importance – Methods of ranking investment proposals – Traditional methods: Payback and ARR – Modern/Discounted cash flow Methods: Net present value – Internal rate of return – Profitability index.

Text Book

- Sharma T.S. & Shashi. K. Gupta, Management Accounting, Kalyani Publications

Reference Books

- Maheswari S.N. Principles of Management Accounting, Sultan Chand & Sons, New Delhi.
- Gupta. S.P. Management Accounting, Kalyani Publications, New Delhi
- Murthy. A, Management Accounting, Vijay Nichole, Chennai

Note: Latest Edition of Text Books may be used.

Semester - VI
Part III- Major Core: Income Tax Law and Practice – II

| | | | |
|-----------------------------------|--|----------------|----------|
| Course Code | | Credits | 5 |
| Instruction Hours per Week | 5 | Marks | |
| Course Objectives | <ul style="list-style-type: none"> • To expose the students to the various provisions of Income Tax relating to computation of Total Income of Individual. • To introduce to the students various forms meant for filing return of income and prepare them to file return of Income. | | |

Unit - I: Income from Business or Profession

Charging Provision – Allowable expenses – Expenses expressly disallowed – Losses incidental and treated as business losses and not treated as business losses – Profession – Computation of Income from Business and Profession. (Both Theory and Problem)

Unit - II: Capital Gains

Types – Cost of acquisition – Cost of Improvement – Exempted Capital gain – Computation of taxable capital gain.(Both Theory and Problem)

Unit - III: Income from other Sources

Chargeable incomes – Deductions – Computation of Income from other sources. (Both Theory and Problem)

Unit - IV: Set off and Carry forward of Losses

Set off of Loss – Within Head – Outside Head – Speculation Loss – Carry forward of losses – Clubbing of Income and Deemed Income. (Both Theory and Problem)

Unit - V: Assessment of Individual

Deductions eligible for Individual U/s 80 – Income tax rate for Individual – Computation of Taxable Income of an Individual (Simple problems only) (Problems only)

Practical: (Internal Only) Filing of Returns: Manually, On-line filing of Returns of Income & TDS.

Text Book

- Gaur, V.P and D.B. Narang, Income Tax Law and Practice, Kalayani Publications, New Delhi.

Reference Books:

- Singhanian, Vinod K. and Monica Singhanian. Students'Guide to Income Tax, University Edition. Taxmann Publications Pvt. Ltd., New Delhi.
- Ahuja, Girish and Ravi Gupta, Systematic Approach to Income Tax. Bharat Law House, Delhi.
- Mehrotra. H.C, Income Tax Law and Practice with Tax Planning, Sahitya Bhawan Publications, New Delhi.
- Hariharan. N, Income Tax Law and Practice, Vijay Nicole Imprints Private Ltd. New Delhi.

Note: Latest Edition of Text Books may be used.

Semester - VI
Part III- Major Core

Business Law

| | | | |
|-----------------------------------|--|----------------|----------|
| Course Code | | Credits | 5 |
| Instruction Hours per Week | 5 | Marks | |
| Course Objectives | <ul style="list-style-type: none"> • <i>To understand the basic structure of Business Law</i> • <i>To enlighten the students' to gain basic knowledge on Information Technology Act 2000 and RTI Act 2005 in India</i> | | |

Unit – I: Introduction to Indian Contracts Act

Business law – Sources of law - legal rights – Rights in rem and rights in personem – Nature of Contract – meaning – definition – classification of contracts.

Unit – II: Essential elements of valid contract

Offer and acceptance – Consideration – Capacity to Contract: Minors, persons of unsound mind and other disqualifications - Free consent - Flaw in consent – Coercion - Undue influence – Misrepresentation - Mistake and Fraud - Legality of object and consideration.

Unit – III: Performance of Contract

Actual Performance – Attempt to Performance - Discharge of contracts – Performance Tender – Discharge of Contract: Agreement – Novation – Alteration - Rescission, Remission - Waiver - Accord and Satisfaction – Operation of law – Impossibility of Performance: Supervening impossibility and exceptions – Discharge by breach – Remedies for breach of contract – Rescission – Suit for specific performance – Injunction – Quantum meruit and damages – Quasi-Contracts.

Unit – VI: Special Contract

Contract of indemnity – Essentials – Rights of indemnity holder and indemnifier – Contract of Guarantee – features – kinds – right and liabilities of surety – discharge of surety – Bailment – rights and duties of bailor and bailee - termination of bailment – Pledge – rights and duties of pawner and pawnee

Unit – V: Information Technology Act 2000 & RTI Act

The Information Technology Act 2000 – Definition- Authentication of electronic Records - Electronic governance- Digital signature Certificates – Cyber Law-concept of cyber space - cyber law in E – commerce - RTI Act 2005 - definition – Objective of RTI act

Text Book:

- Jayashankar, Business Law, Margham Publications, Chennai

Reference Books

- Pillaiv & Bagavathi - Business Law, S. Chand & Co, New Delhi
- Kapoor. N.D. Business Law, Sultan Chand & Sons, New Delhi
- Information Technology Rules 2000 with information technology Act 2000, New delhi, Taxmann publications Pvt Ltd
- An introduction to cyber laws Mishra JP, central law Agency 1st edition- Allahabad.

Note: Latest Edition of Text Books may be used.

Semester - VI
Part III- Major Elective - II
1. Practical Auditing

| | | | |
|-----------------------------------|--|----------------|----------|
| Course Code | | Credits | 4 |
| Instruction Hours per Week | 6 | Marks | |
| Course Objectives | <ul style="list-style-type: none"> • <i>To familiarize the students with the Principles of Auditing</i> • To make the students aware of the qualifications and the qualities of an auditor | | |

Unit - I: Auditing – Principles & Types

Origin – Scope – Features – Objectives – Basic Principles – Functions of Audit – Advantages and Disadvantages of Auditing – Auditing Vs. Investigation – Auditing Vs. Accounting – Types of Audit – Audit Programme – Audit Note Book – Audit Working Paper – Auditors Lien.

Unit - II: Internal Control and Internal Check

Internal Control: Features – Scope – Principles – Objectives – Advantages and Disadvantages. Internal Check: Objectives – Advantages – Limitations – Principles of Good Internal Check System – Differences between Internal Check and Internal Control – Internal Check regarding Sales, Wages, Purchase.

Unit - III - Vouching

Objectives – Importance – Types of Vouchers - Vouching of cash transactions (Debit and Credit side of cash book), trading transactions – purchases book, purchase returns book, sales book, sales returns book and Journal Proper.

Unit - IV: Verification and Valuation of Assets

Verification of Assets – Objectives – Verification Vs. Vouching – Verification of Investment – Freehold Premises – Plant & Machinery – Accounts receivables and Stock in Trade. Valuation of Assets – Objectives – Verification Vs. Valuation – Classification of Assets - Auditors duty in regard to valuation of Assets.

Unit - V: Audit of Limited Companies

Qualification and qualities of an auditor – appointment and removal of auditors – rights, powers, duties and liabilities of an auditor – Government Audit – CAG of India – Powers and Duties - Audit report – contents – Reporting requirements under the Indian Companies Act 2013.

Text Book:

- A Hand Book of Practical Auditing- B.N Tandon, S.Sudharsanam S.Sundharabahu Edition, – 2009, S. Chand & Company Ltd, New Delhi.

Reference Books

- Basics of Auditing- Dinkar Pagare, 11th Edition 2007, Sultan Chand & Sons, Educational Publishers, New Delhi.
- Auditing Principles- Pradeep Kumar, Baldev Sachdeva, Jagwant Singh, 8th Edition – 2012, Kalyani Publishers, Ludhiana,
- Kamal Gupta – Contemporary Auditing

Note: Latest Edition of Text Books may be used.

Semester - VI
Part III- Major Elective - II
2. Indirect Taxation

| | | | |
|-----------------------------------|--|----------------|----------|
| Course Code | | Credits | 4 |
| Instruction Hours per Week | 6 | Marks | |
| Course Objective | <ul style="list-style-type: none"> • To understand the basics of the Indirect Tax Laws and Procedure and to study the computational process under various Acts of Indirect Tax laws. • To teach the concept of Value added tax and the procedures relating to the computation of VAT | | |

Unit - I: Principles and Classification of Taxes

Taxes – Features – Objectives – Importance – Canons of Taxation – Requirement of Good Taxation System – Constitutional Provisions – Classification of Taxes – Direct Taxes – Merits and Demerits – Indirect Taxes – Features – Merits and Demerits – Differences between Direct and Indirect Taxes.

Unit - II: Excise Duty

Constitutional Provisions – Types of Excise Duty – Objectives – Distinguish between Central Excise and Sales Tax - Central Excise Act – Important Definitions – Sources of Central Excise Law – Levy and collection of Central Excise Duty– Excisable Goods – Valuation – Registration and Assessment Procedure of Central Excise Duty – Removal or Clearance of Excisable Goods.

Unit - III: Customs Duty

Objectives - Constitutional Provisions – Customs Act – Important Definitions – Scope of Customs Law - Different Types of Customs Duties – Customs Tariff Act 1985 - Levy of Customs Duty – Exemptions – Classifications of Goods – Valuation of Customs Goods – Provisions related to Baggage - Customs Duty Drawback.

Unit - IV: Service Tax

Need – Origin of Service Tax – Constitutional Provisions – Sources of Service Tax Law – Administration of Service Tax – Classification of Taxable Services – Valuation of Taxable Services – Payment of Service Tax – Registration Procedure – Exemptions from Service Tax.

Unit - V: Value Added Tax

VAT - Features – Merits and Demerits – Importance – Principles – Types - Differences between VAT and Sales Tax – Methods of Computing VAT – VAT registration – Types – Cancellation of Registration – VAT Invoice – Incentive schemes under VAT.

Text Book

- N.P. Srinivasan & M. Periasamy, Principles of Business Taxation, Sultan Chand & Co, New Delhi.

Reference Books:

- P.Radhakrishanan, Indirect Taxation, Kalyani Publishers, Ludhiana, First Edition – 2006.
- Dr.G.K.Pillai, Principles of Taxation, Parasanna Publishers, Chennai, Edition – 2008.
- R.Krishnan, R.Parthasarathy, Service Tax, Commercial Law Publishers, Delhi.

Note: Latest Edition of Text Books may be used.

Semester - VI
Part III- Major Elective - II

3. Industrial Relations and Labour Laws

| | | | |
|-----------------------------------|---|----------------|----------|
| Course Code | | Credits | 4 |
| Instruction Hours per Week | 6 | Marks | |
| Course Objective | <ul style="list-style-type: none">To enable the students to learn the concepts of Industrial Relations including trade unions, collective bargaining and various labour enactments. | | |

Unit - I: Industrial Relations (IR)

Concept – Evolution - Nature – Objectives - Role of State - Factors affecting IR in changing Environment - International Dimensions of IR.

Unit - II: Trade Union

Trade Union: Origin and growth, unions after Independence, unions in the era of liberalization; Factors affecting growth of Trade Unions in India, Major Provisions of Trade Union Act 1926.

Unit - III: Collective Bargaining and Worker's Participation in Management

Collective Bargaining: Meaning, Nature, Types, Process, Importance and Status of Collective Bargaining in India - Functions and role of Trade Unions in Collective bargaining. Workers' Participation in Management(WPM) - practices in India, Works Committees, Joint management councils; Participative Management and co-ownership; Productive Bargaining and Gain Sharing.

Unit - IV: The Industrial Disputes Act, 1947:

Definitions of Industry, workman, and Industrial Dispute; Authorities under the Act; Procedure, Powers and Duties of Authorities; Strikes and Lock outs; Lay-off and Retrenchment; Provisions relating to Layoff, Retrenchment, and closure.

Unit - V: The Factories Act, 1948:

Provisions relating to Health, Safety, Welfare facilities, working hours, Employment of young persons, Annual Leave with wages.

Reference Books:

- PK Padhi, *Industrial Relations and Labour Law*, PHI Learning
- Arun Monalppa, *Industrial Relations and Labour Law*, McGraw Hill Education
- SC Srivastav, *Industrial Relations and Labour Law*, Vikas Publishing House
- C.S. Venkata Ratnam, *Industrial Relations*, Oxford University Press.
- P.L. Malik's *Handbook of Labour and Industrial Law*, Vol 1 and Vol 2, Eastern Book Company.
- JP Sharma, *Simplified Approach to Labour Laws*, Bharat Law House (P) Ltd

Note: Latest Edition of Text Books may be used.

Semester - VI
Part III- Subject Skill - II

4. Computerised Accounting

| | | | |
|-----------------------------------|---|----------------|----------|
| Course Code | | Credits | 4 |
| Instruction Hours per Week | 6 | Marks | |
| Course Objectives | <ul style="list-style-type: none"> • To make the students be aware of the benefits of computerized accounting. • To equip the students with the skill of using Tally ERP9 accounting package for recording the books of accounts. | | |

Unit - I: Introduction to Tally

Introduction to Accounting Packages - Features of Computerized Accounting - Introduction to Tally ERP 9 – Earlier versions of Tally - Features of Tally - Creation- alteration and Deletion of Company - Company details - Accounting Features (F11) - Accounting groups - Predefined groups - User defined groups creation, alteration and deletion.

Unit - II: Ledgers and Final Accounts

Ledgers (Creation, alteration and deletion) - Accounting Vouchers - various types of accounting Vouchers and their short cut keys- Voucher entries in double and single entry mode - Day book - Preparation of Final accounts with adjustments and Balance sheet using ledger balances.

Unit - III: Accounting for Inventories

Inventory Masters: Creation, alteration and deletion of Stock groups, Stock categories, Units of Measures, Godowns and Stock items - Batch wise details - Pure Inventory Vouchers.

Unit - IV: Budgets

Budgets - Creation and alteration - Variance analysis - pay roll preparation - Statutory Features (F11) - Voucher entries using TDS, TCS & VAT.

Unit - V: Reports

F12 - Configurations - Accounting and Inventory books - Statements of Accounts and Inventory - BRS - Extraction of Ratios, Cash flow and fund flow statement.

Text Book

- Mastering Tally.ERP 9, Ashok K Nadhani, (2nd Edition), BPB Publications, Chennai.

Reference Books

- Vishnu P. Singh (2010), “Tally. Earp 9”, Computech Publications Ltd, New Delhi.
- Palanivel S. Tally – Accounting software (2012), Margham Publications, Chennai.

Note: Latest Edition of Text Books may be used.

Tally – Lab

List of exercises

1. Creation, alteration and deletion of companies and user defined Accounting groups.
2. Creation, alteration and deletion of ledgers and final accounts and Balance Sheet Preparations.
3. Voucher entries in double entry mode.
4. Voucher entries in single entry mode.
5. Creation, alteration and deletion of inventory masters.
6. Accounting voucher entries using stock items.
7. Voucher entries using accounting and inventory vouchers.
8. Payroll preparation and applying TDS and TCS.
9. Generation of Accounting and Inventory Reports

Semester - VI Part III- Subject Skill - II

1. Personal Selling and Salesmanship

| | | | |
|-----------------------------------|--|----------------|----------|
| Course Code | | Credits | 4 |
| Instruction Hours per Week | 6 | Marks | |
| Course Objectives | <ul style="list-style-type: none">• The purpose of this course is to familiarize the students with the fundamentals of personal selling and the selling process.• To help the students understand the prospects of selling as a career and what it takes to be a successful salesman. | | |

Unit - I: Introduction to Personal Selling

Nature and importance of personal selling, myths of selling, Difference between Personal Selling, Salesmanship and Sales Management, Characteristics of a good salesman, types of salespersons, Career opportunities in selling.

Unit - II: Personal Selling Objectives

Personal selling Objectives: Types of personal objectives, Market Indices, Sales Potential and sales forecasting, sales forecasting methods, converting industry forecast to company sales forecast, evaluation of forecast.

Unit - III: Buying Motives

Buying Motives: Concept of motivation, Maslow's theory of need hierarchy; Dynamic nature of motivation; Buying motives and their uses in personal selling

Unit - IV: Selling Process

Selling Process: Prospecting and qualifying; Pre-approach; Approach; Presentation and demonstration; handling of objections; Closing the sale; Post sales activities.

Unit - V: Sales Reports

Sales Reports: reports and documents; sales manual, Order Book, Cash Memo; Tour Diary, Daily and Periodical Reports; Ethical aspects of Selling

Text Book:

- Kapoor Neeru, *Advertising and personal Selling*, Pinnacle, New Delhi.

Reference Books:

- Spiro, Stanton, and Rich, *Management of the Sales force*, McGraw Hill.
- Rusell, F. A. Beach and Richard H. Buskirk, *Selling: Principles and Practices*, McGraw Hill
- **Futrell, Charles, contemporary cases in sales management, Dryden Chicago Press.**
- Still, Richard R., Edward W. Cundiff and Norman A. P. Govoni, *Sales Management: Decision Strategies and Cases*, Prentice Hall of India Ltd., New Delhi,

Note: Latest Edition of Text Books may be used.

Semester - V
Part IV – Non Major Elective

Basic Accounts and Its Computer Applications

| | | | |
|-----------------------------------|---|---------------|----------|
| Course Code | | Credit | 1 |
| Instruction Hours per Week | 2 | Marks | |
| Course Objectives | <ul style="list-style-type: none"> • To provide basic accounting knowledge to non-commerce students • To impart the students the basic skills of using computers for accounting | | |

Unit - I: Introduction to Accounting

Book keeping and Accounting - Meaning of Accounting - Definition – Need – Objectives – Functions – Classifications of Accounting – Methods of Accounting – Groups Interested in Accounting - Accounting Concepts and Conventions. – Accounting Standards – Accounting Procedure - Journal - Ledger - Subsidiary Books.

Unit - II: Accounting Procedure

Journal – Ledger – Posting of Journal to Ledger – Journal Vs. Ledger - Trial Balance – Objectives – Preparation of Trial Balance (Simple Problems only)

Unit - III: Final Accounts

Preparation of Final Statement of Accounts – Trading Account — Profit & Loss Account – Balance Sheet – Adjustments (Simple Adjustments only) – Trial Balance Vs. Balance Sheet.

Unit - IV: Introduction to Accounting Packages

Features of Computerized Accounting - Introduction to Tally ERP – Earlier versions of Tally - Features of Tally - Creation- alteration and Deletion of Company - Company details - Accounting Features (F11) - Accounting groups - Predefined groups - User defined group's creation, alteration and deletion.

Unit - V: Preparation of Accounting Records using Tally ERP

Ledgers (Creation, alteration and deletion) - Accounting Vouchers - various types of accounting Vouchers - Day book - Preparation of Final accounts - Balance sheet using ledger balances.

Text Books:

- T.S. Reddy & Murthy “Financial Accounting” - 6th Revised Edition 2015, Margham Publications, Chennai.
- Mastering Tally. ERP 9, Ashok K Nadhani, (2nd Edition), BPB Publications, Chennai.

Reference Books

- Vishnu P. Singh (2010), “Tally. Earp 9”, Computech Publications Ltd, New Delhi.
- Palanivel S. Tally – Accounting software (2012), Margham Publications, Chennai.

Note: Latest Edition of Text Books may be used.

Semester - VI Part IV – Non Major Elective

Advertising and Salesmanship

| | | | |
|-----------------------------------|--|---------------|----------|
| Course Code | | Credit | 1 |
| Instruction Hours per Week | 2 | Marks | |
| Course Objectives | <ul style="list-style-type: none">• To explain the concept of advertising and various types of advertising media• To understand the importance of salesmanship in marketing | | |

Unit - I: Introduction to Advertising

Features of Advertising – Importance – Role of Advertising – Benefits of Advertising – Ethical Issues in Advertising

Unit - II: Advertising Process

Steps in Advertising – Effectiveness of Advertisement – Setting of Advertisement Objectives – Advertising Strategy.

Unit - III: Advertising Media

Media Planning – Role of Advertising Media – Indoor Media and Outdoor Media – Merits and Demerits.

Unit - IV: Salesmanship

Features of Salesmanship – Objectives – Advantages of Salesmanship to the Producers, Distributors, Consumers and Society.

Unit - V: Salesman

Classification of Salesman – Functions – Duties and Responsibilities of Salesman.

Text Book

- Advertising and Salesmanship – Saravanel & Sumathi, Margham Publications, Chennai.

Reference Books

- Advertising and Personal Selling – Gupta C.B, S. Chand, New Delhi
- Principles of Marketing – Philip Kotler, PHI Publications, New Delhi
- Richard R. Still, Sales Management, Pearson Publication, New Delhi.

Note: Latest Edition of Text Books may be used.

Note: Latest Edition of Text Books may be used.

Certificate Courses

| S. No | Part | Subject Title | Hrs. | Credits |
|--------------|-------------|--------------------------------------|-------------|----------------|
| 1 | VI | Income Tax – Filing Practices | 30 | 2 |
| 2 | VI | Indirect Tax – Filing Practices | 30 | 2 |
| 3 | VI | Creativity and Innovation Management | 30 | 2 |
| 4 | VI | Soft and Entrepreneurial Skills | 30 | 2 |

Course - I

Income Tax - Filing Practices

| | | | |
|--------------------------|-----------|----------------|----------|
| Course Code | | Credits | 2 |
| Instruction Hours | 30 | Marks | |

Unit – I: Introduction

Introduction to Income Tax practice – Scope for Auditing and Tax practice – Importance of maintaining books and filing – Scope for small and medium enterprises practice – Formation of sole proprietorship – Partnership registration – Deed drafting – Firm registration – Amendment in deed etc.

Unit – II: Income tax practice

Income tax – PAN, TAN – Applying for PAN/TAN – Forms 49A and 49B – registration under Income tax – Forms under IT, TTR – 1, 2, 3, 4, 5, 6 etc. – E-TDS filing – Queries – Assessment – Correspondence with TTO/AO

Unit – III: Internships

Internship under practicing Chartered Accountant – Paid assistance for six months/one year.

Course - II

Indirect Taxes – Filing Practices

| | | | |
|--------------------------|-----------|----------------|----------|
| Course Code | | Credits | 2 |
| Instruction Hours | 30 | Marks | |

Unit – I: Service Tax Practices

Registration under service tax – E-Filing of sales tax return – Forms under sales tax – ST1, ST2, ST3 – E-Filing procedures

Unit – II: VAT/CST Practices

Registration under VAT/CST – Forms under VAT/CST – Online filing of VAT return

Unit – III: Internships

Internship under practicing Chartered Accountant – Paid assistance for six months/one year.

Course - 79
Creativity and Innovation Management

| | | | |
|--------------------------|-----------|----------------|----------|
| Course Code | | Credits | 2 |
| Instruction Hours | 30 | Marks | |

Unit – I: Overview of Creativity

Meaning and concept of creativity – Creativity process - Nature and Characteristics of creativity – Factors affecting creativity – Understanding creativity from studying the profiles of most creative personalities.

Unit – II: Innovation management

Meaning and importance – Difference with creativity, Invention and Discovery – Process – Typology – Case studies on Innovation business ideas like Redbus, Flipkart, Ola, Bigbasket - Methods and techniques – Organizational Aspects – Economic aspects like venture capital, Angel investors – Evaluation of Effectiveness of innovation – Legal aspects like IPR, Patent etc.

Unit – III: Creativity and Various forms of Arts

Understanding the forms and characteristics of various painting traditions (cave paintings, Ajanta Murals, Indian miniatures, Traditional and Folk Arts), Sculpture (Indian sculpture and Temple architecture), contemporary Art forms – Art and Architecture (Photography, Films, Graphic Animation and Digital Art), Performing Arts (Music, Dance and Theatre), and Poetry and Literature with examples.

Reference Books:

- Vinnie Jauhari and SudhanshuBhushan, “Innovation Management”, Oxford University Press, 2014
- SholmoMaital, DVR Seshadri, “Innovation Management”, Response Books 2007
- Indian Art b ParthaMitter
- Art of India pre-history to present by Frederick M. Asher
- Contemporary Indian Art and Other realities by YashodaraDalmia

Course - 80

Soft and Entrepreneurial Skills

| | | | |
|--------------------------|-----------|----------------|----------|
| Course Code | | Credits | 2 |
| Instruction Hours | 30 | Marks | |

Unit -I: Life Skills

Using technology to communicate safely and effectively – Understanding the concept of community - Obtaining copies of personal documents – booking train, Bus and Air Tickets. Obtaining driver's license etc.

Unit - II: Interpersonal Skill Development

Positive Relationship - Positive Attitudes – Empathise and comprehend others opinions, points of views, and face them with understanding - Mutuality – Trust - Emotional Bonding - Handling Situations (Interview)

Unit - III: Entrepreneurship

Entrepreneurship: Features, Factors affecting entrepreneurship – Barriers. Entrepreneur: Characteristics, Functions and Types. EDP – Meaning – Need – Objectives, Phases, Role and Problems – EDP Curriculum - Risk taking - Innovation and creativity - Opportunity Orientation - Self confidence

Practical – Students will have practical exposure to visit Successful entrepreneurs.

Department of Business Administration

Syllabus with effect from the Academic Year 2017-2018

| Semester - I | | | | | | | | |
|---------------------|----------------|------------------------------|--------------|------------|--------------------------|------------|------------|--------------|
| Part | Type | Subject | Paper | Hrs | Credit | CIA | Sem | Total |
| I | Lang | Tamil | I | 5 | 3 | 30 | 70 | 100 |
| II | Lang | English | I | 5 | 3 | 30 | 70 | 100 |
| III | Main Core | Fundamentals of Management | I | 5 | 5 | 30 | 70 | 100 |
| III | Main Core | Fundamentals of Organization | II | 4 | 4 | 30 | 70 | 100 |
| III | Main Practical | Business Practical – I | III | 1 | 1 | 30* | 70* | 100* |
| III | Allied | Business Statistics | I | 6 | 4 | 30 | 70 | 100 |
| IV | FC | Personal Skills | I | 2 | 1 | | | |
| IV | | Ethics / Religion | I | 2 | 1 | | | |
| | | Communicative English | I | | | 1* | | |
| | | Total | | 30 | 22 + 1* | | | |

- **Internal Paper**

| Semester - II | | | | | | | | |
|-----------------------|----------------|---|--------------|------------|---------------|------------|------------|--------------|
| Part | Type | Subject | Paper | Hrs | Credit | CIA | Sem | Total |
| I | Lang | Tamil | II | 5 | 3 | 30 | 70 | 100 |
| II | Lang | English | II | 5 | 3 | 30 | 70 | 100 |
| III | Main Core | Basic Accounting for Managers | IV | 5 | 5 | 30 | 70 | 100 |
| III | Main Core | Banking and Insurance | V | 4 | 4 | 30 | 70 | 100 |
| III | Main Practical | Business Practical - II | VI | 1 | 1 | 30* | 70* | 100* |
| III | Allied | Operation Research | II | 6 | 4 | 30 | 70 | 100 |
| IV | FC | Social Skills | II | 2 | 1 | | | |
| IV | | Ethics / Religion | | 2 | 1 | | | |
| | | Communicative English | | | | 1* | | |
| | | Total | | 30 | 22+1* | | | |
| Semester - III | | | | | | | | |
| III | Main Core | Principles of Human Resource Management | VII | 5 | 5 | 30 | 70 | 100 |
| III | Main Core | Principles of Marketing | VIII | 4 | 5 | 30 | 70 | 100 |
| III | Main Core | Cost Accounting | IX | 5 | 4 | 30 | 70 | 100 |
| III | Main Core | Economics for Management | X | 5 | 3 | 30 | 70 | 100 |
| III | Main Practical | Business Practical - III | XI | 1 | 1 | 30* | 70* | 100* |
| III | Allied | Legal Aspects of Business | III | 6 | 4 | 30 | 70 | 100 |
| IV | FC | Employability Skills - I | | 2 | 1 | | | |
| IV | | Human Rights | | 2 | 1 | | | |
| V | | DEEDS | | | | | | |
| V | | SHELTERS | | | | | | |
| | | Total | | 30 | 24 | | | |
| Semester - IV | | | | | | | | |
| III | Main Core | Research Methods | XII | 5 | 5 | 30 | 70 | 100 |
| III | Main Core | Production Management | XIII | 4 | 4 | 30 | 70 | 100 |
| III | Main Core | Financial Management | XIV | 5 | 4 | 30 | 70 | 100 |
| III | Main Core | Modern Industrial Relations & Labour Laws | XV | 5 | 3 | 30 | 70 | 100 |
| III | Main Practical | Mini Project | XVI | 1 | 2 | 30* | 70* | 100* |
| III | Allied | Organizational Behaviour | IV | 6 | 4 | 30 | 70 | 100 |
| IV | FC | Employability Skills - II | | 2 | 1 | | | |
| IV | | Environmental Studies | | 2 | 1 | | | |
| V | | DEEDS | | | 2 | | | |
| V | | SHELTERS | | | 2 | | | |
| | | Total | | 30 | 28 | | | |

***Internal Paper**

| Semester - V | | | | | | | | |
|---------------|----------------------|---|-------|-----------|----------------|-----|-----|-------|
| Part | Type | Subject | Paper | Hrs | Cre | CIA | Sem | Total |
| III | Main Core | Accounting for Managers | XVII | 5 | 4 | 30 | 70 | 100 |
| III | Main Core | Project | XVIII | 1 | 4 | 30 | 70 | 100 |
| III | Main Core | Business Environment | XIX | 4 | 3 | 30 | 70 | 100 |
| III | Main Core | Computer Applications for Management | XX | 4 | 3 | 30 | 70 | 100 |
| III | Main Practical | Computer Applications for Management –Lab | | 2 | 2 | 30 | 70 | 100 |
| III | Main Elective - I | Consumer Behaviour | I | 6 | 4 | 30 | 70 | 100 |
| | | Retail Management | II | | | | | |
| | | Service Marketing | III | | | | | |
| III | Subject Elective - I | Sales & Distribution Management | I | 6 | 4 | 30 | 70 | 100 |
| | | Export Management | II | | | | | |
| | | Project Management | III | | | | | |
| III | SSP | Brand and Product Management | I | | 1* | | | |
| | | Integrated Marketing Communication | II | | | | | |
| III | NME | Management Concepts | I | 2 | 1 | 30 | 70 | 100 |
| Total | | | | 30 | 25 + 1* | | | |
| Semester - VI | | | | | | | | |
| III | Main Core | Strategic Management | XXI | 5 | 5 | 30 | 70 | 100 |
| III | Main Core | Entrepreneurial Development | XXII | 5 | 5 | 30 | 70 | 100 |
| III | Main Core | E-Commerce | XXIII | 4 | 4 | 30 | 70 | 100 |
| III | Main Practical | E-Commerce Lab | | 2 | 2 | 30 | 70 | 100 |
| III | Main Elective -II | Financial Services | IV | 6 | 4 | 30 | 70 | 100 |
| | | Logistics & Supply Management | V | | | | | |
| | | Total Quality Management | VI | | | | | |
| III | Subject Elective -II | Training & Development | IV | 6 | 4 | 30 | 70 | 100 |
| | | Customer Relationship Management | V | | | | | |
| | | B2B Marketing | VI | | | | | |
| | SSP | Business Communication | III | | 1* | | | |
| | | Event Management | IV | | | | | |
| III | NME | Organizational Behaviour | | 2 | 1 | 30 | 70 | 100 |
| Total | | | | 30 | 25+1* | | | |

***Internal Papers**

| Certificate Programme | Semester | Credits |
|-----------------------------------|----------|---------|
| Certificate in NGO Management | III | 2 |
| Certificate in Tourism Management | IV | 2 |

Paper - XVII: Accounting For Managers

Semester – V

5 Hours

Code:

4 Credits

Objectives

- To provide an understanding of the theory and practice of management accounting in decision making.
- To gain a working knowledge of the principle and practices of management accounting.

Methodology

- Class room teaching of each the units followed by regular exercise, surprise tests and Practical assignments.
-

Unit - I: Introduction to Management Accounting

Meaning and Definition of Management Accounting - Nature and scope of management accounting. **Financial statement analysis:** Comparative statement- Common size statement- Trend analysis (Problems). **Ratio Analysis:** Meaning and Definition of Ratio – Classification of Ratio – i) Profitability Ratio ii) Liquidity Ratio iii) Turnover Ratio: Debtors turnover Ratio – Creditors Turnover Ratio - Stock turnover Ratio Only (**Excluding preparation of final accounts**).

Unit - II: Fund Flow Statement

Meaning of Fund – Rule for calculation of statement of changes in financial position – Fund from operation – Fund Flow Operations

Unit - III: Cash Flow Statement

Meaning of Cash – Rule for calculation of statement of changes in cash position – Computation of Cash from Operation – Preparation of Simple Cash Flow Statement

Unit - IV- Budget and Budgetary Control

Meaning and definition of budget – objectives – advantages - limitation of budgetary control. **Classifications of budgets:** Sales, Production, Cash and Flexible budget only (Problems) – zero base budgeting (Theory).

Unit - V: Marginal Costing

Meaning and definition of Marginal cost- Advantage and limitations - Concept of Variable Cost – Fixed Cost- Contribution- P/V ratio, MOS, Angle of Incidence-Break Even Analysis - Marginal cost equations. (Excluding Absorption Costing). Calculation of P/V ratio, BEP, MOS (Simple problems). Computation of BEP – Computation of sundry items and when two consecutive period's figures are given (Problems).

Text Book:

1. T.S. Reddy and Hari Prasad Reddy, Management accounting, Marham,2015

References:

1. S.N. Maheswari, Management Accounting, Sultan chand, 2008
2. S.P. Gupta, Management Accounting, Sahitha bhawan, 2007
3. P. Saravanavel, Management Accounting Principles & Practice, marham,2009

Web Resources:

1. www.accountingformanement.com
2. <http://www.business.com>
3. www.icai.org www.icwai.org

Question paper pattern – 80 (Sum): 20 (Theory)

Blue print for Question Paper setting

| | Unit 1 | | Unit 2 | | Unit 3 | | Unit 4 | | Unit 5 | |
|-----------|----------------|----------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Section A | Q.1 T | Q.2 P | Q.3 T | Q.4 P | Q.5 T | Q.6 P | Q.7 T | Q.8 P | Q.9 T | Q.10 P |
| Section B | Q.11 a T | Q.11 b P | Q.12a P | Q.12b P | Q.13a P | Q.13b P | Q.14a T | Q.14b P | Q.15a P | Q.15b P |
| Section C | Q.16 P | | Q.17 P | | Q.18 P | | Q.19 P | | Q.20 P | |

T - Theory

P. Practical

Paper - XVIII: Project

Semester – V

1 Hour

Code:

4 Credits

Each student shall be required to prepare on the basis of investigations carried out by them in an industrial organizational project on possible solutions for a typical problem of current interest in the area of management. The report should demonstrate the capability of the students for some creative potential and original approach to solve the practical problems in to-days business or industry. The report should include field studies, survey, interpretation, planning and design of improved integrated management systems, presented in a comprehensive manner with recommendations for solutions based on scientifically worked out data and viva will be conducted on the basis of the report.

Evaluation Patten

- Each student should carry out his / her investigation separately
- The mode of evaluating the student will consists of two parts. One of the basis of report writing and the other will be through Viva Voce

- The valuation of the Report writing and Oral examination will be by both External Examiner and Internal Examiner
- 80 Marks will be awarded for report writing and 20 Marks for oral examination
- Average of marks can be taken as final

The following are the components for report writing

- Content - 50 Marks
- Layout - 5 Marks
- Methodology - 10 Marks
- Grammar - 5 Marks

Mid Month Review - 10 Marks

Marks for Viva Voce

- Oral Presentation - 10 Marks
- Question & Answer - 10 Marks
- Project will be for a period of one month, which will be in the month of May of every academic year
- Each student should find a reputed industry to carry out his / her investigation with the approval of the department
- After completing his / her training, the student should get an attendance certificate from the company

Paper - XIX: Business Environment

Semester – V

4 Hours

Code:

3 Credits

Objectives:

- Provide an understanding of the role of business in society.
- To relate the Impact of Environment on Business in an integrative manner
- To know about the culture, constitution, MRTP act

Methodology:

- Lectures, simulation exercise, group discussions

Unit - I: Business & its Environment

Business & its Environment: Definition of Business Environment – Factors of Business Environment (Demographic, Economic, Geographical and Ecological, Social and Cultural, Political and Legal, Technological) – Classification of Business Environment – Economic and Non Economic Environment – Interaction

Unit - II: Political & Constitutional Environment

Political & Constitutional Environment: Economic Systems – Functions of an Economic System – Types of Economic System (Capitalism, Socialism, Mixed) – Marxian Socialism – Gandhian and Sarvodaya Approach – Government and Business Relationship

Unit - III: IDRA & Consumer Protection Act

Industries (Development and Regulation) Acts: MRTP Act 1969 – Recommendation of Raghavan Committee – Legislation for consumer protection – The Consumer Protection Act 1986 – Consumerism

Unit - IV: Macro Economic Parameters

Macro Economic Parameters: Economic Development – Rostow’s Stages of Economic Growth – National Income – Definition and concepts – National Income Accounts – GNP – NNP – NI – PI – Computation of National Income – Factors Determining National Income – Five Year Plans of India – Objectives – Achievements.

Unit V – Environmental Analysis:

Environmental Analysis: Privatization – Globalization – Liberalization – Environmental Analysis and Managerial Development – GATT and Tariffs – WTO – Trade Related Aspects of intellectual Property Rights (TRIPs) – TRIMS

Text Book:

1. Dr. Sankaran, Business Environment, Margham Publications, 2016

References:

1. Francis Chrunilam, Business Environment, Himalaya Publications, 2012
1. K. Aswathappa, Essentials of Business Environment, Himalaya Publications, 2012
2. K. Aswathappa, Legal Environment of Business, Himalaya Publications, 2013
3. M. Adhikary, Economic Environment of Business, Sultan Chand Sons 2014

Web Resources

1. <http://www.wikipedia.org>
2. <http://www.allbusiness.com>
3. <http://www.ehow.com>
4. <http://www.quickmba.com>
5. <http://www.businessballs.com>
6. <http://www.goidirectory.gov.in>

Elective - I: Paper - I: Consumer Behaviour

Semester – V

6 Hours

Code:

4 Credits

Objectives:

- To impart to the students an understanding the importance of consumer behaviour in marketing, its models and influence
- To equip the learners in various influence of consumer behaviour

Methodology:

- Lectures, Case studies, field based mini projects, individual and group presentation on the given assignment.

Unit - I: Introduction

Concepts – Characteristics – Significance – Dimensions of consumer behaviour – Factors – Application of knowledge of consumer behaviour in marketing decisions – Industrial buying behaviour – Process – types – difference.

Unit - II: Consumer Behaviour Models

Individual consumer behaviour models: Black box model – John Howard Model – Elements – Decision states – Howard Sheth Model – Variables – Engel-Kollat-Blackwell Model – Steps – Nicosia Model – Elements. Industrial Consumer Behaviour Models: Sheth Model –

Aspects – Webster and Wind Model – Variables.

Unit - III: Internal Influences

Psychological influences on consumer behaviour – **Motivation** – Process – Theories – **Perception** - Features – Components – Factors – Process – **Learning** – Characteristics – Elements – **Attitude** – Nature – Functions – **Personality** – Nature – Significance – Influence.

Unit - IV: External Influences

Socio-Cultural Influences on Consumer Behaviour – Culture – Meaning – Characteristics – Factors – Subculture – Types – Cross Culture – Values – Social Class – Features – Social Stratification – Group – Nature – Types – Family – Types – Characteristics – Reference Group – Types – Communication – Process – Influence – Designing effective Communication.

Unit - V: Purchase Decision Process

High and low involvement – Pre-purchase and Post purchase behaviour – Online purchase decision process – Diffusion of Innovation – Managing Dissonance – Emerging issues – Case Studies.

Text Book:

1. Supriya Singh and Naina Agarwal, Consumer Behavior, Thakur Publications, 2011.

References:

1. L. Venugopal Reddy, C N. Krishna Naik, Consumer Behaviour, Discovery Publishing House, 1999.
2. Jay D. Lindquist and Joseph Sirgy, Shopper, Buyer and Consumer Behaviour, Biztranza, 2008.
3. Paul Peter et al., Consumer Behaviour and Marketing Strategy, Tata McGraw Hill, Indian, Edition, 7th Edition 2005.
4. Leon G. Schiffman and Leslie Lasar Kanuk, Consumer behaviour, Pearson, 2002.
5. Seth Mittal, Consumer Behaviour – A Managerial Perspective, Thomson Asia, 2003.

Web Resources:

1. www.iste.co.uk/index
2. www.icmrindia.org/casestudies/case_st...
3. www.researchandmarkets.com/reportinfo..
4. www.management-hub.com/marketing-cons
5. videos.najah.edu/sites/default/files/..

Elective – I: Paper II: Retail Management

Semester – V

6 Hours

Code:

4 Credits

Objectives:

- To impart to the students an understanding the importance of consumer behaviour in marketing, its models and influence.
- To equip the learners in various influence of consumer behavior.

Methodology:

Lectures, Case studies, field based mini projects, individual and group presentation on the given assignment.

Unit - I: Introduction to Retailing

Concept of retailing, Functions of retailing, Terms & Definition, Retail formats and types, Retailing Channels, Retail Industry in India, Importance of retailing, Scope of retailing.

Unit - II: The Retail Customer

Retail consumer behavior, Factors influencing the Retail consumer, Customer decision making process, Types of decision making, CRM. Retail Communication Mix, POP Displays, Merchandising.

Unit - III: Retail Market Segment

Market Segmentation, Targeting & Positioning, Kinds of Market and Dimensions of Segmentation. Retail Marketing Mix.

Unit - IV: Retailing Strategy

Importance of Retail locations, Types of retail locations, Retail Operations, Store administration, Inventory and Receipt Management, Customer service, Retail Pricing, Factors influencing retail price, Promotions Strategy.

Unit V: Retail Space Management:

Retail Space and Ambience Management, Store layout and Design, Visual Merchandising, Emerging trends in retailing: Changing nature of retailing, Organized retailing, Modern retail formats, E-tailing, Challenges faced by the retail sector.

Text Book:

1. Michael Barton and others, Retailing management, Tata Mcgraw Hill co. 2014

References:

1. Piyush Kumar Suiha and others, Managing Retailing,.Oxford University press. 2014
2. Andrew J. Newman and other, Retailing environment & operations, cengage learning Chennai, 2013
3. Nicholas Alexander, International Retailing, Oxford University press Chennai, 2013
4. KVS madaan,Fundamentals of Retailing, Tata Mcgraw Hill Co.,2014
5. Chetan Bajaj and others, Retail Management, Oxford University Press,2014
6. Neelesh Jani ,Retail Management, Global India Publications, New Delhi,2015
7. Sajai Gupta and GVR Preet Randhawa ,Retail Management,Atlantic publishers 2015

Web Resources:

1. www.retailingstrategy.com
2. www.retailspace management.com
3. www.retailing.com

Semester - V
Code:

6 Hours
3 Credits

Objectives:

- To understand the role of Service Marketing in the Society
- To make the students understand the uniqueness of Services Marketing
- To know about the Marketing of Services, Services sector contribution in the area of marketing

Methodology:

- Lectures, field projects, simulation exercise, group discussions

Unit - I: Introduction to Service Marketing

What is Service? – Service Management – How technology is leveraging customer service – The future of the services sector – Limitations in the growth in service industries – services in the modern economy – Goods Vs Services – Characteristics of Services – Classification of Services – The components of service – Categories in the decision making process

Unit - II: Marketing Mix in Services Marketing – I

Underlying concepts – The Product Life Cycle – New Services – Service Product Range – New Service Product Features – Failures – Success – Service Product Elimination – Characteristics of services and prices – Price Terminologies – Understanding the costs of service incurred by customers – Understanding Value – Establishing monetary Pricing Objectives – Pricing Strategy – Pricing and Marketing Strategy

Unit III – Marketing Mix in Services Marketing – II

Promotional Objectives – Difference in Promoting Services – Selection Criteria – Developing & Guidelines to improve the promotional mix – The role of Sales Promotion – Sales Promotion Tools – Direct Marketing – Public Relations – Placing or Distribution methods for services – People, Physical Evidence and Process

Unit - IV: Delivering Quality Services & Performance

The impact of service quality - Approaches to service quality – Dimensions of service quality – A model of service quality – Service gaps – Quality traps – Causes – How to improve service quality – Service quality information system – Measures for service monitoring and improvement – performance, monitoring and stabilizing procedure – Service performance metrics – Design and collection of right data – Monitoring service performance

Unit - V: Marketing of Services

Health & Hospital Service – Tourism Service – Professional or Consultancy Services – Telecommunication services – Roadways – Railways – Postal and courier – Education – International marketing services – Event Management

Text Book:

1. Dr. L. Natarajan, Services marketing, Margham Publications, 2016

References:

1. Dr. B. Balaji, Services Marketing, S. Chand, 2016
2. Gurdev Singh Thankur & Supreet Babnrath, Service Marketing, Kalyani, 2014
3. Christopher H. Lovelock, Joehn Wirtz, Services Marketing, Pearson Education, 2013

Web Resources:

1. www.marketstrategies.com
2. www.practitionerstrategies.com
3. www.fsfinancialstrategies.com
4. www.learnmarketing.net/servicemarketi..
5. marketingteacher.com/lesson-store/les...

Subject Skill - I: Paper - I: Sales & Distribution Management

Semester – V
Code:

6 Hours
4 Credits

Objective:

- The purpose of this paper is to acquaint the student with the concepts which are helpful in developing a sound sales and distribution policy and in organising and managing sales force and marketing channels.

Methodology:

- Lectures, Case studies, Application exercises, Group or Class learning activities, Experiential Exercises

Unit - I: Nature and Scope

Nature and scope of Sales Management; Setting and Formulating Personnel; Developing and Conducting Sales Training Programmes; Designing and Administering Compensation Plans.

Unit - II: Sales Personnel

Supervision of Salesmen; Motivating Sales Personnel; Sales Meetings and Sales Contests; Designing Territories and Allocating Sales Efforts; Objectives and Quotes for Sales Personnel

Unit - III: Sales Evaluation

Developing and Managing Sales Evaluation Programme; Sales Cost and Cost Analysis. An overview of Marketing Channels, their structure, Functions and Relationships.

Unit - IV: Channel Intermediaries

Channel Intermediaries – Wholesaling and Retailing; Logistics of Distribution; Channel Planning Organizational Patterns in Marketing Channels; Managing Marketing Channels; Marketing Channel Policies and Legal Issues.

Unit - V: Information System

Information System and Channel Management, Assessing Performance of Marketing Channels including sales force; International Marketing Channels

Text book:

1. Krishna K. Havaldar and Vasant M Cavale, Sales and Distribution Management - Tata Mcgraw Hill. 2014

References:

1. Bill DONALDSON, Sales Management, principles, process and practice, Palgrave macmillan 2012
2. Pingalivenugopal, Sales and Distribution management, An Indian perspective sage, 2013

3. Basics of Distribution Management A logistical approach, By Satish. K Kapoor and Purvakansal, PHI learning PVT Ltd.,
4. Kujnish Vashisht , A practical Approach to Sales Management, Atlantic publishers, 2013
5. Joseph F Hair and others, Sales Management, India Edition, Cengage learning. 2014
6. CL Tyagi and Arunkumar, Sales Management , Atlantic publishers.

Web Resources:

1. www.channelintermediaries.com
2. www.wholesale.com
3. www.retailing.com
4. www.informationssystem.com
5. www.internationalmarketingchannels.com

Subject Skill - I: Paper - II: Export Management

Semester – V

6 Hours

Code:

4 Credits

Objectives:

1. To make the students well aware about the formalities associated with export trade.
2. To make the students aware of the external environmental factors having a bearing on the export trade.
3. To make the students aware of the export stimulation efforts of the government and the opportunities available to exporters to make good business.

Methodology:

- Lectures, Case studies, Application exercises, Group or Class learning activities, Experiential Exercises.

Unit - I: Exports

Exports- Meaning, scope and difference between export and domestic trade; Difficulties in export trade- fishing in turbulent waters - Impact of external and internal environment on export trade; Identifying and selecting foreign markets- modes of entering foreign markets.

Unit - II: Product Planning

Product planning for exports; Product designing - standardization Vs. Adoption; Export pricing; Factors influencing export price; Pricing process; Methods of pricing; International price quotations; Payment terms.

Unit - III: Promotion of Products

Promotion of product for export; Methods of international promotion; Direct mail and sales literature; Advertising, personnel selling; Trade fairs and exhibitions. Branding and packaging; Labelling; Quality issues; After sales services. Distribution channels and logistics decisions for export trade; Selection and appointment of foreign sales agents.

Unit - IV: Export Policy

Export policy and practices in India; EXIM Policy; Legislative framework regarding exports- Customs Act, FERA and FEMA; Trends in India's foreign trade; EXIM Bank; Measures for Export promotion and incentives offered for exports by the government of India- EPZs, EOUs, and FTZs.

Unit - V: Export Documents

Export documentation; Export procedure; Free Trade Agreements negotiated by India; WTO and its impact on India's agriculture and textiles trade; TRIPs and TRIMs

Text Book:

1. Dr Francis Cherunilam, International Trade and Export Management Himalaya Publications (Students Edition, Edition No. 14), 2016

References:

1. RBI Annual Report and bulletins published by the RBI, 2016
2. The government of India website.
3. John E Ray, Managing Official Exports, Publisher: Peterson Institute
4. Eugene W Perry, Practical Export Trade Finance; ISBN: 1556230184. Publisher: Irwin Professional Publications; Published date: May 1 1989

Web Resources

1. www.indiandata.com
2. www.indianindustry.Com
3. www.thaitrade.Com
4. www.tradeindia.Com

Subject Skill - I: Paper - III: Project Management**Semester – V****6 Hours****Code:****4 Credits**

Objective:

- The purpose of this paper is to acquaint the student with the concepts which are helpful in developing a projects

Methodology:

- Lectures, Case studies, Application exercises, Group or Class learning activities, Experiential Exercises

Unit – I: Concepts of Project Management

Concepts of project management -concept of a project categories of projects - project life - cycle phases - project management concepts - tools and techniques for project management. The project manager - roles and responsibilities of project manager.

Unit – II: Project Formulation

Project formulation - formulation stages - bottlenecks - feasibility report - financing arrangements - finalization of project implementation schedule.

Unit – III: Administrative Agencies

Administrative agencies for project approval Ministry of Finance - Bureau of public enterprises planning commission public investment board - Organizing human resources and contracting - delegation project manager's authority - project organization - accountability in project execution - contracts - 'R' of contracting - tendering and selection of contractors - team building.

Unit – IV: Procedures

Organizing systems and procedures - working of systems - design of systems - project work system' design - work break down structure - project execution plan -project procedure

manual project control system - planning scheduling and monitoring - monitoring contracts and project diary.

Unit – V: Project Implementation

Project implementation stages project direction - communications in a project - coordination guidelines for effective implementation reporting in project management - project evaluation and its objectives, types and methods.

Text Book:

1. Choudhary , Project Management Tata McGraw Hill Pub, 2016

References:

1. Clifford F Gray, Project Management: The Managerial Process (Special Indian Edit.), Oregon State University, 2014
2. Chandra, Prasanna, Projects: Planning, Analysis, Selection, Financing, implementation and Review. 2013

Web Resources:

1. www.projectlifecycle.com
2. www.administrativeagenceministryoffinance.com
3. www.projectimplementation.com

Self-Study Paper - I: Brand and Product Management

Semester – V

Code:

1 Credit

Objective:

- To impart in depth knowledge to the students regarding the theory and practice of Brand and Product Management

Learning Outcome:

- To successfully establish and sustain brand and lead to extensions

Unit - I: Basic Concepts of Product Management

Understanding brands – Characteristics of branding and practices, Brand Manager concept and organization product management.

Unit - II: Branding

Assessment of Brands through research – Brand identity, Brand personality, Brand Image. Brand Identity, Brand Positioning, Brand Equity, Value addition from Branding – Brand – Customer Relationships, Brand Loyalty and Customer loyalty.

Unit - III: Managing Brands

Managing brands, Brand Creation, Brand Extensions, Brand product relationships, Important factors in conception and various stages of growth and maturity of brands.

Unit - IV: Product Analysis

Brand Portfolio, brands going international, brand revitalization, brand repositioning, financial aspects of brands, branding in different sectors, customer, industrial, retail and service brands.

Unit - V: New Product Development

New product development and launching, managing development risk, product portfolio management, incremental and radical innovation, product leadership, power brands, emerging trends in brand and product management.

Text Book:

1. Aaker David, A Managing Brand Equity, New York Free press, 1st Edition 1991

References:

1. C. Merle Crawford, C. Anthony Di Benedetto, New Products Management, McGraw Hill/ Irwing 2004
2. Cowley, Don Understanding Brands, London
3. Kapfere, J. N. Strategic Brand Management, New York Free Press
4. Linda Gorchels, The product manager's Handbook, McGraw Hill
5. YLR. Moorthi, Brand Management – The Indian context, Vikas Publishing House

Web Resources:

1. www.branding.com
2. www.newproductdevelopment.com

Self-Study Paper - II: Integrated Marketing Communication

Semester – V

Code:

1 Credit

Objective:

- Understand the basic aspects of Advertisement & Sales Promotion

Learning Outcome:

- Knowledge about Advertisement, Media, Execution of Advertisement, Sales Promotion, Campaign etc

Unit - I: Introduction to Advertisement

Introduction to Advertisement: Concept and definition of advertisement – Social, Economic and Legal Implications of advertisements – setting advertisement objectives – Advertisement Agencies – Selection and remuneration – Advertisement campaigns.

Unit - II: Advertisement Media

Advertisement Media: Media plan – Type and choice criteria – Reach and frequency of advertisements – Cost of advertisements - related to sales – Media strategy and scheduling.

Unit - III: Design and Execution of Advertisement

Design and Execution of Advertisement: Message development – Different types of advertisements – Layout – Design appeal – Copy structure – Advertisement production – Print – Radio - Television and Web advertisements – Media Research – Testing validity and Reliability of ads – Measuring impact of advertisements.

Unit - IV: Introduction to Sales Promotion

Introduction to Sales Promotion: Scope and role of sale promotion – Definition – Objectives of sales promotion - sales promotion techniques – Trade oriented and consumer oriented.

Unit - V: Sales Promotion Campaign

Sales Promotion Campaign: Sales promotion – Requirement identification – Designing of sales promotion campaign – Involvement of salesmen and dealers – Out sourcing sales promotion national and international promotion strategies – Integrated promotion – Coordination within the various promotion techniques – Online sales promotions.

Text Book:

1. Saravanavel & Sumathi, Advertising & Sales Promotion, Margham Publications, 2009
2. Wells, Moriarty & Burnett, Advertising, Principles & Practices, Pearson Education, 2007

References:

1. S. H. H. Kazmi and Satish K Batra, Advertising & Sales Promotion, Excel Books, New Delhi, 2001.
2. George E Belch and Michel A Belch, Advertising & Promotion, McGraw Hill, Singapore, 1998.
3. Julian Cummings, Sales Promotion, Kogan Page, London 1998.
4. E. Betch and Michael, Advertising and Promotion, McGraw Hill, 2003.
5. Jaishri Jethwaney, Advertising Management, Oxford, 2008.

Web Resources:

1. www.advertisingage.com
2. www.Internetretailer.com
3. www.promomaganine.com
4. www.businessweek.com
5. www.addage.com
6. www.ama.org
7. www.emarketer.com

Non Major Elective – Paper I - Management Concepts

Semester – V

2 Hours

Code:

1 Credit

Objective:

- To expose the students to the concepts of Business Management

Unit - I: Introduction

Management – Definition – Importance – Role and Function of a Manager – Contribution of Fayol, Taylor, Elton Mayo and Drucker only

Unit - II: Planning

Planning – Nature – Purpose – Steps – Types – Merits and Demerits of Planning – MBO – Decision Making- Definition – Steps only

Unit - III: Organizing

Organizing – Purpose – Formal and Informal Organization – Authority and Responsibility - Departmentation – Span of Control – Delegation – Centralization and Decentralization

Unit - IV: Directing

Direction – Leadership – Definition – Types – Qualities – Importance -Motivation – Definition – Types – Theories (Maslow & Herzberg Only) – Communication – Definition – Process - Barriers

Unit - V: Controlling

Controlling – Concept of Control – Methods of Control – Co-ordination – Need – Principles – Approaches to achieve effective Co-ordination

Text Book:

1. Jayashankar, Principles of Management, Prassana Publications. 2012

References:

1. Koontz & Weirich, “Essentials of Management: An International perspective”, 8th Edn. Tata McGraw-Hill, New Delhi, 2009.
2. Koontz H. “Essentials of Management 5E, Tata McGraw-Hill, New Delhi, 1994.
3. Stephen P. Robbins & David A. Decenzo, “Fundamentals of Management”, Pearson Education, New Delhi, 3rd Edn. 2001
4. L.M. Prasad, Principles of Management, Sultan Chand Publications, 2007
5. Dinkar Pagare, Business Management, Sultan Chand Publications, 2003

Web Resources

1. www.shrm.org
2. www.shrmindia.org
3. www.ipma-hr.org
4. www.ahrd.org

Paper - XXI: Strategic Management

Semester – VI

6 Hours

Code:

5 Credits

Objective:

- This course is to help students to integrate their knowledge of the functional areas of business into a holistic view of the firm and thereby determine and execute proper business level and corporate strategies

Methodology:

- Lectures, Case studies, field based mini projects, individual and group presentation on the given assignment.
-

Unit - I: Conceptual Framework

Evolution of strategic management and business policy – Understanding Strategy – Levels – Strategic Decision-Making – Issues – Introduction to Strategic management – Definition – Phases – Elements - Model.

Unit - II: Strategic Intent

Concepts of Stretch, Leverage and Fit – Vision – Nature – Definition – Benefits – Process-Mission – Definition – How mission statements are formulated - Characteristics of a mission – Business Definition – Goals and objectives – Role of Objectives – Characteristics – Issues.

Unit - III: Corporate Level Strategies – I

Growth Strategies – Concentration Strategies – Integration Strategies – Diversification Strategies – Cooperation Strategies (Strategic Alliances, Joint Ventures, Merger, Acquisition) – Stability Strategies – Types.

Unit - IV: Corporate Level Strategies – II

Retrenchment Strategies – Turnaround Strategy – Corporate Restructuring – Divestment Strategy – Liquidation Strategy – Combination Strategies – Guidelines for situation when particular strategies are most effective.

Unit - V: Strategic Evaluation and Control

Concept – Nature – Need – Participants – Role – Barriers – Concept and types of Strategic Control – Concept and Process of operational Control – Techniques for strategic control – How to make strategic control effective – Rumeli's criteria for evaluation and control – Tilles' criteria for evaluation and control – Strategic Audit.

Text Book:

1. Strategic Management and Business Policy, Azhar Kazmi, McGraw Hill, 2008. Strategic Management, Dr.C.B.Gupta, S.Chand & Company Pvt.Ltd.,2014

References:

1. Fred.R.David, Strategic Management and Cases, PHI Learning, 2008.
2. Upendra Hachru, Strategic Management Concepts & Cases, Excel Books, 2006.
3. Saloner and Shepard, Podolny, Strategic Management, John Wiley, 2001
4. Lawrence G. Hrebiniak, Making strategy work, Pearson, 2005

Web Resources:

1. www.businessweek.com,
2. www.foxnes.com,
3. www.atimes.com,
4. www.brandweek.com

Paper - XXII: Entrepreneurial Development

Semester – VI

4 Hours

Code:

5 Credits

Objectives:

- To introduce basis of Entrepreneurship
- To familiar with concepts and process of Entrepreneurship

Methodology:

- Lectures, Case studies, Application exercises, Group or Class learning activities, Experiential Exercises, Visit to the factories

Unit - I: Conceptual Frame Works

Entrepreneur- Evolution – Definition – Entrepreneur and enterprise – Entrepreneur and managers – Intrapreneurs – Qualities of entrepreneurs – Types and functions of entrepreneurs – Role of entrepreneurs in economic development – Entrepreneurship – Nature – Characteristics - Barriers – Behavioral pattern affecting entrepreneurship – Entrepreneurial Process – Challenges.

Unit - II: Institutions Assisting Entrepreneurs & Creation of Business

DIC – SIDO – NSIC – SIDCO – SISI – SIPCOT – ITCOT – NIESBUD – NAYE – commercial banks – Self Help Groups – Micro Credit – Institutional Finance System. Creation of Business ideas – Idea generation methods – Creative Problem Solving – Legal Consideration.

Unit - III: Project Appraisal

Meaning of Project – Objectives - Classification – Identification – Internal and external constraints – Techno Economic Survey – Project Life Cycle – Formulation and significance – Elements of Formulation – Project Selection – Design – Basic concepts of Network Analysis – CPM – PERT.

Unit - IV: Women Entrepreneurs in India & Project Formulation:

Prospects - problems in Women development – role of self help group towards women empowerment - Project identification and formulation – Business Plan – Marketing Plan – Financial Plan – Organizational Plan.

Unit - V: International Entrepreneurship

International Entrepreneurship – Entrepreneurial partnering – Types – International Trade Protectionism – Trade Blocks – GATT, WTO.

Text Book:

1. R.V. Bedi and N.V. Bedi, Entrepreneurship, Vrinda Publications, 2014

References:

1. P. Saravanavel, Entrepreneurial Development, Esspee Kay Publications, 2016
2. Jayshree Suresh, Entrepreneurial Development, Margam Publications, 2016
3. S.S. Khanka, Entrepreneurial Development, S. Chand, 2015
4. Dr. Vasant Desai, Small Scale and Industries and Entrepreneurship, Himalaya Publishing, 2012

Web Resources:

1. www.ediindia.org
2. www.enterweb.org/entrship.htm
3. www.bdu.ac.in/skillbased/etd.pdf
4. wikieducator.org
5. www.suite101.com/content/entrepreneur

Elective - II: Paper - IV: Financial Services

Semester – VI

Code:

6 Hours

3 Credits

Objectives:

- To understand the role of financial institutions and Stock exchanges
- To know about the general understandings of Financial Institutions

Methodology:

- Lectures, field projects, simulation exercise, group discussions

Unit - I: Indian Financial System

Indian Financial system – financial system and economic development -Banks as financial intermediaries – Need or Importance of Capital Market – Classification of Capital Market in India

Unit - II: NBF

Non – Banking financial intermediaries – Unit trust of India – Mutual Funds – Hire Purchase Finance Companies – Lease Finance Companies – National Housing Bank – Housing Development Finance Corporation – Housing Urban Development Corporation Functions and Services.

Unit - III: Financial Institutions:

Special financial institutions –IDBI, ICICI, IFCI – EXIM Bank – SFCS -SIDCS – functions and services.

Unit - IV: NSE

National Stock Exchange (NSE) – OTCEI – SEBI – Powers and function – Discount and Finance House of India (DFHI) – Organizational Structure of Stock Exchanges in India – Growth of Stock Exchanges in India – Present Position of Stock Markets in India – Need to control stock exchanges – Steps taken by Government for promoting capital market in India..

Unit - V: Merchant Banking

CRISIL - Debentures – Shares – Underwriting of Shares - Bonds - Merchant banking – functions and services underwriting – credit rating agencies in India.

Text Book:

1. B. Santhanam, Banking and Financial System, Margham Publications
2. Gorden and Natarajan, Financial Institution and Services, HPH.

References:

1. Bhole L.M. Financial Institutions and Market, TMH.
2. Avadhani V.A., Investment and Securities markets in India, HPH.
3. KulKarni P.V., Corporate Finance –HPH
4. Khan M.Y. Financial Services, TMH.
5. Bhatia & Batra, Management of financial services, Deep & Deep

Web Resources:

1. www.NSE.com
2. www.idbi.com
3. www.icici.com
4. www.merchantbanking.com
5. www.icici.com
6. www.ifci.com

Elective - II: Paper - V: Logistics & Supply Chain Management

Semester – VI

6 Hours

Code:

3 Credits

Objectives:

- To understand the role of logistic and supply chain management in the modern society
- To make the students understand the uniqueness of logistic and supply chain management
- To know about the general understandings of Logistic and supply chain management

Methodology:

- Lectures, field projects, simulation exercise, group discussions

Unit - I: Logistics Management

Logistics Design – Logistics Management – Definition – Meaning - Types - Transportation – Inventory – Warehousing – Material Handling and Packaging – Organizational Structures.

Unit - II: Logistics Network

Logistics Network – Logistics Resources – Principles of Logistics Information – Application of Information Technologies – Barcode – Scanning.

Unit - III: Logistics Demand

Logistics Demand – Forecasting – The Nature of Demand – Forecast Components – Forecast Technique – Forecast Error - Logistics Location Structure.

Unit - IV: Supply Chain Management Models

Supply Chain Management Models – Definition – Objectives –Applications – Types – Conceptual Models – Key issues in supply chain management.

Unit - V: Supply Chain Management Strategy

Supply Chain Management Strategy – Inventory Management – Push and Pull Systems – Demand and cash flow in supply chain management – Enterprise Resource Planning (ERP) – Supply chain management matrix.

Text Books:

1. Donald J. Bolversox and Daavis J. Closs, Logistics Management. The integrated supply chain process Tata McGraw Hill, 2006.
2. David Simchi – Levi, Philip Kaminsky and Edith Simchi – levi, Designing and managing the supply chain concepts, strategies and case, 2nd Edition, Tata McGraw Hill, 2006
3. David A. Taylor, Supply chain – A Manager’s Guide, Pearson Education, 2006.

References:

1. Rahul, V. Altekar, Supply chain Management, Concepts & Cases, PHI learning, 2006.
2. Ailawadi, Rakesh Singh, Logistics Management, PHI Learning 2006.
3. Donald Waters, Palgrake, Logistics. An introduction to supply chain management, Macmillan, 2006.
4. Sarika Kulkarni, Ashok Sharma, Supply Chain Management, Tata McGraw Hill Publishing Company 2004.
5. Harold Dyckhoff, Springer, Supply Chain Management and Reverse Logistics, International Edition, 2004

Web Resources

1. www.logisticsmanagement.com
2. www.modelsof supplychainmanagement.com
3. www.logisticsforecasting.com

Elective - II: Paper - VI: Total Quality Management

Semester – VI

6 Hours

Code:

3 Credits

Objective:

- The objective of this course is to cover not only Quality Management concepts, but also to give students an understanding of the tools necessary to solve Quality management problems.

Methodology

- Power Point Presentation, Participative type classes, case study, Assignments , test. Subject quiz, Factory visit and field study, seminar, Game, Subject Video presentation and Illustrative exercise

Unit - I: Basic Concepts

Basic Concept of Total Quality – Evolution of Total Quality Management – Cost of Quality – Quality Productivity – Components of Total Quality Loop

Unit - II: Statistical Quality Control and Inspection

Conceptual Approach to SQC – Acceptance Sampling and Inspection Plans – Statistical Process Control – Prevention through Process Improvement.

Unit - III: Process Capability

Process Capability Studies – Humanistic Aspects of TQM – Management of Quality Circle and ZD Programmes.

Unit - IV: Just in Time

KANBANQ - 7 Tools – Taguchi Loss Function –Failure Analysis – Just in Time – JIT Pull System – JIT Purchase.

Unit - V: Total Productive Maintenance

Optimum Maintenance Decisions – Total Productive Maintenance – Process Design – Buyer Seller Relations – Supply Chain Management

Text Books:

1. Subburaj, Total Quality Management, Tata mcgraw hill, 2006.
2. Shridhara Bhat, Total Quality Management, Himalaya Publishing house, 2006.

References:

1. Ansari.A and Modarress, JIT purchasing, Free press, Newyork.
2. Sandeepa Malhotra, Quality Management planning, Deep & Deep, 2006

Web Resources

1. www.JIT.com
 2. www.tqm.com
 3. www.kanbanq.com
 4. www.supplychainmanagement.com
-

Subject Skill - II: Paper - IV: Training & Development

Semester – VI

6 Hours

Objective:

- The purpose of this paper is to provide an in-depth understanding of the role of Training in the HRD, and to enable the course participants to manage the Training systems and processes.

Methodology:

- Part of Part Time Study
-

Unit - I: Introduction

Process of Development of HRM Function – HRD Concepts – Training – Education – Development – Objectives of HRD – Role and Significance of HRD – Structure of HRD system – Definition and purpose of training – Need – Classification of Training Program.

Unit - II: Personality Development through Training

Definition and Concepts – Characteristics of Personality – Personality Types – Personality Opposites – Personality Inventories – Personality Development – Measurement of Personality Traits – Aspects of Emotional Intelligence – Personality assessment.

Unit - III: Competency-Based T&D

Skill and Competency – Competency Mapping – Competency mapping process – Process of Competency Mapping – Steps of a Competency Identification Process – Steps to Introduce a Competency-based system – Advantages.

Unit - IV: Training Need Analysis

Sources for Identifying Training Needs – Benefits of need assessment – Levels – Process – Purpose – Steps – Types – Techniques.

Unit V –Designing Training Programmes

How to Design Training – Models of Training – Training Design and work environment - Training Design Template.

Text Book:

1. Dipak Kumar Bhattacharyya, Training and Development, Theories and Applications, 2015

References:

1. Rolf Lynton, Udai Pareek: Training for Development, New Delhi, Sage Publications
2. Raymond Andrew Noe: Employee Training & Development, India (P) Ltd., 1990 New Delhi, Tata McGraw
3. Rao PL: HRD through In-House Training, New Delhi, Vikas Publishing House (P) Ltd.,
4. Reid M.A.: Training Interventions: managing Employee Development London, IPM, 3rd ed., 1992.

Web Resources:

1. strategichrinc.com/services/training-development/

2. www.businessdictionary.com/definition/training-and-development.html
3. hrcouncil.ca › Resource Centre › HR Toolkit › Learning, Training & Development
4. www.inc.com/encyclopedia/training-and-development.html

Subject Skill - II: Paper - V: Customer Relationship Management

Semester – VI

6 Hours

Code:

4 Credits

Objective:

- The objective of this course is to enable the students to understand the importance of satisfying the customer in today's competitive world

Methodology:

- Case Study, Tutor class, Lecture, Group discussion etc

Unit – I: Introduction

CRM – Introduction – Definition – Need for CRM – Complementary Layers of CRM – Customer Satisfaction – Customer Loyalty - Product Marketing – Direct Marketing.

Unit – II: Customer Learning Relationships

Customer Learning Relationship – Key Stages of CRM – Forces Driving CRM – Benefits of CRM – Growth of CRM Market in India – Key Principles of CRM.

Unit – III: CRM Program

CRM Program – Groundwork for Effective use of CRM – Information Requirement for an Effective use of CRM – Components of CRM – Types of CRM

Unit – IV: CRM Process

CRM Process Framework – Governance Process – Performance Evaluation Process.

Unit – V: Technology in CRM

Use of Technology in CRM – Call Center Process – CRM Technology Tools – Implementation – Requirements Analysis – Selection of CRM Package – Reasons and Failure of CRM

Text books:

1. Customer relationship management, K.Balasubramaniyan, GIGO publication, 2005.
2. The essentials guide to knowledge management – E-business and CRM application, Amrit tiwana, Pearson education, 2001.

References:

1. E-business –Roadmap for success, Dr.Ravi Kalakota, Pearson education asia, 2000.
2. Business –The Dell way, Rebecca saunders, India book distributors, 2000.

Web Resources

1. www.crmprocess.org
2. www.customerlearningrelationship.com

Subject Skill - II: Paper - VI: Business to Business Marketing

Semester – VI

6 Hours

Code:

4 Credits

Objective:

- The Course attempts to expose the various concepts of Industrial marketing to students who have had a foundation course in marketing. This would enable the students to become familiar with the peculiarities of Industrial marketing and be able to apply the concepts and practices Industrial marketing to real life situations.

Methodology:

- Lectures, Case studies, Application exercises, Group or Class learning activities, Experiential Exercises.
-

Unit - I: Introduction

Introduction to Industrial marketing – Industrial Marketing Operations.

Unit - II: Segmentation of Marketing

Segmentation in Industrial Marketing, Demand concepts for Industrial products, Industrial Marketing Research, Industrial Buyer Behaviour.

Unit - III: Product Management

Product Management – Product line planning – New Product development strategy.

Unit - IV: Pricing

Pricing, Distribution, Advertising and Sales Promotion of Industrial Products.

Unit - V: Marketing Strategy

Marketing strategy for Industrial Firms – Product Market Management – Developing & Evaluating Strategies – Effective implementation of Strategies – Case Studies.

Text books:

1. Industrial Marketing Management M. Govindarajan, Vikas publishing House PVT Ltd., 2014
2. Industrial Marketing by MILIND T. Phadtare - PHI learning PVT Ltd, 2014

Web Resources:

1. www.industrialmarketing.com
 2. www.segmentationinindustrialmarketing.com
 3. www.productmanagement.com
 4. www.pricing
-

Self-Study Paper – II: Business Communication

Semester – VI

Code:

1 Credit

Objective:

- Understand the critical and important role of Business Letters

Learning Outcome:

- Knowledge about Trade Letter, Export Letter, Letters of Application and Report Writing

Unit - I: Introduction

Communication in Business – Meaning and Importance – Essentials of Effective Business, Types of Communication – Oral and Written Communication – Principles of effective communication –Types of Letter – Structure, Physical Appearance, Kinds of Business Letters

Unit - II: Trade Letters

Trade Letters – Enquires – Offers – Quotations – Orders – Confirmation – Execution – Refusal and Cancellation of an order, Acknowledging the Receipt of Goods and Payments – Claims – Complaints and Adjustments – Collection Letters – Circular Letters

Unit - III: Export and Import Letters

Letters relating to Export and Import – Agency Correspondence – Opening of an account, Payment of Insurance Premium, Request for a Loan and Overdraft – Dishonor of Cheque – Letter of Credit.

Unit - IV: Letters of Application

Letters of Application – Application for a situation – Status Enquires and Recommendations, Appointment Letter.

Unit - V: Report Writing

Report Writing: Meaning, Importance, Characteristics of a Good Reports by Individuals and committees, Drafting of Report for Press, E-Mail, Cell Phones, Pagers, Video Conferencing and Internet.

Text Book:

1. Radha Katherisan, Business Communication, Prassana Publications, 2011

References:

1. L. Gartside, Modern Business Correspondence, Macdonald & Evans Ltd, 2002
2. Ramesh and Pattenshetty, Business English and Correspondence, S. Chand & Co, 2002
3. A.N. Kapoor, Business Communication, S. Chand & Co Ltd, 2004
4. R. Sandhanam, Business Communication, Margham Publications, 2009
5. Locker & Stephen, Business communication, Building critical skills, Tata mcgraw Hill, 2000
6. Asha Kaul, Business Communication, PHI Learning Private Limited

Web Resources:

1. www.Anebooks.com
2. www.ddpbooks.com

Self-Study Paper – II: Event Management

Semester – VI

Code:

1 Credit

Objectives:

- To enable the students to understand the essentials of planning an event
- To study the concept and significance of event management

Learning Outcome:

- Knowledge about organizing the event

Unit - I: Introduction

Introduction to Event Management: Concepts – Nature – Scope – Evolution of professional event management – Significance and components of events – Staffing and managing event business – Event Co-ordination.

Unit - II: Conceptualizing and designing event:

Key Elements of event s- Activities in event management – Planning – Organizing – Staffing – Leading – Coordination – Controlling – Event Management Information System.

Unit - III: Event Production

Staging an event – Choosing the event site – Developing the theme – Conducting rehearsals – Providing Services – Arranging catering – Inter Personal skills and public relations – Necessity of human resource management and human relationships.

Unit - IV: Celebrity Management

Corporate event management, Experiential Marketing, Event Marketing, Finance Management in Events, statutory requirements for events, safety and security in event.

Unit - V: Evaluation of Event Performance

Basic Evaluation process – measuring performance – formative evaluation – Objective evaluation- Summative evaluation – correcting deviations – critical evaluation points – Event management industry: India / International / Present and Future.

Text Book

1. Sanjaya Singh Gaur & Sanjay V. Saggere , Event Marketing and Management, Himalayas Publications, 2015

References:

1. Sanjay sing, Event Management, Himalayas Publications, 2014
2. Supriya, Event Management, Tahur Publications, 2013

Web Resources:

1. www.eventmanagement.com
2. www.eventperformance.com

Non Major Elective: Paper - II: Organizational Behaviour**Semester – VI****2 Hours****Code:****1 Credit**

Objective

- To establish knowledge in the areas of Personality, Perception and attitudes.

Methodology:

- Lectures, Case studies, Application exercises, Group or Class learning activities, Experiential Exercises.

Unit - I: Introduction

Definition – Foundation of Individual Behaviour – Models of Organizational Behavior – Personality – Types and Theories of Personality – Perception – Perception Process – Factors affecting Perception – Perception and its application in Organizational Behavior.

Unit - II: Learning & Motivation

Learning, Values and Attitudes - Motivation – Contribution of Maslow, Herzberg, McClelland, McGregor – Motivational Techniques.

Unit - III: Groups

Group Dynamics – Functions of Formal, Informal Groups – Types – Group Decision Making.

Unit - IV: Organizational Climate and Development

Organizational Climate – Organizational Development – Need – Steps – Business Ethics.

Unit - V – Organizational Conflict

Organizational Conflict – Causes, Types, Management of Conflict

Text Book:

1. Jayasankar, Organizational Behaviour, Margham Publications, 2011

References:

1. S.S. Khanka, Organizational Behaviour, S. Chand, 2008
2. Stephen P. Robins, Organizational Behaviour, PHI Learning / Pearson Education, 11th Editio, 2008
3. Fred Luthans, Organizational Behavior, McGraw Hill, 11th Edition, 2001
4. Schermerhon. Hunt and Osborn, Organizational Behaviour, John wiley, 9th Edition, 2008
5. Udai Pareek, Understanding Organizational Behaviour, 2nd Edition, Oxford Higher Education 2004

Web Resources:

1. www.obweb.org
 2. http://www.indianchild.com/organizational_behavior.htm
 3. www.obmnetwork.com
 4. <http://onlinelibrary.wiley.com/journal>
 5. http://www.elsevier.com/wps/find/journaldescription.cws_home/
 6. www.mbti.com
 7. www.humanmetrics.com
 8. <http://www.thinkingmanagers.com/>
 9. www.mindtools.com
 10. www.studygs.net
-

Certificate in NGO Management

Unit – I – Concepts and Functions of NGO

Introduction – What is an NGO? – Define NGO – Does the Government Recognize NGOs? – Kinds of NGO's Functioning in India – Working of NGOs – NGO Environment – Issues in NGO Management - Aid to Development – Poverty and Development – Poverty and Exploitation – Poverty and Powerlessness – Development Indicators .

Unit – II Problem Identification

Introduction – Problem Identification – Problems of NGOs – Strengthening Voluntary Efforts – Managing People – Governance – Governance and Management – Need for Good Governance for NGOs – Ethical Challenges – Leadership – Need for Leadership with values .

Unit – III Strategy and Planning

Elements of Strategy – Introduction – Understanding your organization – Organization Development- Strategy and Planning – Strategy in the Management World – Elements of a Strategic Plan – Core Values – Strategic Goals.

Unit – IV: SWOT Analysis

Introduction – SWOT analysis – Meaning of Strengths and Weakness – Alternative Formats to Analyze Strengths and Weaknesses – Matching Strength and Weaknesses– The concept of Synergy.

Unit - V: Process of Management & Reporting

Planning – Organizing – Staffing – Directing – Controlling – Coordinating - Introduction to Communications– General Guidelines in Preparing Reports – Procedure of Reporting – Stages in Reporting – Long Reports – Short Reports.

Reference Books

1. Abell, Derek F and John S. Hammond: Strategic Market Planning: Problems and Analytical Approaches, Prentice Hall, Englewood Cliffs: New Jersey
2. Peter Drucker: Tasks, Responsibilities, Practice, New York: Harper & Row
3. Ansoff, H Igor: Business Strategy, Penguin Books Limited, Harmondsworth
4. Porter, Michael E: Competitive Strategy: Techniques for Analyzing Industries and Competitors, The Free Press, A Division of Macmillan publishing Co

Certificate in Tourism Management

Unit - I

Definition of tourism and the need for tourism. The birth, growth and development of tourism - factors influencing growth of tourism - tourism in India and abroad.

Unit - II

Tourism - planning - need for planning - government's role in planning - tourism under five year plans. Tourism marketing - concepts and importance - marketing functions in tourism - tourist marketing mix.

Unit - III

Tourism and culture - tourism and people: tourism and economic development - tourism and growth of related industry, tourism and employment.

Unit - IV

Tourism pricing - methods of pricing - tourism promotion - advertising costs - steps in planning an advertising campaign -tourist publicity.

Unit-V

Tourism and government administrative systems - ministry of tourism - department of tourism -Indian tourism development corporation -world tourism organization -travel agents in India.

Reference Books

1. Tourism and hotel industry in India -Anand M.M.
2. Perspectives of Indian Tourism in India - Clib SN.
3. Successful tourism management - Pran Nath Seth.
4. The management of tourism - Bukart A J.
5. The social implications of tourism development - Butler R W

Question Paper Pattern
CIA: Max. Marks: 50 / 2 Hours

Section - A (15 x 1 = 15)

I. True or False: 5 x 1 = 5

- 1.
- 2.
- 3.
- 4.
- 5.

II. Fill up the Blanks - 5 x 1 = 5

- 6.
- 7.
- 8.
- 9.
- 10.

III Choose the Best Answer - 5 x 1 = 5

- 11.
- 12.
- 13.
- 14.
- 15.

Section - B (3 x 5 = 15)

16. (a) (Or) (b)
17. (a) (Or) (b)
18. (a) (Or) (b)

Section - C (Any TWO) 2 x 10 = 20)

- 19.
- 20.
- 21.

CA Components

| | | |
|--------------------|---|----------|
| CIA (2 test) | - | 20 Marks |
| Attendance | - | 5 Marks |
| Seminar/Assignment | - | 5 Marks |
| Total | | 30 Marks |

Question Paper Pattern
Semester: Max. Marks: 70 / 3 Hours

Section - A (10 x 2 = 20 Marks) Answer ALL the questions

Section - B (5 x 4 = 20 Marks) Either or Type of questions

Section - C (3 x 10 = 30 Marks) Answer ANY THREE questions from FIVE questions

Department of Commerce (Computer Application)
Restructured Academic Programme - CBCS
(To be introduced in 2017 –18)

| S.No | Subject Code | Subject Name | Hours | No. of Credits | CIA | SE | Total |
|-------------------|--------------|---|-----------|----------------|-----|----|-------|
| SEMESTER I | | | | | | | |
| 1 | | Part I Language I – Tamil I | 5 | 3 | 30 | 70 | 100 |
| 2 | | Part II General English I | 5 | 3 | 30 | 70 | 100 |
| | | Communicative English | | 1 | 30 | 70 | 100 |
| 3 | | Part III MC- Financial Accounting – I | 5 | 5 | 30 | 70 | 100 |
| 4 | | MC- Business Environment | 5 | 5 | 30 | 70 | 100 |
| 5 | | Allied: Office Automation | 4 | 3 | 30 | 70 | 100 |
| | | Practical –I Office Automation | 2 | 1 | 40 | 60 | 100 |
| 6 | | Part IV Personal Skills | 2 | 1 | 30 | 70 | 100 |
| 7 | | Christian Religion / Value Education - I | 2 | 1 | 30 | 70 | 100 |
| Total | | | 30 | 23 | | | |

| S.No | Subject Code | Subject Name | Hours | No. of Credits | CIA | SE | Total |
|--------------------|--------------|--|-----------|----------------|-----|----|-------|
| SEMESTER II | | | | | | | |
| 1 | | Part I Language II – Tamil II | 5 | 3 | 30 | 70 | 100 |
| 2 | | Part II General English II | 5 | 3 | 30 | 70 | 100 |
| | | Communicative English | | 1 | 30 | 70 | 100 |
| 3 | | Part III MC- Financial Accounting – II | 5 | 5 | 30 | 70 | 100 |
| 4 | | MC- Business Management | 5 | 5 | 30 | 70 | 100 |
| 5 | | Allied: Web Design Technology | 4 | 3 | 30 | 70 | 100 |
| | | Practical –II Web Design Technology | 2 | 1 | 40 | 60 | 100 |
| 6 | | Part IV Social Skills | 2 | 1 | 30 | 70 | 100 |
| 7 | | Christian Religion / Value Education - II | 2 | 1 | 30 | 70 | 100 |
| Total | | | 30 | 23 | | | |

| S.No | Subject Code | Subject Name | Hours | No. of Credits | CIA | SE | Total |
|---------------------|--------------|---|-----------|----------------|-----|----|-------|
| SEMESTER III | | | | | | | |
| 1 | | Part III MC- Principles of Marketing | 5 | 5 | 30 | 70 | 100 |
| 2 | | MC- Corporate Accounting – I | 5 | 5 | 30 | 70 | 100 |
| 3 | | MC- Modern Banking | 5 | 5 | 30 | 70 | 100 |
| 4 | | Allied: Object Oriented Programming Using C++ | 4 | 3 | 30 | 70 | 100 |
| | | Practical -III: Object Oriented Programming Using C++ | 2 | 1 | 40 | 60 | 100 |
| 5 | | Allied: Business Mathematics | 5 | 3 | 30 | 70 | 100 |
| 6 | | Part IV Employability Skills - I | 2 | 1 | 30 | 70 | 100 |
| 7 | | Human Rights | 2 | 1 | 30 | 70 | 100 |
| 8 | | Part VI Optional: Certificate Course – I Stock Market Operation | | 2# | | | |
| Total | | | 30 | 24 +2# | | | |

| S.No | Subject Code | Subject Name | Hours | No. of Credits | CIA | SE | Total |
|--------------------|--------------|---|-----------|----------------|-----|----|-------|
| SEMESTER IV | | | | | | | |
| 1 | | Part III MC- Mercantile Law | 5 | 5 | 30 | 70 | 100 |
| 2 | | MC- Corporate Accounting – II | 5 | 5 | 30 | 70 | 100 |
| 3 | | MC- Cost Accounting | 5 | 5 | 30 | 70 | 100 |
| 4 | | Allied: Windows Application using .NET | 4 | 3 | 30 | 70 | 100 |
| | | Practical -IV: Windows Application using .NET | 2 | 1 | 40 | 60 | 100 |
| 5 | | Allied: Business Statistics | 5 | 3 | 30 | 70 | 100 |
| 6 | | Part IV Employability skills - II | 2 | 1 | 30 | 70 | 100 |
| 7 | | Environmental Science | 2 | 1 | 30 | 70 | 100 |
| 8 | | Part V: Extension: DEEDS | - | 2 | | | |
| | | SHELTERS | - | 2 | | | |
| | | Part VI: Optional Certificate Course – II Tourism Marketing | | 2 # | | | |
| Total | | | 30 | 28 +2 # | | | |

| S.No | Subject Code | Subject Name | Hours | No. of Credits | CIA | SE | Total |
|-------------------|--------------|---|-----------|----------------|-----|----|-------|
| SEMESTER V | | | | | | | |
| 1 | | Part III MC- Web Programming Using PHP | 4 | 4 | 30 | 70 | 100 |
| | | MC- Practical -V: Web Programming Using PHP | 2 | 2 | 40 | 60 | 100 |
| 2 | | MC- Computer Organization and Architecture | 4 | 4 | 30 | 70 | 100 |
| 3 | | MC- Management Accounting | 6 | 5 | 30 | 70 | 100 |
| 4 | | Main Elective: I ME: 1.1 Income Tax Law and Practice - I | 6 | 5 | 30 | 70 | 100 |
| | | ME: 1.2 E-Commerce | | | | | |
| | | ME: 1.3 Auditing | | | | | |
| 5 | | Subject Skill: I SS: Entrepreneurial Development | 6 | 4 | 30 | 70 | 100 |
| 6 | | Self-Study Paper: I SSP: 1.1 Business Organisation 1.2 Office Administration | - | 1* | 30 | 70 | 100 |
| 7 | | Part III Non Major Elective: Basics of Accounting using computers (Tally) | 2 | 1 | 30 | 70 | 100 |
| Total | | | 30 | 25 + 1* | | | |

| S.No | Subject Code | Subject Name | Hours | No. of Credits | CIA | SE | Total |
|--------------------|--------------|--|------------|---------------------|-----|----|-------|
| SEMESTER VI | | | | | | | |
| 1 | | Part III MC- Computerized Accounting | 4 | 4 | 30 | 70 | 100 |
| | | MC- Practical -VI: Computerized Accounting | 2 | 2 | 40 | 60 | 100 |
| 2 | | MC- Mobile Applications | 4 | 4 | 30 | 70 | 100 |
| 3 | | MC- Financial Management | 6 | 5 | 30 | 70 | 100 |
| 4 | | Main Elective: II ME: Income Tax Law and Practice - II | 6 | 5 | 30 | 70 | 100 |
| | | ME: Investment Management | | | | | |
| | | ME: Company Law | | | | | |
| 5 | | Subject Skill: II SS: Human Resource Management | 6 | 4 | 30 | 70 | 100 |
| 6 | | Self-Study Paper: II 2.1. Customer Relationship Management 2.2. Sales Promotion | - | 1* | 30 | 70 | 100 |
| 7 | | Part III Non Major Elective: General Commercial Knowledge | 2 | 1 | 30 | 70 | 100 |
| Total | | | 30 | 25 + 1* | | | |
| Grand Total | | | 180 | 148+4+ 2 | | | |

Core: Management Accounting

Semester: V

Hours: 6

Subject Code:

Credit: 5

Objectives:

- To equip the students to interpret financial statements with specific tools of management accounting.
- To enable the students to have a thorough knowledge on the management accounting techniques in business decision making.

Unit – I: Management Accounting

Definition, Objectives - Functions – Advantages and limitations - Financial Statement Analysis - Comparative and Common Size Statements - Trend Percentages

Unit - II: Ratio Analysis

Definition - Significance and Limitations - Classification - Liquidity, Solvency, Turnover and Profitability Ratios - Computation of Ratios from Financial Statements - Preparation of Financial Statement from Ratios

Unit – III: Fund Flow and Cash Flow Analysis

Concept of Funds, Sources and Uses of Funds - Fund Flow Statement - Concept of Cash Flow - Cash Flow Statement as Per AS3

Unit – IV: Budget and Budgetary Control

Definition - Objectives - Essentials - Uses and Limitations - Preparation of Material Purchase, Production, Sales, Cash and Flexible Budget - Zero Base Budgeting

Unit - V: Capital Budgeting

Concepts - Nature - Advantages and Limitations - Pay Back Period, ARR, NPV, IRR and Present Value Index.

Text Book:

- T. S.Reddy & Hari Prasad Reddy - Management Accounting - Margham Publications, Chennai.2016

Reference Books:

1. S.N.Maheswari, Management Accounting, Sultan Chand & Sons, New Delhi.2008
2. Manmohan & Goyal, Management Accounting, Saithiya Bhavan, Agra.2006
3. R.S.N.Pillai & Bhagavathi, Management Accounting, S.Chand & Co. Ltd., New Delhi. 2004
4. S.P.Gupta, Management Accounting, Sultan Chand & Sons, New Delhi.2007

Main Elective – 11 Income Tax Law and Practice – I

Semester-V

Hours: 6

Subject Code:

Credit: 5

Objectives

- To enable the students to understand the basic provisions of Income Tax Law.
- To study the procedure on computation of Income under different heads.

Unit – I: Basics of Income Tax

Introduction to Income Tax Act – Definition: Assessment year, Previous year, Person, Assessee, Income, Gross Total Income, Total Income. Agricultural Income - Exempted Incomes - Residential Status of Assessee - Incidence of Tax

Unit – II: Assessment Procedure and Powers

Income Tax Authorities: General Powers of Income tax authorities and Meaning of Assessing Officer. Assessment: Due date, Prescribed Forms and PAN. Types of Assessment (Theory Only)

Unit – III: Income from Salaries

Income from Salaries: Definitions, Allowances, Perquisites, Profits-in-lieu of salary, Provident Fund and Deductions u/s 16 – Computation of Income from salary

Unit - IV: Income from Salaries (Retirement)

Gratuity – pension – Commuted Pension – Compensation on Voluntary Retirement Service – Encashment of Earned Leave – Computation of Taxable Salary (Retirement)

Unit – V: Income from House Property

Income from House Property: Meaning, Annual value, Exempted incomes and deductions. Let out Property – Self Occupied Property – Deemed to be let out property. Arrears of rent received – Realization of Unrealized rent – Computation of income from House property

Text Book:

- Mehrotra H.C, Income Tax Law and Practice with Tax Planning, Sahitya Bhawan Publications, New Delhi (Relevant new Editions)

Reference Books: (Relevant new Editions)

5. Singhanian, Vinod.K.Singhanian, Direct Taxes Law and Practice, Taxmann Publications, New Delhi.
6. Gaur. V.P and D.B. Narang, Income Tax Law and Practice, Kalyani Publications, New Delhi.
7. Murthy. A, Income Tax Law and Practice, Vijay Nicole Imprints Private Ltd, New Delhi.
8. Hari Prasad Reddy and Reddy T.S, Income Tax Law and Practice, Margham Publications, Chennai.

***Note:**

Kindly refer next immediate page for semester question paper pattern of Income Tax Law and Practice - I

***Question Paper Pattern for Income Tax Law and Practice – I**

Weightage of Marks:

- **Theory = 30 Percentage**
- **Problem = 70 Percentage**

The question paper shall have three sections with the Maximum of 70 marks for three hours with the following break-up.

Section – A Each question shall carry 2 Marks. (10x 2 = 20 Marks)

Section-A shall contain 10 short answer questions without choice drawn from all the units on the basis of minimum two from each unit.

- Second Unit: Theory Only
- Other Units: One theory from each unit and all other questions are problem oriented

Section – B Each question shall carry 4 Marks. (5 x 4 = 20 Marks)

Section- B shall contain 5 **either or** questions drawn from all the five units.

- Second Unit – Theory Only
- Other Units: Two questions in remaining units should have one theory question. All other questions are problem oriented.

Section – C Each Question shall carry 10 marks (3 x 10 = 30 Marks)

Section- C shall contain five question drawn one each from the five units.

- Second Unit: Theory Only
- Other Units: All questions are problem oriented.
- **Three questions out of five** are to be answered each carrying ten marks.

Main Elective: 1. 2 E- Commerce

Semester: V

Hours: 6

Subject Code:

Credit: 5

Objectives:

- To enable the student to become familiar with the mechanism for conducting business transactions through electronic means
- To impart knowledge regarding technological commerce

Unit – I: Introduction:

Meaning, nature, concepts, advantages, disadvantages and reasons for transacting online, types of E-Commerce, e-commerce business models (introduction , key elements of a business model and categorizing major E-commerce business models), forces behind e-commerce. Technology used in E-commerce: The dynamics of World Wide Web and internet - Designing, building and launching e-commerce website

Unit –II: Security and Encryption:

Need and concepts, the e-commerce security environment: (dimension, definition and scope of e-security), security threats in the E-commerce environment (security intrusions and breaches, attacking methods like hacking, sniffing, cyber-vandalism etc.), technology solutions (Encryption, security channels of communication, protecting networks and protecting servers and clients)

Unit – III: IT Act 2000 and Cyber Crimes

IT Act 2000: Definitions, Digital signature, Electronic governance, Attribution, acknowledgement and dispatch of electronic records, Regulation of certifying authorities, Digital signatures certificates, Duties of subscribers, Penalties and adjudication, Appellate Tribunal, Offences and Cyber-crimes

Unit - IV: E-Payment System:

Models and methods of e-payments (Debit Card, Credit Card, Smart Cards, e-money), digital signatures(procedure, working and legal position), payment gateways, online banking

(meaning, concepts, importance, electronic fund transfer, automated clearing house, automated ledger posting), risks involved in e-payments

Unit – V: On-line Business Transactions:

Meaning, purpose, advantages and disadvantages of transacting online, E-commerce applications in various industries like {banking, insurance, payment of utility bills, online marketing, e-tailing (popularity, benefits, problems and features), online services (financial, travel and career), auctions, online portal, online learning, publishing and entertainment} Online shopping (Amazon, Snapdeal, Alibaba, Flipkart, etc.)

Text Book:

- Bharat Bhaskar, Electronic Commerce: Framework, Technology and Application, 4th Ed. McGraw Hill Education 2006

Reference Books:

1. PT Joseph, E-Commerce: An Indian Perspective, PHI Learning 2015
2. KK Bajaj and Debjani Nag, E-commerce, McGraw Hill Education 2005
3. David Whiteley, E-commerce: Strategy, Technology and Applications, McGraw Hill Education 2001
4. Sushila Madan, E-Commerce, Taxmann New Delhi 2015

Main Elective - 1. 3. Auditing

Semester: V

Hours: 6

Subject Code:

Credit: 5

Objectives:

- To gain the knowledge of auditing principles, procedures and techniques in accordance with the current legal requirements
- To give an overview of the eligibility, qualities, rights and duties of Auditors

Unit – I: Introduction

Definition – Objectives - functions of audit - distinction between book keeping and auditing, auditing and investigation - Qualities of an auditor - advantages and limitations of an audit

Unit – II: Classification of Audit

Statutory, internal, continuous, periodical, interim, complete, partial, management, service, energy, environmental, cost and Balance Sheet audit - Audit engagement letter - Audit programme - Audit note book - Audit working papers - Steps before commencement of new audit.

Unit – III: Internal Audit

Meaning - Importance - objects and Essentials of good internal control and internal check - Distinction between internal control and internal check - internal check for cash, purchase, sales and wages – Access Centers – Electronic Data Processing Audit

Unit – IV: Vouching

Meaning – Objectives of Voucher, Vouching of cash transaction - verification and valuation of assets - : Investments, land and building - plant and machinery, account receivable and stock - in – trade

Unit – V: Company Audit

Auditor - Qualification - Disqualification, appointment, remuneration, removal, status, rights, powers, duties and liabilities of an auditor - share capital audit and share transfer audit.

Test Book:

- B.N. Tandon and S. Sudharsan and S. Sundharabalu: Practical Auditing. S. Chand & Company Ltd 2013

Reference Books:

1. Ravinder Kumar and Virender Sharma, Prentice-Hall of India Pvt.Ltd 2015
2. Dinkar Pagare: Principles and practice of Auditing. Sultan Chand & Sons 2016
3. Kamal Gupta: Contemporary Auditing. Tata McGraw-Hill Education, 2004
4. Aruna Jha Auditing- University Edition Taxman - 2016

Subject Skill: I Entrepreneurial Development

Semester: V

Hours: 6

Subject Code:

Credit: 4

Objectives:

- To familiarize the students with the latest programs of the government authorities in promoting small and medium industries
- To impart knowledge regarding how to start new ventures

Unit - I: Introduction

Concept of Entrepreneurship - Meaning - Types - Qualities of an Entrepreneur - Classification of Entrepreneurs - Factors influencing Entrepreneurship - Functions of Entrepreneurs

Unit - II: Women Entrepreneurship

Women Entrepreneurs – Concept – Functions and Role – Problems of Women Entrepreneurs – Suggestions for Development of Women Entrepreneurs – Rural Entrepreneurship – Need – Problems – How to Develop Rural Entrepreneurship.

Unit - III: Entrepreneurial Development Programmes

Entrepreneurial Development Programmes (EDP) - Role of Government and Non-Government in organizing EDPs - Small scale industries: Definition - Classification of small scale units -. Procedures in setting of small scale units – Licensing - Registration – Concessions – Rebates - Incentives and Subsidies to small scale units

Unit – IV: Institutional Support to Entrepreneurs

Entrepreneurial Development Agencies: District Industries Centre - National Small Industries Corporation - Small Industries Development Organisation – Small Industries Service Institute - All India Financial Institutions - IDBI - IFCI - ICICI – IRDBI

Unit - V: Project Management

Project Management - Business idea generation techniques - Identification of Business Opportunities - Feasibility study: Marketing, Finance, Technology & Legal Formalities - Preparation of Project Report - Tools of Appraisal.

Text book:

- Jayashree Suresh, Entrepreneurial Development, Margham publications, Chennai 2016

Reference Books:

1. Gupta C B & Srinivasan N.P. Entrepreneurial Development Sultan Chand & Sons New Delhi 2014
2. S S Kanka, Entrepreneurial Development, S. Chand and Co 2013
3. S. Anilkumar. Entrepreneurial Development - New Age Publications (P) Ltd 2003
4. Ranbir Singh Entrepreneurial Development S.K. Kataria & Sons; Reprint 2013 edition

SSP: 1.1 Business Organization**Semester: V****Hours: -****Subject Code:****Credit: 1****Objectives:**

- To gain knowledge of Business Organization and its importance
- To impart knowledge on establishment of industry

Unit – I: Introduction

Business: Meaning and types – Profession: Meaning and importance of business
Organization-Social Responsibilities of Business-Business Ethics

Unit - II: Types of Business Organization

Forms of Business organization -Sole trader -Partnership- Joint Hindu Family -Joint Stock companies -Co-operative societies- Public utilities and Public enterprises-Public Sector vs. Private Sector

Unit – III: Establishment of Industry

Location of industry - Factors influencing location - Size of industry - Optimum firm - advantages of Large - scale operation - limitation of small scale operation - Industrial estates - District Industries Centres.

Unit – IV: Stock Exchange Functions

Stock Exchange - Function -Types -Working - Regulation of Stock Exchanges in India - Business Combination - Causes -Types - Effects of Combination in India.

Unit – V: Trade Associations

Trade association -Chamber of commerce -Functions-Objectives -Working in India

Text Book:

- R.N. Gupta, Business organization & Management- S. Chand & Co. New Delhi.2016

Reference Books:

1. I.Y.K.Bhushan, Business organization, SultanChand, New Delhi. 2012
2. Vijay Kumar Kaul Business organization & Management, Pearson India 2011
3. Frank R. Mason, Business Principles and Organization - Clarke Press 2008
4. M.C. Shukla,Business Organization and Management S.Chand 2010

SSP: 1.2 Office Administration

Semester-V
Subject Code:

Hours: -
Credit: 1

Objectives:

- To introduce the students the functioning of modern office and latest information technologies in offices.
- To expose the students in office supervision and accommodation

Unit - I: Office Management and Supervision

Meaning - Definition – Functions – Importance – Departmentation – Relationship of office with other departments - Office Manager: Qualification – function – Roles duties and Responsibilities – Office Supervision – Requisites of effective supervision.

Unit - II: Office Systems and Work Simplification

Meaning - Need – Planning and Principles of office systems –System Design and Planning - Flow of work – Work simplification – Work Measurement - Principles and Procedures - Techniques and Standards of performance.

Unit - III: Office Accommodation and Environment

Importance - Location – Office layout – Principles – System approach to layout – Types – New trends in office layout – working environment – Lighting Ventilation –Interior Decoration - Safety, Security and Secrecy.

Unit - IV: Record Management and Office Machines

Meaning – Significance of record management– Filing: Objectives & Methods – Indexing: meaning & objectives – Office forms: Types - designing and control – Choice of office machines: objective- Automation and mechanizations.

Unit - V: Computer and Information Technology

Techniques and devices in data communication and computer systems – Value – Electronic data Processing (EDP), Integrated Date Processing (IDP)– Wide Area Network (WAN)-satellite communication- Hypertext transfer protocol (HTTP) – Online office security services.

Text Book:

- Moorthy Krishna, Office Management, S., Sultan Chand Publication.2016

References:

1. Bhatia R.C., Principles of Office Management, Lotus Press Publication, 2007.
2. Jain J.N Singh P.P, Modern Office management, Regal Publications, 2007.
3. Gupta C.B. Office organization and management, Sultan Chand Publication, 2007
4. Pillai and Bagavathi, Office management, Sultan Chand Publication, 2008.

Non-Major Elective - I: Basics of Accounting using Computers (Tally)

Semester: V

Hours: 2

Code:

Credit: 1

Objectives:

- To gain the knowledge about accounting software in the current industry.

- To impart knowledge to the students on the added features on the latest version.

Unit: I Introduction to Tally

Introduction to Tally – Features of Tally – Tally and Accounting – Security of Tally – Benefits of Tally – Installation of Tally and getting started – Steps for installing Tally – Operating system for Tally – Activating Tally.

Unit: II Starting Tally and Company Creation

Starting Tally and Company creation: Gateway of Tally – Button Bar – Creation of Company – Selecting Company – Shutting Company – Company Info.

Unit – III: Classification of Accounts

Classification of Accounts: Grouping – Display of Group – Creation of Group – Creation of Ledger – Final Statement – Trading Account – Income Statement – Profit & Loss Account – Balance Sheet – Methods of showing Balance sheet.

Unit – IV: Tally New Version

Tally New Version – Features – Multilingual support – Comparison between old and new version – Availability of additional features

Unit – V: Practical Assignments

Practical Assignments – Preparation of Journal entries, Ledgers, Trial Balance & Final Accounts (Simple problems only)

Text Book:

- Palanivel.S, “Tally Accounting Software”, Margham Publications, Chennai 2016

Reference Books:

1. Narmada Agarwal, Tally User Manual, Tally Solutions Pvt. Ltd 2008
2. Institute of Computer Accountants. Tally, Vikas Publishing House, New Delhi.2015
3. Tally Academy. Tally Manual.2016
4. TALLY 9 Upto release 3.0, Computech Publications Ltd., New Delhi.2016

Core: Computerized Accounting

Semester – VI

Hours: 4

Subject Code:

Credit: 4

Objectives:

- To enable the students to acquire basic knowledge on computer application in the field of Accounting.
- To equip the students to meet the demands of the industry and to develop practical skills in the application of Tally Package.

Unit – I: Company creation and set-up of accounts in Tally (8.1 or Higher version)

Startup Tally, Quitting Tally, Creation of a Company, Alteration, deleting, and shut a company - Concepts of Grouping of Accounts – Predefined account groups, display or alter groups. Creating Ledger Accounts – Predefined ledger accounts, creation, display, alter and deleting ledger accounts - Inventory – items, groups, units, creating a single stock group, creating a multiple stock group, stock items

Unit – II: Accounting vouchers

Meaning and Types of Vouchers used in Tally, Creation of Voucher type, Maintaining Bill-wise Details, Cost centre and cost category, interest calculation, Reversing journals – delivery note, physical stock voucher, purchase order, sales order, receipt note, rejection in, rejection out, stock journal, Stock category, multiple Godowns - Working with payroll info menu-payroll configuration and pay head creation- pay roll vouchers- payroll reports.

Unit – III: Books of accounts and its advanced usages

Cash book, Bank book, Journal Register, Ledger, Purchase Register, Sales Register, Stock item, Stock group summary, movement analysis, sales order, purchase order, location wise stock reports, stock query, branch accounting, flexible invoicing, discount in invoicing, price list, bank reconciliation, manufacturing account.

Unit – IV: Financial Management

TDS, Generation and Reconciliation of TDS Challans; Filing e-TDS return, Calculation of VAT in Tally - Fund flow, receivables turnover, budgeting and controls, variance analysis, ratio analysis, calculating key financial ratios

Unit - V: Report Generation and Printing

Display of Trial balance, profit and loss accounts, balance sheets, consolidated statements companies/branches. Printing options, quick format, printing reports, printing of primary books, printing of registers, printing of outstanding statements, printing of inventory books

Text Books:

- S. Nadeem Shah, Peachtree, “Computerized Accounting”2016

Reference Books:

1. Institute of Computer Accountants, *Tally*, Vikas Publishing House, New Delhi.2015
2. Tally Academy, Tally Manual 2016
3. TALLY 9 Upto release 3.0, Computech Publications Ltd., New Delhi. 2016
4. User Manual of Accounting & Budgeting Software System Prepared by TEVTA

Core: Computerized Accounting (Practical)

Semester – VI

Hours: 2

Subject Code:

Credit: 2

1. Application of Tally - creation of companies; creation of primary groups, Secondary groups
2. Creation of ledgers; creation of inventory – items, groups, units etc
3. Creation of different types of vouchers; bills wise details; interest calculation; Creation of Godowns
4. Preparing, display and alter books of accounts, preparing stock reports, stock query
5. Branch accounts, invoices, price list and bank reconciliation statement
6. Creating payroll vouchers in TALLY
7. Generating fund flow statements, ratio analysis statements, budgets
8. Calculation of VAT in tally; preparation of TDS return
9. Generating Trial balance, Profit and Loss Accounts, Balance Sheets
10. Consolidated statement of companies

Core: Financial Management

Semester-VI

Hours: 6

Subject Code:

Credits: 5

Objectives

- To introduce the basic concepts of Financial Management
- To enable the students to gain knowledge on various financial functions of Finance manager

Unit – I: Basics of Financial Management

Financial Management –Meaning, Functions, Objectives and Scope of Financial Management – Risk Return Trade Off - Source of Finance – Meaning, Purpose and Sources of Short Term finance - Meaning, Purpose and sources of Long term Finance. (Theory Only)

Unit – II: Financial Planning and Leverages

Financial Planning: Meaning and Objectives – Factors affecting Financial planning - Principles of sound financial planning. (Theory Only); Leverage: Meaning and types – Operating, Financial and Combined Leverage. (Both Theory and Problem)

Unit – III: Capital Structure

Capital Structure – Meaning - Factors influencing Capital Structure – EBIT–EBT–EPS Analysis – Capital Structure Theories – NI Approach - NOI Approach - Traditional Approach – MM Approach (Both Theory and Problem)

Unit - IV: Cost of Capital

Cost of Capital-Cost of Equity- Cost of Debt- Cost of Preference shares- Cost of Retained Earnings- Weighted Average Cost of Capital- Methods of computation of Cost of Capital. (Both Theory and Problem)

Unit – V: Dividend Decisions & Working capital management

Dividend policy – Determinants of dividend policy – Types of dividend policy – forms of dividend – Theories of Dividend Policy (Walter, Gordon and MM Model)– Working Capital Management (simple problems only) (Both Theory and Problem)

Text Book:

- Murthy.A, Financial Management, Margham Publication, Chennai

Books for Reference:

1. S.N. Maheswari – Elements of Financial Management, Sultan Chand & Sons, New Delhi. 2006
2. I.M. Pandey – Fundamentals of Management, Vikas Publishers, New Delhi.2016
3. Dr. R.M. Srivastava – Financial Management, Himalaya Publishing House, Mumbai.2013
4. Prasanna Chandra – Financial Management, Tata McGraw Hill, New Delhi.2008

****Note:**

Kindly refer next immediate page for semester question paper pattern of Financial Management

****Semester Question Paper Pattern for Financial Management**

Weightage of Marks:

- **Theory = 40 Percentage**
- **Problem = 60 Percentage**

The question paper shall have three sections with the Maximum of 70 marks for three hours with the following break-up.

Section – A Each question shall carry 2 Marks. **(10 x 2 = 20 Marks)**

Section-A shall contain 10 short answer questions without choice drawn from all the units on the basis of minimum two from each unit.

- First Unit: Theory Only
- Other Units: One theory from each unit and all other questions are problem oriented

Section – B Each question shall carry 4 Marks **(5 x 4 = 20 Marks)**

Section- B shall contain 5 **either or questions** drawn from all the five units.

- First Unit – Theory Only
- Other Units: only two theory and all other questions are problem oriented.

Section – C (3 x 10 = 30 Marks)

Section- C shall contain five question drawn one each from the five units.

- First Unit: Theory Only
- Other Units: Only one theory and all other questions are problem oriented.
- **Three questions out of five** are to be answered each carrying ten marks.

Main Elective: 2.1 Income Tax Law and Practice – II**Semester - VI****Hours: 6****Subject Code:****Credit: 5****Objectives:**

- To prepare the students to compute taxable income of various heads of Income.
- To enable the students to compute Total Income and Tax Liability of an Individual.

Unit - I: Income from Business or Profession

Meaning – Business – Profession - Rules for adjustment – Allowable expenses – Disallowed expenses – Scientific Research Expenses – Computation of Income from Business or Profession

Unit – II: Capital Gains

Meaning of Capital asset – Type – Transfer – transfer not considered as transfer - Cost of Acquisition – Cost of Improvement – types of capital gain - Exemption from Capital gain – Computation of taxable capital gain

Unit - III: Income from other Source

Income taxable under the head Other Sources – Deductions from other source income – Interest on Securities - Computation of Income from other source

Unit - IV: Set off and Carry forward of Losses

Set off of Losses – Intra Head adjustment and Inter Head Adjustments - Carry forward of Losses – Rules regarding adjustment of losses of different heads - Clubbing of Income and Deemed Income

Unit - V: Assessment of Individual

Deductions eligible for Individual u/s. 80 – Donation u/s 80G - Income tax rate for Individual - Computation of Taxable Income of Individual (Simple Problem Only)

Text Book

- Mehrotra H.C, Income Tax Law and Practice with Tax Planning, Sahitya Bhawan Publications, New Delhi (Relevant new Editions)

Reference Books

1. Vinod.K.Singhania, Direct Taxes Law and Practice, Taxmann Publications, New Delhi.
2. Gaur. V.P and D.B. Narang, Income Tax Law and Practice, Kalyani Publications, New Delhi.
3. Murthy. A, Income Tax Law and Practice, Vijay Nicole Imprints Private Ltd, New Delhi.
4. Hari Prasad Reddy and Reddy T.S, Income Tax Law and Practice, Margham Publications, Chennai. (Relevant new Editions)

*****Note:**

Kindly refer next immediate page for semester question paper pattern of Income Tax Law and Practice - II

*****Semester Question paper Pattern for Income Tax Law and Practice – II**

Weightage of Marks:

- Theory = 30 Percentage
- Problem = 70 Percentage

The question paper shall have three sections with the maximum of 70 marks for three hours with the following break-up.

Section – A (10x 2 = 20 Marks)

Section-A shall contain 10 short answer questions without choice drawn from all the units on the basis of minimum two from each unit.

- One theory from each unit and all other questions are problem oriented
- Each question shall carry 2 Marks.

Section – B (5 x 4 = 20 Marks)

Section- B shall contain 5 either or questions drawn from all the five units.

- All the units should have one theory question.
- Each question shall carry 4 Marks.

Section – C (3 x 10 = 30 Marks)

Section- C shall contain five question drawn one each from the five units.

- One theory from any Unit and All others questions are problem oriented.
- Three questions out of five are to be answered each carrying ten marks.

Main Elective: 2. 2 Investment Management

Semester - VI

Hours: 6

Subject Code:

Credit: 5

Objectives:

- To make the student to understand the concepts and objectives of Investment
- To introduce various avenues of the investments to the student

Unit – I: Investment Management

Meaning - Nature and scope of investments management – Investments and Speculation – Investment and Gambling – Investment avenues– features of an investment programme – investment process and stages in investment

Unit – II: Financial Institutions and Markets in India

Development of the financial system in India – Structure of financial markets, Financial Institutions — New developments in the financial system

Unit - III: The Securities Exchange Board of India

Kinds of Market-New issue market and stock exchange in India - Role of the new issue market – mechanics of floating new issues – Development in the stock market. Meaning – definition-Nature and scope. Objectives - functions organization of SEBI – SEBI’s Role in the Primary market and Secondary market

Unit – IV: Return and Risk:

Return; Definition – Measurement – Traditional technique – Statistical methods - Risk; Definition – Systematic risk – Unsystematic risk – Quantitative analysis of risk.

Unit – V: Portfolio Investment:

Meaning - Importance of ideal portfolio-Government securities – Life insurance – Private insurance companies – Commercial bank – Post office scheme – Fixed deposit schemes in companies – New instruments – Mutual fund – Investment in real estate and Gold

Text book:

- Preethi Singh, Investment management, Himalaya Publishing House, Mumbai.

Reference Books:

1. Punithavathy Pandian , 2004 security analysis and portfolio management , Vikas Publishing House Private Ltd.
2. Charles P. Jones, Investments: Analysis and Management - Wiley India Pvt. Ltd;2007
3. Maheshwari and Yogesh, Investment management - Prentice Hall India 2008
4. Bhalla V.K, Investment management - S Chand & Company 2008

Main Elective: 2.3 Company Law

Semester - VI

Hours: 6

Subject Code:

Credit: 5

Objectives:

- To enable the students to understand the principles and procedures of company law
- To impart basic knowledge of the provision of the companies act

Unit – I: Introduction

Definition of Company – Characteristics of Company – Kinds – Promotion of companies – Rights, duties, status and liabilities of promoter – Contents of Memorandum of Association and Articles of Association – Incorporation of companies – Commencement of Business

Unit – II: Company Management

Company secretary and board of Directors – Appointment – Qualifications and disqualifications – Removal – Powers, rights, duties, and liabilities of directors

Unit – III: Company Meetings

Meetings of company – General meetings of shareholders – Statutory Meeting – Statutory Report – Annual General Meeting – Extraordinary General Meeting – Meetings of Directors – Requisites of a valid Meeting

Unit – IV: Proceedings of Meetings

Minutes of meeting – Proxies – Voting and Poll – shares without voting Rights – Resolutions – Ordinary resolution – Special resolution – Resolutions requiring special notice.

Unit – V: Winding-up of Companies

Methods of winding up – Winding up by court – Grounds for compulsory winding up – Voluntary winding up and winding up subject to supervision of the court – Consequences of winding up

Test Book:

- ND Kapoor, Company Law & Secretarial Practice -Sultan Chand & Sons

Books for Reference:

1. N.D. Kapoor --Sultan & Chand,-Elements of Company Law Sultan Chand & Sons 2014
2. M.C. Shukla & S.S. Gulshan Principles of Company Law –Sultan & Chand, New Delhi, 2006
3. Dr. M.R. Srinivasan -Company Law & Secretarial Practice - Margham Publications 2012
4. P.P.S. Gogna, A Text of Company Law-- S. Chand Publishing New Delhi, 2008

Subject Skill – II: Human Resource Management

Semester: VI

Hours: 6

Sub Code:

Credits: 4

Objectives:

- To understand the basic perspective of Human resource management.
- To enable the students to be aware on the procedure of performance appraisal and training methods.

Unit - I: Introduction

Human Resource Management – Meaning – Definition – Importance-Functions of HRM- Duties and qualities of HR manager- Strategic HRM: Meaning- Definition and Scope.

Unit – II: Human Resource Planning

Meaning- Definition- Importance- Objectives- Factors influencing Human Resource Planning- Process of Human Resource Plan- Analyzing the Organizational planning.

Unit - III: Recruitment and Selection

Meaning- Definition- Objectives and Methods of Recruitment - Factors Determining Recruitment- Selection Process - Different types of Test and Interview- Characteristics of Good test- Guidelines for ensuring successful Interview

Unit – IV: Training and Development

Meaning - Needs and Importance of Training- Essentials of good training program- Methods of Training (On the job and Off the Job Training methods only)

Unit - V: Performance Appraisal

Meaning - Definition - Features – Advantages – Methods of performance Appraisal (Traditional and Contemporary methods only) - Steps for Effective Performance Appraisal – Career planning and counseling

Text Book:

- Aswathappa, Human Resource and personnel Management, Tata McCreaw Hill, New Delhi 2011

Reference Book:

1. Khanka K, Human Resource Management, S.Chand& Co, New Delhi.2011
2. Tripathi.P.C., Human Resource Management, Sultan Chand, New Dehli.2006
3. Gupta. C.B., “Business Organization and Management” S.Chand& Co, New Delhi.2008
4. Jaishankar J, Human Resource Management, Margham Publication, Chennai. 2002

SSP - II .1 Customer Relationship Management**Semester-VI****Subject Code:****Hours: -****Credit: 1****Objectives:**

- To highlight the importance of customer expectations and customer satisfaction.
- To high light the methods to retain customers in business and to develop a long term relationship with customer through appropriate strategies.

Unit - I: Introduction

Concept of CRM - characteristics and peculiarities of CRM – Steps in CRM - Relevance of CRM – Customer expectations (branding identity, loyalty, innovation)

Unit - II: Customer Values

Customer Profile – Customer values – Customer life cycle – Economics of customer care – Characteristics of outstanding customer service – Managing customer satisfaction.

Unit - III: Customer Centric Marketing

Customer Centric Business - Customer Centric Marketing – bonding of customer relationship

Unit - IV: CRM Strategy

Customer Defection – Contact centres for CRM – CRM strategy.

Unit - V: CRM in Action

Client retention programmes – Reorganization – Customer loyalty – Customer rewards programmes – CRM in action – e-solution.

Text Book:

- R K Sugandhi, CRM, New Age International 2008

Reference Books:

1. Subhasish Das, CRM –Jain book agency 2007
2. Alok Kumar Rai, CRM concept and cases - Jain book agency 2014
3. Mukesh Chaturvedi & Abhinav Chaturvedi, CRM An Indian Perspectives 2005
4. Shainesh & Jagdish Seth, CRM, a strategic perspective, Macmillan. 2005

SSP-II .2 Sales Promotions

Semester-VI

Subject Code:

Objectives:

- To enable the students to acquire knowledge on selling aspect of marketing
- To impart the various techniques of sales promotion with ethics

Hours: -

Credit: 1

Unit – I: Introduction

Nature and importance of sales promotion, its role in marketing - Forms of sales promotions - Consumer oriented sales promotion; trade oriented sales promotion & Sales force-oriented sales promotion.

Unit – II: Tools of sales promotion

Tools of sales promotion- samples point of purchase, displays & demonstrations, exhibitions & fashion shows, sales contests & games of chance and skill, lotteries gifts offers, premium and free goods, price packs, rebates patronage rewards, Conventions, conference & trade shows, specialties and novelties.

Unit – III: Promotional Programme

Developing sales promotion programme, pre-testing implementing, evaluation of results and making necessary modifications

Unit – IV: Creating Public Relations

Public relations-Meaning, features, growing importance, role in marketing, similarities in publicity and public relations, Major tools of Public Relations- News, speeches, special events, handouts, and leaflets, audio-visual public service activities, miscellaneous tools.

Unit – V: Ethical and legal promotion

Ethical and legal aspects of sales promotion and public relations

Text book:

- Wells, Moriarty & Burnett, Advertising, Principles & Practice, Pearson Education 7th Edition, 2007.

Reference books:

1. S. H. H. Kazmi and Satish K Batra, Advertising & Sales Promotion, Excel Books, New Delhi, 2001.
2. George E Belch and Michel A Belch, Advertising & Promotion, McGraw Hill, Singapore, 1998.
3. Julian Cummings, Sales Promotion, Kogan Page, London 1998.
4. Kenneth Clow. Donald Baack, Integrated Advertisements, Promotion and Marketing communication, Prentice Hall of India, New Delhi, 2003.

Non-Major Elective-II: General Commercial Knowledge**Semester-VI****Hours: 2****Subject Code:****Credit: 1****Objectives:**

- To enable the students to gain basic knowledge of Trade, Commerce and Industry
- To impart knowledge on joint stock companies and its management

Unit – I: Introduction

Commerce, Trade, Industry – Meaning – Scope and Importance of Commerce – Economic Basis of Commerce

Unit – II: Business forms

Forms of Business Organizations – Sole Trade – Partnership Features – Merits and Demerits

Unit – III: Joint Stock Company

Joint Stock Company – Features – Memorandum and Articles – Contents – Prospectus and Contents – Types – Co-operatives – Features – Types – Advantages

Unit – IV: Management of Joint Stock Companies

Management of Joint Stock Company – Directors – Qualification, Appointment, Removal, Powers and Duties

Unit – V: Meeting Procedures

Company Meetings – Types – Minutes – Agenda – Quorum – Resolution

Text Book

- K.L.Nagarajan, Vinayagam, Radhasamy and Vasudevan, Principles of Commerce and General Commercial Knowledge, S.Chand & Co., New Delhi

Reference Books

1. Ghosh and Bhushan, General Commercial Knowledge, Sultan Chand & Sons, New Delhi 2007
2. J.C. Bahl & E.R.Dhongde, Elements of Commerce & Business Methods, New Book & Co., Mumbai 2015
3. P.N. Reddy & S.S.Gulshan, Commerce – Principles & Practice, S. Chand & Co., New Delhi 2015
4. J.C. Sinha & V.N.Mughali, A text book of Commerce, R. Chand & Co., New Delhi 2009

Semester Question Paper Pattern for Theory Papers (Commerce papers)

The question paper shall have three sections with the Maximum of 70 marks for three hours with the following break-up.

Section – A

Section- A shall contain 10 short answer questions without choice drawn from all the units on the basis of minimum two from each unit. Each question shall carry 2 marks. (10 x 2 = 20 Marks)

Section – B

Section- B shall contain 5 either or questions drawn from all the 5 units. Each question shall carry 4 marks. (5 x 4 = 20 Marks)

Section – C

Section- C shall contain 5 questions drawn one each from the 5 units. 3 Questions out of 5 are to be answered. Each question shall carry 10 marks. (3 x 10 = 30 Marks)

Semester Question Paper Pattern for Accounts Papers

The question paper shall have three sections with the maximum of 70 marks for three hours with the following break-up.

Section - A

Section-A shall contain 10 short answer questions without choice drawn from all the units on the basis of minimum two from each unit. Out of ten questions five shall be problem oriented and the other five shall be theory questions. Each question shall carry 2 marks. (10x 2 = 20 Marks)

Section-B

Section- B shall contain **5 either or questions** drawn from all the five units. One question should be theory and four questions should be problems. Each question shall carry 4 marks. (5 x 4 = 20 Marks)

Section - C

Section- C shall contain five question drawn one each from the five units. All the questions are problems. **Three questions out of five** are to be answered each carrying ten marks. (3 x 10 = 30 Marks)

Note: Income Tax Law and Practical – I & II and Financial Management subjects; semester question paper pattern have given concern syllabus immediate page itself kindly refer, because those papers pattern differ from above mentioned pattern.

Continuous Internal Assessment (CIA) Pattern

It was resolved to adopt 30 marks for Internal Assessment and 70 marks for the end semester examination.

Internal marks components:

The Break – up of the Internal Marks Components is as follows:

| Components | Marks |
|--|-------|
| CA Test (Two test per semester) 7.5 Marks per CA test | 15 |
| Attendance | 5 |
| Assignment/ Seminar / Snap test / Multiple choice questions / Group discussion/ Quiz / Problem Solving. Choices left to the course teacher | 10 |
| Total | 30 |

CA Test Question Pattern (Exam time duration 2 Hours)

| Question Pattern | Marks |
|---|-------|
| A Section: Answer all the question (5 Questions, 3 Marks each) | 15 |
| B Section: Either or type Questions (3 Questions, 5 Marks each) | 15 |
| C Section: With choice (Two out-of Three Questions) 10 Marks each | 20 |
| Total | 50 |

Note: There is no passing minimum for CA.

Regulations for Computerized Accounting Practical (Semester VI)

1. Each practical paper will have maximum of 100 Marks.
2. For a practical paper, CA is 40 marks and Semester Examination is 60 Marks.
3. The features of every programme are alone listed in the syllabus, however the student are expected to carry out at least 2 exercises in each feature of the programme.

Continues Assessment

- A. Performance in the practical session : 30 Marks
B. CA Test : 10 Marks

C. Performance in the practical session

Every practical session will carry a maximum of 10 marks and it is divided as follows:

1. Initial Preparation & Observation : 5 Marks
2. Debugging & Execution of Program : 5 Marks

The Students must submit the observation note book with the written preparation of the current practical exercise, before the practical session at the time fixed by the staff concerned. Marks will be deducted for late as well as incomplete or incorrect submission. The Ten marks will be awarded for each exercise subject to the successful completion of the entire exercise as directed by the staff concerned.

CA Test

For each practical paper, only one CA test will be conducted for a maximum of 50 marks and it will be computed for 10 Marks.

There is no passing minimum for CA.

Semester Examinations

The duration of practical examination is three hours. The candidate should submit a bonafide record of the experiments done at the time of the semester examination. The student shall not be allowed to appear for the semester examination without the bonafide record.

Semester Examinations will be conducted for 60 marks and the marks are divided as follows:

Programming : 50 Marks
Record : 10 Marks

If a student fails in a semester examinations he has to reappear for the next semester practical examination.

Question Paper Pattern Practical Examinations

Time: 3 Hrs Max.Marks:50+10 (10 for Record)

Each student will get a single question to be answered. The question may have subdivisions.

No more than five candidates should get the same question in a batch.

PG & Research Department of Mathematics

Syllabus with effect from the Academic Year 2017-2018

| Part | Type | Subject | Paper | Hours | Credits | CIA | Sem | Total |
|-----------------------|-----------|--|-------|-----------|-----------|-----|-----|-------|
| Semester - I | | | | | | | | |
| I | Language | Tamil | I | 5 | 3 | 30 | 70 | 100 |
| II | Language | English | I | 5 | 3 | 30 | 70 | 100 |
| | | Communicative English | I | | 1 | | | |
| III | Main Core | Differential Calculus (MC) | I | 5 | 5 | 30 | 70 | 100 |
| III | Main Core | Algebra & Trigonometry | II | 5 | 5 | 30 | 70 | 100 |
| III | Allied | Physics | I | 6 | 4 | 30 | 70 | 100 |
| IV | FC* | Personal Skills | I | 2 | 1 | - | - | 100* |
| IV | ET/RE* | Religion & Ethics | I | 2 | 1 | - | - | 100* |
| | | Total | | 30 | 23 | | | |
| Semester - II | | | | | | | | |
| I | Language | Tamil | II | 5 | 3 | 30 | 70 | 100 |
| II | Language | English | II | 5 | 3 | 30 | 70 | 100 |
| | | Communicative English | | | 1 | | | |
| III | Main Core | Integral Calculus (SEC) | III | 5 | 5 | 30 | 70 | 100 |
| III | Main Core | Differential Equations (MC) | IV | 5 | 5 | 30 | 70 | 100 |
| III | Allied | Physics | II | 6 | 4 | 30 | 70 | 100 |
| IV | FC* | Social Skills | II | 2 | 1 | - | - | 100* |
| IV | ET/RT* | Ethics / Religion | II | 2 | 1 | - | - | 100* |
| | | Total | | 30 | 23 | | | |
| Semester - III | | | | | | | | |
| I | Language | Tamil | III | 5 | 3 | 30 | 70 | 100 |
| II | Language | English | III | 5 | 3 | 30 | 70 | 100 |
| III | Main Core | Vector Calculus(SEC) | V | 5 | 5 | 30 | 70 | 100 |
| III | Main Core | Solid Geometry and Fourier Series(SEC) | VI | 5 | 5 | 30 | 70 | 100 |
| III | Allied | Chemistry | I | 6 | 4 | 30 | 70 | 100 |
| IV | FC* | Employability Skills – I | III | 2 | 1 | - | - | 100* |
| IV | HR | Human Rights | I | 2 | 1 | - | - | 100* |
| V | | Deeds | | | | | | |
| V | | Shelters | | | | | | |
| | | Total | | 30 | 22 | | | |

***Internal Paper**

| Part | Type | Subject | Paper | Hours | Credits | CIA | Sem | Total |
|----------------------|---------------|--|-------|-----------|----------------------------|-----|-----|-------|
| Semester - IV | | | | | | | | |
| I | Language | Tamil | IV | 5 | 3 | 30 | 70 | 100 |
| II | Language | English | IV | 5 | 3 | 30 | 70 | 100 |
| III | Main Core | Numerical Methods (DSE) | VII | 5 | 5 | 30 | 70 | 100 |
| III | Main Core | Algebraic Structures - I (MC) | VIII | 5 | 5 | 30 | 70 | 100 |
| III | Allied | Chemistry | II | 6 | 4 | 30 | 70 | 100 |
| IV | FC* | Employability Skills - II | IV | 2 | 1 | - | - | 100* |
| IV | EVS* | Environmental Science | I | 2 | 1 | - | - | 100* |
| V | | Deeds | | | 2 | | | |
| V | | Shelters | | | 2 | | | |
| | | Total | | 30 | 26 | | | |
| Semester - V | | | | | | | | |
| III | Main Core | Real Analysis – I (MC) | IX | 6 | 6 | 30 | 70 | 100 |
| III | Main Core | Algebraic Structures – II (MC) | X | 6 | 6 | 30 | 70 | 100 |
| III | Main Core | Mechanics (DSE) | XI | 5 | 5 | 30 | 70 | 100 |
| III | Main Core | Probability and Statistics (SEC) | XII | 5 | 5 | 30 | 70 | 100 |
| III | Main Elective | Number Theory (SEC) Mathematical Modeling (SEC) Graph Theory (SEC) | XIII | 6 | 4 | 30 | 70 | 100 |
| IV | NME | Mathematics for Competitive Examinations-I | I | 2 | 1 | 30 | 70 | 100 |
| VI | SSP | Mathematical Aptitude - I Mathematical Competence Course | | | 1* | | | |
| VI | CC | Mathematical Modeling with Spreadsheet | I | | 2 [#] | | | |
| | | Total | | 30 | 27+1*+2[#] | | | |
| Semester - VI | | | | | | | | |
| III | Main Core | Linear Algebra (DSE) | XIV | 6 | 6 | 30 | 70 | 100 |
| III | Main Core | Real Analysis – II (MC) | XV | 6 | 6 | 30 | 70 | 100 |
| III | Main Core | Complex Analysis (DSE) | XVI | 6 | 6 | 30 | 70 | 100 |
| III | Subject Skill | Resource Management Techniques (DSE) | XVII | 5 | 4 | 30 | 70 | 100 |
| III | Subject Skill | Mathematical Statistics (SEC) | XVIII | 5 | 4 | 30 | 70 | 100 |
| IV | NME | Mathematics for Competitive Examinations - II | | 2 | 1 | 30 | 70 | 100 |
| VI | SSP | Mathematical Aptitude –II | | | 1* | | | |
| VI | CC | SCILAB for Mathematical Computations | II | | 2 [#] | | | |
| | | Total | | 30 | 27+1*+2[#] | | | |

| | | | | | | | | |
|--|--|--|--|--|----------------|--|--|--|
| | | | | | 2 [#] | | | |
|--|--|--|--|--|----------------|--|--|--|

***Internal Paper**

| Part | Course | No of Courses | Total No of Hours | Total No of Credits | Total |
|------|-----------------------|---------------|-------------------|-------------------------------|---|
| I | Tamil | 4 | 20 | 12 | 20 (12) |
| II | English | 4 | 20 | 12 | 20 (14) |
| II | Communicative English | 2 | | 2 | |
| III | Main Core | 18 | 80 | 80 | 120 (108) |
| III | Main Elective | 1 | 6 | 4 | |
| III | Subject Skills | 2 | 10 | 8 | |
| III | Allied Physics I | 2 | 12 | 8 | |
| III | Allied Chemistry II | 2 | 12 | 8 | |
| IV | Foundation Course | 4 | 8 | 4 | 20 (10) |
| | ET/RT | 2 | 4 | 2 | |
| | Environmental Science | 1 | 2 | 1 | |
| | Human Rights | 1 | 2 | 1 | |
| | Non Major Elective | 2 | 4 | 2 | |
| V | Deeds | | | 2 | 2 |
| | Shelters | | | 2 | 2 |
| VI | Certificate Course | 2 | | 4 [#] | 4 [#] |
| | Self-Study Paper | | | 2* | 2* |
| | Total | | 180 | (148+2*+4[#]) | 180 (148+2*+4[#]) |

UG SYLLABUS

| Sem | Title | Type | Hrs/Wk | Credits | Marks | | |
|--------------|--|------|--------|--------------------------|-------|----|-------|
| | | | | | Int | SE | Total |
| I | Differential Calculus | MC | 5 | 5 | 30 | 70 | 100 |
| | Algebra & Trigonometry | MC | 5 | 5 | 30 | 70 | 100 |
| II | Integral Calculus | MC | 5 | 5 | 30 | 70 | 100 |
| | Differential Equations | MC | 5 | 5 | 30 | 70 | 100 |
| III | Vector Calculus | MC | 5 | 5 | 30 | 70 | 100 |
| | Solid Geometry and Fourier Series | MC | 5 | 5 | 30 | 70 | 100 |
| IV | Numerical Methods | MC | 5 | 5 | 30 | 70 | 100 |
| | Algebraic Structures – I | MC | 5 | 5 | 30 | 70 | 100 |
| V | Real Analysis – I | MC | 6 | 6 | 30 | 70 | 100 |
| | Algebraic Structures – II | MC | 6 | 6 | 30 | 70 | 100 |
| | Mechanics | MC | 5 | 5 | 30 | 70 | 100 |
| | Probability and Statistics – I | MC | 5 | 5 | 30 | 70 | 100 |
| | Number Theory Mathematical Modeling Graph Theory | ME | 6 | 4 | 30 | 70 | 100 |
| | Mathematics for Competitive Examinations- I | NME | 2 | 1 | 30 | 70 | 100 |
| | Mathematical Aptitude – I Mathematical Competence Course | SSP | | 1* | | | |
| | Mathematical Modeling with Spreadsheet | CC | | 2 [#] | | | |
| VI | Linear Algebra | MC | 6 | 6 | 30 | 70 | 100 |
| | Complex Analysis | MC | 6 | 6 | 30 | 70 | 100 |
| | Real Analysis – II | MC | 6 | 6 | 30 | 70 | 100 |
| | Resource Management Techniques | SS | 5 | 4 | 30 | 70 | 100 |
| | Mathematical Statistics | SS | 5 | 4 | 30 | 70 | 100 |
| | Mathematics for Competitive Examinations- II | NME | 2 | 1 | 30 | 70 | 100 |
| | Mathematical Aptitude – II | SSP | | 1* | | | |
| | Scilab for Mathematical Computations | CC | | 2 [#] | | | |
| Total | | | 100 | 94+2*+ 4 [#] | | | |

UG Allied Subjects (CBCS) - Mathematics
For the candidates admitted from 2017-2018

| Year / Semester | Course | Title of the Paper | Hrs/Week | Cre | Marks | | |
|----------------------|-------------------------|-------------------------------|----------|-----|-------|----|-------|
| | | | | | CIA | SE | Total |
| I Year / I Sem | B.Sc., Physics | Allied Mathematics - I | 6 | 5 | 30 | 70 | 100 |
| I Year / I Semester | B.Sc., Chemistry | Allied Mathematics - I | 6 | 5 | 30 | 70 | 100 |
| I Year / I Semester | B.Sc., Computer Science | Allied Mathematics - I | 6 | 5 | 30 | 70 | 100 |
| I Year / I Semester | BCA | Mathematical Foundations – I | 6 | 5 | 30 | 70 | 100 |
| I Year / II Semester | BBA | Allied Business Statistics | 6 | 5 | 30 | 70 | 100 |
| II Year / IV Sem | B.Com | Allied Business Statistics | 6 | 5 | 30 | 70 | 100 |
| II Year / IV Sem | B.Com (CA) | Allied Business Statistics | 5 | 3 | 30 | 70 | 100 |
| I Yr / II Sem | B.Sc., Physics | Allied Mathematics - II | 6 | 5 | 30 | 70 | 100 |
| I Year / II Sem | B.Sc., Chemistry | Allied Mathematics - II | 6 | 5 | 30 | 70 | 100 |
| I Year / II Sem | B.Sc., Computer Science | Allied Mathematics - II | 6 | 5 | 30 | 70 | 100 |
| I Year / II Sem | BCA | Mathematical Foundations – II | 6 | 5 | 30 | 70 | 100 |
| I Year / I Sem | BBA | Allied Business Mathematics | 6 | 5 | 30 | 70 | 100 |
| II Year / III Sem | B.Com | Allied Business Mathematics | 6 | 5 | 30 | 70 | 100 |
| II Year / III Sem | B.Com (CA) | Allied Business Mathematics | 5 | 3 | 30 | 70 | 100 |
| II Year / III Sem | B.Sc., Biochemistry | Bio Statistics –I | 6 | 5 | 30 | 70 | 100 |
| II Year / IVSEM | B.Sc., Biochemistry | Bio Statistics -II | 6 | 5 | 30 | 70 | 100 |

Self-Study Courses

The Department may offer Self-Study Papers. Students may be permitted to credit at most two Self-Study Papers with the approval of Departmental Consultative Committee and Controller of Examinations.

The purpose of the course is to permit the student to study a course of the student's choice. The students shall study on their own under the guidance of a faculty member. No formal lectures need be delivered. The syllabus of the course and mode of assessments shall be approved by the Departmental Consultative Committee and forwarded to the Controller of Examinations preferably before the commencement of the semester. The self-study paper of 1 credit can be considered as one elective course. One Faculty member approved by the Head of the Department shall be responsible for the periodic monitoring and evaluation of the course.

Assessment for Self-Study Course

The Faculty member approved by the Head of the Department shall be responsible for periodic monitoring and evaluation of the course. The course shall be evaluated through Continuous Assessment (as decided by the Departmental Consultative Committee) and End Semester Examination (internal). A committee consisting of the Head of the Department, the Faculty Member and another senior Faculty member nominated by the Head of the Department shall assign the grades to the students based on their relative performance.

Certificate Course

Certificate courses are to be conducted either by faculty members or outside resource persons with 30 hours of class, outside the working hours, with due payment collected from stake holders only for remuneration to course teachers. Lab fee/study material cost if any has to be collected separately. Amount to be collected depends on the strength of participants. There will not be any final examination. Assessment will be done through assignment/quiz/mini project work.

Year/Semester: III Year /V Semester
Credits: 6

Code: M
Hours/Week: 6

Real Analysis – I

Objective: To study the real number system, point set topology, limits and continuity, derivatives of real-valued functions.

Unit – I: Real Number System

Upper bounds, maximum element, least upper bound – The completeness axiom – Some properties of the supremum – Properties of the integers deduced from the completeness axiom – The Archimedean property of the real number system – Rational number with finite decimal representation – Finite decimal approximation to real numbers – Infinite decimal approximation to real numbers – Absolute values and the triangle inequality – The Cauchy-Schwarz inequality – Plus and minus infinity and the extended real number system \mathbb{R}^* - Finite and infinite sets – Countable and uncountable sets – Uncountability of the real number system – Set algebra – Countable collection of countable sets. (Chapter 1: Sections 1.10 to 1.20) (Chapter 2: Sections 2.11 to 2.15, Related Problems).

Unit – II: Point Set Topology

Introduction – Euclidean space in \mathbb{R}^n – Open balls and open sets in \mathbb{R}^n – Structure of open ball in \mathbb{R}^1 – Closed sets – Adherent points, Accumulation points – Closed sets and adherent points – Bolzano Weierstrass theorem (without proof) – Cantor intersection theorem. (Chapter 3: Sections 3.1 to 3.9, Related Problems).

Unit – III: Limit and Continuity

Introduction – Convergent sequences in a metric space – Cauchy sequences – Complete metric spaces – Limit of a function – Continuous functions – Continuity of composite functions – Examples of continuous functions (Chapter 4: Sections 4.1 to 4.5, 4.8, 4.9, 4.11, Related Problems).

Unit – IV: Continuity and Connectedness

Continuity and inverse images of open or closed sets – Functions continuous on compact sets – Topological mappings – Bolzano's theorem – Uniform continuity - Uniform continuity and compact sets – Fixed point theorem for contractions. (Chapter 4: Sections 4.12 to 4.15, 4.19 to 4.21, Related Problems).

Unit – V: Derivatives

Introduction – Definition of derivative – Derivatives and continuity – Algebra of derivatives – The chain rule – One-sided derivatives and infinite derivatives – Functions with non-zero derivatives – Zero derivatives and local extrema – Rolle's theorem – The Mean Value theorem for derivatives – Intermediate Value theorem for derivatives – Taylor's formula with remainder. (Chapter 5: Sections 5.1 to 5.12, Related Problems).

Book for Study:

Tom M. Apostol, Mathematical Analysis, Indian student second edition, Narosa Publishing House, Chennai, 20th Reprint, 2002.

Books for Reference :

1. P. N. Arora and Ranjit Singh, First course in Real Analysis, Third edition, Sultan Chand and Sons Publishers, New Delhi, 1981.
2. S. Arumugam, Modern Analysis, New Gamma Publishers, Palayamkottai, 1993.
3. E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
4. Robert G. Bartle and Donald R. Sherbert, Introduction to Real Analysis by 2-e John Wiley and Sons, 2000.
5. Richard R. Goldberg, Methods of Real Analysis, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi, 1970.

E-Learning source: mathworld.wolfram.com/Analysis.html.

Year/Semester: III Year /V Semester
Credits: 6

Code: M
Hours/Week: 6

Algebraic Structures – II

Objective: To acquire the knowledge of basic concept of some of the fundamental algebraic structures on Rings and Integral Domains, Ideals, Factor Rings and Polynomials.

Unit – I: Rings and Integral Domains

Definition - Examples of Rings - Properties of Rings - Subrings. Definition and Examples - Fields - Characteristic of a Ring.(Chapter 12, 13)

Unit – II: Ideals and Factor Rings

Ideals - Factor Rings - Prime Ideals and Maximal Ideals.(Chapter 14)

Unit – III: Ring Homomorphisms and Polynomial Rings

Definition and Examples - Properties of Ring Homomorphisms - The Field of Quotients - The Division Algorithm and Consequences.(Chapter 15, 16)

Unit – IV: Factorization of Polynomials

Reducibility Tests - Irreducibility Tests– Unique Factorization in $Z[x]$ - Weird Dice: An Application of Unique Factorization. (Chapter 17)

Unit – V: Divisibility in Integral Domains

Irreducibles, Primes - Historical Discussion of Fermat's Last Theorem - Unique Factorization Domains– Euclidean Domains.(Chapter 18)

Book for Study:

Joseph A. Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.

Books for Reference:

1. M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
2. S.Arumugam and A.Thandapani, Modern Algebra, SciTech Publications Pvt. Ltd.
3. George E Andrews, Number Theory, Hindustan Publishing Corporation, 1984.
4. N. Herstein, Topics in Algebra, John Wiley and sons, 2-e, New Delhi, 2006.
5. John B. Fraleigh, A First Course in Abstract Algebra, 7-e, Pearson Education Publication, New Delhi 2003.

6. Saunders Maclane and Garrett Birkoff, Algebra, 2-e, Macmillan Publishing Co.inc, New York, 1979.
7. Serge Lang, Algebra, Addition Wesley Publishing Company, London 1965.
8. Surjeeth Singh and QuaziZameeruddin, Modern Algebra 2-e, Vikas Publishing House Pvt.Ltd., New Delhi, 1975.

E – Learning source: <http://mathworld.wolfram.com>

Year/Semester: III Year/V Semester
Credits: 5

Code: M
Hours/Week: 5

Mechanics

Objective: To introduce the study of the motion of particles or bodies under the influence of forces and to provide a basic knowledge of behavior of objects in motion.

Unit – I: Forces on a particle and on a Rigid body

Forces – Types of forces – Resultant of three forces related to triangle acting at a point – Resultant of several forces acting on a particle – Equilibrium of a particle under three forces – Equilibrium of a particle under several forces. (Chapter 2: Sections 2.1, 2.2 and Chapter 3: Sections 3.1)

Unit – II: Frictional Forces

Friction – Laws of friction – Cone of friction and angle of friction – Applications involving frictional forces – Limiting equilibrium of a particle on an inclined plane.(Chapter 3:Section 3.2 and Chapter 5: Section 5.2)

Unit – III: Kinematics

Introduction – Velocity – Relative velocity – Angular velocity – Acceleration – Rectilinear motion – Rectilinear motion with a constant acceleration –Relative angular velocity – Coplanar motion. (Chapter 1: Sections 1.2 to 1.4)

Unit – IV: Simple Harmonic Motion

Simple harmonic motion – Projection of a particle having a uniform circular motion – Composition of two simple harmonic motions of same period – Simple harmonic motion along a horizontal line - Motion under gravity in a resisting medium. Simple pendulum – Seconds pendulum (Chapter 12: Sections 12.1 and Chapter 15: Section 15.6)

Unit – V: Projectiles and Impact

Forces on a projectile – Displacement as a combination of vertical and horizontal displacements – Nature of trajectory – Maximum horizontal range for a given velocity – Two trajectories with a given speed and range – Projectile projected horizontally- Impulsive Force – Conservation of linear momentum- Impact of Spheres – Laws of Impact - Impact of Two Smooth Spheres - Direct impact of two smooth spheres. (Chapter 13: Sections 13.1 and Chapter 14: Sections 14.1, 14.2, 14.3)

Book for Study:

1. P.Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasam, Mechanics, 6-e, S.Chand and Company Ltd., 2005.

Books for Reference:

1. V.Dharmapadam, Statics, S.Viswanathanpvt.Ltd. Madras, 1974.
2. A.V. Dharmapadam, Dynamics, S. Viswanathan Pvt. Ltd. 1981
3. R.C.Hibbler, Engineering Mechanics, Statics and Dynamics, Macmillan Publishing Company.
4. S.L.Loney, Principle of mechanics, Macmillan and Company Ltd, 1969
5. T.Natarajan, T.GovindaRajan, G.r.Venkataraman, K.Muthuswamy, Statics, Rochouse and sons, Madras, Chand and Company Ltd, New Delhi 1970.

Year/Semester: III Year/V Semester
Credits: 5

Code:
Hours/Week: 5

Probability and Statistics

Objective: To develop the statistical concepts and introduce the techniques of analysis and inference used for research in social and life sciences.

Unit – I: Probability

Basic Terminology – Mathematical probability – Axiomatic approach to probability – Theorems on probability – Conditional probability - Independent events – Pair wise independent events. (Chapter 3: Sections 3.3, 3.4, 3.8 to 3.15)

Unit – II: Random variables and Distribution Functions

Introduction – Distribution functions – Discrete random variables – Continuous random variable – Two dimensional random variables. (Chapter 5: Sections 5.1 to 5.5; Omit 5.4.1, 5.4.2, 5.5.6, 5.5.7)

Unit – III: Mathematical Expectation and Generating Functions

Introduction – Mathematical expectation – Expected values of function of a random variable – Properties of expectation – Properties of variance – Covariance – Inequalities involving expectations – Moment generation function – Cumulants – Characteristic function – Chebychev's inequality – Bernoulli law of large numbers. (Chapter 6: Sections 6.1 to 6.7; Chapter 7: Sections 7.3, 7.5, 7.7.1)

Unit – IV: Discrete and Continuous Distributions

Bernoulli distribution – Binomial distribution – Poisson distribution – Normal distribution – Rectangular distribution – Gamma distribution. (Chapter 8: Sections 8.3 to 8.5; Chapter 9: Sections 9.2 to 9.3, 9.5 omit 9.2.12 & 9.2.15)

Unit – V: Correlation and Regression

Meaning of correlation – Scatter diagram –Karl Pearson's correlation coefficient – Bivariate frequency distribution – Probable error – Rank correlation – Linear regression.(Chapter 10: Sections 10.2 to 10.7; Chapter 11: Sections 11.1, 11.2)

Book for Study:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11-e, Sultan Chand & Sons, New Delhi, 2009.

Books for Reference:

1. Murray R. Spiegel, Statistics, 2-e, McGraw Hill Book Company, New Delhi,1992.

- Richard A. Janson, Miller, Friends, Probability and statistics for engineers, 6-e Pearson Education Pvt. Ltd. Delhi, 2001.
- Sheldon Ross, A First course in probability, 6-e Pearson Education Pvt. Ltd. Delhi, 2014.
- William – Feller, An introduction to probability theory and its applications, 3-e, Wiley eastern limited, New Delhi, 1968.

E – Learning source: <http://mathword.wolfram.com>

Year/Semester: III Year /V Semester

Credits: 4

Elective:

Code: M

Hours/Week: 6

Number Theory

Objective: To study the divisibility, primes, congruences and arithmetic functions in number theory.

Unit – I: Divisibility

Introduction – Divisibility, Greatest Common Divisor, Euclid’s Algorithm, Greatest Common Divisor via Euclid’s Algorithm – Least Common Multiple – Representation of Integers, Decimal Representations of Integers, Binary Representations of Integers (Chapter 2: Sections 2.1 to 2.4, Related Problems)

Unit – II: Primes

Introduction – Primes, Prime counting function, prime number theorem, Test of primality by trial division - Sieve of Eratosthenes, Canonical Factorization, Fundamental theorem of arithmetic, Sieve of Eratosthenes, Determining the canonical factorization of a natural number (Chapter 3: Sections 3.1 to 3.3, Related Problems)

Unit – III: Congruences

Introduction – Congruences and Equivalence Relations, Equivalence Relations – Linear Congruences – Linear Diophantine Equations and the Chinese Remainder Theorem (Chapter 4: Sections 4.1 to 4.4, Related Problems)

Unit – IV: Congruences (continued)

Polynomial Congruences – Modular Arithmetic: Fermat’s Theorem – Wilson’s Theorem and Fermat Numbers – Pythagorean Equation (Chapter 4: Sections 4.5 to 4.8, Related Problems)

Unit – V: Arithmetic Functions

Introduction – Sigma function, Tau function, Dirichlet product – Dirichlet Inverse, Moebius function, Euler’s Function, Euler’s Theorem, An application of algebra (Chapter 5: Sections 5.1 to 5.3, Related Problems)

Book for Study:

- Neville Robinns, Beginning Number Theory, 2nd Ed., Narosa Publishing House Pvt. Limited, Delhi, 2006.

Books for Reference :

1. David M. Burton, Elementary Number Theory 6th Ed., Tata McGraw-Hill Edition, Indian reprint, 2007.
2. Neville Robinns, Beginning Number Theory, 2nd Ed., Narosa Publishing House Pvt. Limited Delhi, 2007.
3. Richard E. Klima, Neil Sigmon, Ernest Stitzinger, Applications of Abstract Algebra with Maple, CRC Press, Boca Raton, 2000.

E-Learning source: [mathworld.wolfram.com/topics/Number Theory.html](http://mathworld.wolfram.com/topics/Number%20Theory.html).

Year/Semester: III Year /V Semester

Credits: 4

Elective:

Code: M

Hours/Week: 6

Mathematical Modeling

Objective: This course aims at the study and to discuss the mathematical modeling through differential equations, systems of ordinary differential equations, difference equations, graphs, calculus of variations and dynamical programming.

Unit - I: Mathematical Modeling: Need, Techniques, Classifications and Simple Illustrations

Simple Techniques requiring Mathematical Modeling – The Technique of Mathematical Modeling – Classification of Mathematical Models – Some Characteristics of Mathematical Models – Mathematical Modeling through Geometry – Mathematical Modeling through Algebra – Mathematical Modeling through Trigonometry. (Chapter 1: Sec: 1.1 – 1.7)

Unit - II: Mathematical Modeling through Ordinary Differential Equations of First Order

Mathematical Modeling Through Differential Equations – Linear Growth and Decay Models – Non- Linear Growth and Decay Models – Compartment Models – Mathematical Modeling in Dynamics through Ordinary Differential Equations of First Order - Mathematical Modeling of Geometric Problems Through Ordinary Differential Equations of First Order. (Chapter 2: Sec: 2.1 -2.6)

Unit - III: Mathematical Modeling through Systems of Ordinary Differential Equations of First Order

Mathematical Modeling in Population Dynamics – Mathematical Modeling of Epidemics through Systems of Ordinary Differential Equations of First Order – Compartment Models through Systems of Ordinary Differential Equations – Mathematical Models in Medicine, Arms Race, Battles and International Trade in terms of Systems of Ordinary Differential Equations. (Chapter 3: Sec: 3.1, 3.2, 3.3, 3.5)

Unit - IV: Mathematical Modeling through Ordinary Differential Equations of Second Order

Mathematical Modeling of Planetary Motions – Mathematical Modelling of Circular Motion and Motion of Satellites – Mathematical Modeling through Linear Differential Equations of Second Order. (Chapter 4: Sec: 4.1, 4.2, 4.3 (4.3.1 & 4.3.2 only))

Unit - V: Mathematical Modeling Through Difference Equations

The Need for Mathematical Modelling through Difference Equations: Some Simple Models – Basic Theory of Linear Difference Equations with constant co-efficients - Mathematical Modelling Through Difference Equations in Population Dynamics and Genetics (Chapter 5: Sec: 5.1, 5.2 & 5.4)

Book for Study:

1. J.N. Kapur, Mathematical Modelling, New Age International (P) Ltd., Publishers, Reprint 2000.

Books for Reference:

1. Belinda Barnes, Glenn Robert Fulford, Mathematical Modelling with case studies, Chapman & Hall/CRC, 2009.
2. Brian Albright, Mathematical Modeling with Excel, Jones and Bartlet Publishers, LLC, First Indian Edition, 2010.
3. Dilwyn Edwards, Mike Hamson, Guide Mathematical Modelling, PALGRAVE, St.Martin's Press, LLC, Reprint 2007.
4. Glenn Fulford , Peter Forrester , Arthur Jones Modelling with Differential and Difference Equations, Cambridge University Press 1997.
5. R.Robert Huckfeldt, C.W.kohfeld, Thomas W.Likens, Dynamic modeling An Introduction, SAGE Publications, 1982.

E – Learning source: https://people.maths.bris.ac.uk/~madjl/course_text.pdf.

Year/Semester: III Year /V Semester
Credits: 4

Code: M
Hours/Week: 6

Elective:

Graph Theory

Objective: To study the basic concepts of Graph Theory such as Trees, planarity, Coloring, directed graphs and know the applications to Travelling Salesman Problem, teleprinter's problem, maximum network flow and arborescence.

Unit – I: Basic Concepts of Graph

What is a graph? - Application of graphs – Finite and Infinite graphs – Incidence and degree – Isolated Vertex, Pendant Vertex and Null graph – Isomorphism – Sub graphs – Walks, Paths and Circuits – Connected graphs, disconnected graphs and components – Euler graphs – Operations on graphs – More on Euler graphs – Hamiltonian Paths and Circuits – The Travelling Salesman Problem. (Chapter 1(Except 1.6), Chapter 2: (2.1 – 2.10) (Except 2.3))

Unit – II: Trees

Trees – Some properties of trees – Pendant Vertices in a tree – distance and centers in a tree – Rooted and Binary tree – On Counting trees - Spanning trees.(Chapter 3:(3.1 – 3.7))

Unit – III: Cut Sets and Planar Graph

Cut-Sets – Some properties of a cut set – All cut sets in a graph – Fundamental circuits and Cut – Sets – Connectivity and Separability – Network flows – Combinatorial Vs. Geometric

graph – Planar graphs – Kuratowski’s two graphs – Different Representation of a planar graph. (Chapter 4: (4. 1 – 4. 6), Chapter 5: (5.1 – 5.4))

Unit – IV: Colouring and Matching

Incidence matrix – Submatrices of A (G) – Chromatic number – Chromatic partitioning – Chromatic Polynomial – Matchings. (Chapter 7: (7.1, 7.2), Chapter 8: (8.1 – 8.4))

Unit – V: Digraphs

What is a directed graph? – Some types of digraphs – Digraphs and binary relations – Directed paths and Connectedness–Euler Digraphs–Trees with directed edges. (Chapter 9: (9.1 – 9.6))

Book for Study:

1. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science –Prentice–Hall of India, 2001.

Books for Reference:

1. Douglas B. West, Introduction to Graph Theory – Prentice - Hall of India, 2001.
2. Gary Chartrand and Ping Zhang, Introduction to Graph Theory – Tata McGraw–Hill, 2006.
3. Harary F, Graph Theory – Addison –Wesley Publishing Company, 1989

E – Learning source: <http://cs.bme.hu/fcs/graphtheory.pdf>

Certificate Course

Year/Semester - V

Credits: 2[#]

Code:

Hours/ Sem: 30 Hrs/Sem

Mathematical Modeling with Spreadsheet

Objective: To analyze the long term behavior of discrete and continuous dynamical systems numerically and graphically using Spreadsheet.

Unit – I

Difference Equations – Dynamical Systems – Long Term Behavior and Equilibria, Growth of a Bacteria Population (Chapter 4, Sections: 4.1, 4.2, 4.3)

Unit – II

A Linear Predator - Prey Model – A Nonlinear Predator-Prey Model - Epidemics (Chapter 4, Sections: 4.4, 4.5, 4.6)

Unit – III

Formation of Differential Equations – Newton’s Law of Cooling – Euler’s method (Chapter 5, Sections: 5.1, 5.2)

Unit – IV

Quadratic Population Model – Volterra’s Principle (Chapter 5, Sections: 5.3, 5.4)

Unit – V

Lanchester Combat Models – Eigen Values (Chapter 5, Sections: 5.5, 5.6)

Book for Study:

Brian Albright, Mathematical Modeling with Excel, Jones & Bartlett, Student Edition, 2012.

Books for Reference:

1. Allman, E.S, and J.A.Rhodes, Mathematical models in Biology, An Introduction, Cambridge, UK, Cambridge University Press, 2004.
2. Coleman,C.S, Combat Models, In modules in applied mathematics, Vol.1, Differential Equations Models, ed, W.F.Lucas, new York, NY, Springer-Verlag, 1983.
3. M.M.Meerschaert, Mathematical Modeling, 2nd ed, San Diego,CA, Academic press, 127, 1999.

Year/Semester: III Year/VI Semester**Credits : 6****Code: M****Hours/Week:6****Linear Algebra**

Objective: To study the transformations, Matrices, Systems of Linear Equations, Determinants and Diagonalization in Vector Space.

Unit - I: Vector Spaces

Introduction - Vector Spaces - Subspaces - Linear Combinations and Systems of Linear Equations - Linear Dependence and Linear Independence - Bases and Dimension - Maximal Linearly Independent Subsets (Chapter 1)

Unit - II: Linear Transformations and Matrices

Linear Transformations, Null Spaces and Ranges - The Matrix Representation of a Linear Transformation - Composition of Linear Transformations and Matrix Multiplication - Invertibility and Isomorphisms - The Change of Coordinate Matrix - Dual Spaces - Homogeneous Linear Differential Equations with Constant Coefficients (Chapter 2)

Unit – III: Matrix Operations and Systems of Linear Equations

Elementary Matrix Operations and Elementary Matrices - The Rank of a Matrix and Matrix Inverses - Systems of Linear Equation Theoretical Aspects - Systems of Linear Equations Computational Aspects . (Chapter 3)

Unit – IV: Determinants

Determinants of Order 2 - Determinants of Order n - Properties of Determinants - Summary Important Facts about Determinants - A Characterization of the Determinant. (Chapter 4)

Unit – V: Diagonalization

Eigenvalues and Eigenvectors - Diagonalizability - Matrix Limits and Markov Chains - Invariant Subspace and the Cayley-Hamilton Theorem (Chapter 5)

Book for Study:

Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra, Fourth Edition, Prentice hall of India, New Delhi (2007).

Books for Reference:

1. S. Arumugam and A.Thandapani, Modern Algebra, SciTech Publications Pvt. Ltd.

2. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
3. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007.
4. N. Herstein, Topics in Algebra, John Wiley and sons, 2-e, New Delhi, 2006.
5. John B. Fraleigh, A First Course in Abstract Algebra, 7-e, Pearson Education Publication, New Delhi 2003.
6. S. Lang, Introduction to Linear Algebra, 2nd Ed., Springer, 2005.
7. Saunders MacLane and Garrett Birkhoff, Algebra, 2-e, Macmillan Publishing Co. Inc, New York, 1979.
8. Santiago, Modern Algebra, Arul Publications, Madras, 1988.
9. Serge Lang, Algebra, Addition Wesley Publishing Company, London 1965.
10. Surjeeth Singh and Quazi Zameeruddin, Modern Algebra 2-e, Vikas Publishing House Pvt.Ltd., New Delhi, 1975.

E – Learning source: <http://mathworld.wolfram.com>

Year/Semester: III Year /VI Semester
Credits: 6

Code: M
Hours/Week: 6

Real Analysis – II

Objective: To study on infinite series, test of convergence, sequence of functions, uniform convergence and power series.

Unit – I: Infinite Series

Introduction – Convergent and divergent sequences of complex numbers – Limit superior and limit inferior of a real valued sequence – Monotonic sequences of real numbers – Infinite series – Inserting and removing parentheses – Alternating series. (Chapter 8: Sections 8.1 to 8.7, Related Problems)

Unit - II: Test of Convergence

Absolute and conditional convergence – Real and imaginary parts of a complex series – Test for convergence of series with positive terms – The geometric series – The integral test – The big oh and little oh notations – The ratio test and the root test – Dirichlet's test and Abel's test. (Chapter 8: Sections 8.8 to 8.15, Related Problems)

Unit - III: Sequence of Functions

Point wise convergence of sequences of functions – Examples of sequences of real-valued functions – Definition of uniform convergence – Uniform convergence and continuity – The Cauchy condition for uniform convergence – Uniform convergence of infinite series of functions (Chapter 9: Sections 9.1 to 9.6, Related Problems)

Unit - IV: Uniform Convergence and Power Series

Uniform convergence and differentiation – Sufficient conditions for uniform convergence of a series – Uniform convergence and double sequences – Mean convergence – Power series – Multiplication of power series – The substitution theorem (Chapter 9: Sections 9.10 to 9.16, Related Problems).

Unit - V: Power Series

Reciprocal of a power series – Real power series – The Taylor's series generated by a function – Bernstein's theorem – The binomial series – Abel's limit theorem – Tauber's theorem (Chapter 9: Sections 9.17 to 9.23, Related Problems).

Book for Study:

1. Tom M. Apostol, Mathematical Analysis, Indian student second edition, Narosa Publishing House, Chennai, 20th Reprint, 2002.

Books for Reference :

1. P. N. Arora and Ranjit Singh, First course in Real Analysis, Third edition, Sultan Chand and Sons Publishers, New Delhi, 1981.
2. S. Arumugam, Modern Analysis, New Gamma Publishers, Palayamkottai, 1993.
3. E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
4. Robert G. Bartle and Donald R. Sherbert, Introduction to Real Analysis by 2-e John Wiley and Sons, 2000.
5. Richard R. Goldberg, Methods of Real Analysis, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi, 1970.

E-Learning source: mathworld.wolfram.com/Analysis.html.

Year/Semester: III Year / VI Semester

Credits: 6

Code: M

Hours/Week: 6

Complex Analysis

Objective: Upon completing this course the students will be able to use C-R equations to test for analyticity and compute a derivative, work with standard complex functions (mapping properties, derivatives), compute contour integrals using definition and Cauchy integral theorems, compute Taylor and Laurent series expansions of functions and apply the Residue theorem in the evaluation of integrals.

Unit – I: Analytic Functions

Functions of a complex variable – Limits – Theorems on limit – Continuous functions – Differentiability – The Cauchy-Riemann equations – Analytic functions – Harmonic functions. (Chapter 2: Sections 2.1 to 2.8)

Unit – II: Conformal Mapping and Bilinear Transformations

Conformal mapping – Elementary transformations – Bilinear transformations – Cross ratio – Fixed points of bilinear transformations – The mapping $w = z^2$, $w = e^z$, $w = \sin z$, (Chapter 2: Section 2.9, Chapter 3: Sections 3.1 to 3.4, Chapter 5: Sections 5.1, 5.3, 5.4)

Unit – III: Complex Integration

Definite integral – Cauchy's theorem – Cauchy's integral formula – Higher derivatives. (Chapter 6: Sections 6.1 to 6.4)

Unit – IV: Series Expansions

Ta

Taylor's series – Laurent's series – Zeros of an analytic function. (Chapter 7: Sections 7.1 to 7.3)

Unit – V: Singularities and Calculus of Residues

Singularities – Residues – Cauchy’s residue theorem (Chapter 7: Section 7.4, Chapter 8: Sections 8.1 & 8.2)

Book for Study:

1. S.Arumugam, A.Thangapandi Isaac, A. Somasundaram, Complex Analysis, Scitech Publications (India) PVT LTD, Chennai, Reprint, May 2011.

Books for Reference:

1. Goyal, Gupta, Functions of a Complex Variable, Pragati Prakashan, Meerut, 2003.
2. T.K.Manicavachagom Pillay, Dr.S.P.Rajagopalan, Dr.R.Sattanathan, Complex Analysis, S.ViswanathanPvt.Ltd, Chennai, 2011.
3. Murray R.Spiegel, Seymour Lipschutz, John J.Schiller, Dennis Spellman, Complex Variables, Schaum"s Outlines, Second Edition, New Delhi, 2010.
4. S.Ponnusamy, Foundations of Complex Analysis, Narosa Publishing House, New Delhi, 2000.
5. Shanti Narayan, Theory of Functions of a Complex Variable, S.Chand& Company LTD, New Delhi, 2001.

E-Learning source: <http://math.sfsu.edu/beck/papers/complex.pdf>,
<http://www.math.ku.dk/noter/filer/koman-12.pdf>

Year/Semester: III Year /VI Semester

Credits: 4

Code: M

Hours/Week: 5

Resource Management Techniques

Objective: To know the origin and development of Operations Research. To develop the skill of formulation of LPP and different techniques to solve it. To know the applications of Transportation and Assignment problems. To study the optimizing problems in Game theory, Networking and Inventory control.

Unit – I: Linear Programming Problem

Introduction – Formulation of the Problem – Illustration on Mathematical Formulation of LPPs – Procedure of solving LPP by Graphical Solution Method – Simplex method — Duality theory. (Chapter 2, 3, 4, 6(6.1 – 6.3) – Text Book – 2)

Unit – II: Transportation Problem and Assignment Problem

Introduction – LP Formulation of the Transportation Problem – Solution of a Transportation Problem – Finding an Initial Basic feasible Solution – Test for Optimality–Degeneracy in Transportation Problem–Transportation Algorithm (MODI Method). Assignment Problem: Introduction – Mathematical Formulation of the Problem – Solution Methods of the Assignment Problem – Special Cases in Assignment Problem – The Travelling Salesman Problem. (Chapter 10 (10:1, 10:2, 10:8, 10:9, 10:10, 10:12, 10:13), Chapter 11(11:1 – 11:4, 11:7) – Text Book – 1)

Unit – III: Games and Strategies

Introduction – Two Person Zero Sum Games – Some Basic Terms – The Maximin – Minimax Principle – Games without Saddle Points – Mixed Strategies – Graphic Solution of

2xn and mx2 Games –Dominance Property.(Chapter 17(17:1 – 17:7) –Text Book– 1)

Unit – IV: Inventory Control

Introduction – Types of Inventories – Reasons for carrying Inventories – The inventory Decisions – Objectives of Scientific Inventory Control – Costs Associated with Inventories – Factors Affecting Inventory Control – An Inventory Control Problem – The Concept of EOQ – Deterministic Inventory Problems with no Shortages (Problems only) – Deterministic Inventory Problems with Shortages (Problems only). (Chapter 19 (19:1 – 19:11) – Text Book – 1)

Unit - V: Network Scheduling by PERT/CPM

Introduction – Network: Basic Components – Rules of Network Construction – Critical Path Analysis – Probability Considerations in PERT–Distinction between PERT and CPM.(Chapter 25 (25:1, 25:2, 25:4, 25:6, 25:7, 25:8)– Text Book – 1)

Book for Study:

1. KantiSwarup, P. K. Gupta, Man Mohan, Operations Research – Sultan Chand & Sons, Reprint 2013
2. S. Kalavathy, Operations Research – Vikas Publishing House Pvt. Ltd., 5th Edition, 2006.

Books for Reference:

1. P.K Gupta, Problems in Operations Research,2-e, S.Chand& Sons, New Delhi, 1983.
2. R.Pannerselvam, Operations Research, Prentice Hall of India Pvt. Ltd., New Delhi, 2005.
3. S.D.Sharma, Operations Research, KedarNath Ram Nath and Co, Meerut, 1998.
4. H.Taha, Operational Research, Prentice Hall, New Delhi, 2008.

E – Learning source: http://cs.bme.hu/fcs/operations_research.pdf

Year/Semester: III Year/VI Semester

Credits : 4

Code: M

Hours/Week: 5

Mathematical Statistics

Objective: To apply statistical techniques for interpreting and drawing conclusion for business problem.

Unit - I: Multiple and Partial Correlation

Partial correlation – Partial correlation coefficient – Partial correlation in case of four variables – Multiple correlations – Multiple regression. (Chapter 16: Pages16.1 to 16.21)

Unit – II: Time Series

Components of time series – Secular trend – Seasonal variation – Cyclical variation – Irregular variation – Measures of trend – Graphic Method – Semi average method – Moving average method – Period of moving average – Method of least squares – Measures of seasonal variation – Method of averages – Moving average method – Ratio to a moving average method – Ratio to trend method. (Chapter 37: Pages 37.1 to 37.22)

Unit - III: Sampling

Sampling: Sampling methods, sampling error and standard error – Relationship between sample size and standard error. Testing hypothesis: Testing of means and proportions – Large and small samples – z-test and t-test.(Chapter 24: Pages 24.1 to 24.44, 26.1 to 26.45).

Unit - IV: F- Distribution

F Distribution – Testing equality of population variances –Analysis of variance – One way and two way classification. (Chapter 27: Pages 27.1 to 27.29).

Unit - V: Chi square Distribution

Chi-square distribution – Characteristics and application – Test of goodness of fit and test of independence– Test of homogeneity.(Chapter 28: Pages 28.1 to 28.44).

Note: The Proportion between Theory and Problem shall be 1:4.

Book for Study:

1. P.R.Vittal and V.Malini, Statistical and Numerical Methods, Margham publications, Chennai, 2002.

Books for Reference:

1. S.C. Gupta and V.K.Kapoor, Fundamental of Mathematical Statistics, 11-e, Sultan Chand & Sons, New Delhi, 2004.
2. S.P.Gupta, Statistics Methods,, Sultan Chand & Sons, New Delhi 2000.
3. Richard I Levin and David S. Rubit, Statistics for Management, Seventh edition, Pearson Education, New Delhi, 2001.
4. D.C. Sancheti and V.K.Kapoor, Business Statistics 2-e, Sultan Chand & Sons, New Delhi 1979.

E – Learning source: http://www.college_stats.org/

Certificate Course

Year/Semester: III Year/ VI Semester

Credits : 2[#]

Code:

Hours/Sem: 30 Hrs/Sem

SCILAB for Mathematical Computations

Objective: To acquire the practical knowledge of SCILAB for solving the matrices, polynomials and differential equations.

Unit - I:

Login - Talking between Scilab and the Editor - Basic Commands - Linear Algebra - Loops and Conditionals - Help in Scilab. (Chapter 1: Sections 1.1 to 1.7).

Unit – II:

Matrices and Vectors - Solving Equations - Creating Matrices - Systems of Equations. (Chapter 2: Section 2.2).

Unit – III:

Plotting Lines and Data - Adding a Line - Hints for Good Graphs – Graphs - Function Plotting - Component Arithmetic - Printing Graphs - Saving Graphs. (Chapter 3: Sections 3.2, 3.3).

Unit – IV:

Evaluation of Polynomials – Polynomials - Linear Least Squares (Heath Computer Problem). (Chapter 6: Sections 6.2, 6.3, 6.4).

Unit – V:

Differential Equations - Scalar ODE's - Order 2 ODE's . (Chapter 8: Sections 8.2).

Book for Study:

1. Graeme Chandler and Stephen Roberts, Scilab Tutorials for Computational Science, 2002.

Books for Reference:

1. Scilab for very beginners, Scilab Enterprises, S.A.S, 143, bis rue Yves Le Coz – 78000 Versailles (France).
2. K. S. Surendran, SCILAB FOR DUMMIES, Version 2.6.
3. Some notes on SCILAB, Université de Nice Sophia-Antipolis.

Year/Semester: III Year /V Semester

Credit: 1

Elective:

Code:

Hours/Week: 2

**Non-Major Elective - I
Mathematics for Competitive Examinations-I**

Objective: To prepare the students for competitive examinations

Unit-I:

Average–Problems on numbers (Chapters 6, 7)

Unit-II:

Ratio and proportion (Chapter12)

Unit -III:

Time and work–Time and distance (Chapters 15, 17).

Unit-IV:

Simple interest and compound Interest (Chapters 21, 22).

Unit- V:

Permutations and combinations (Chapter 30).

Book for Study:

1. Dr. R.S. Aggarwal, Quantitative Aptitude (for Competitive Examinations), Revised Edition, S. Chand and Company Ltd., Ram Nagar, New Delhi, Reprint 2012.

E-learning source: www.tcyonline.com/tests/mathematics-competitive-exam

Question Paper Pattern: 100 Objective type questions each carrying 0.75 mark for semester examinations.

Year/Semester: III Year /VI Semester

Credit: 1

Elective - II

Code:

Hours/Week: 2

Non-Major Elective - II
Mathematics for Competitive Examinations – II

Objective: To prepare the students for competitive examinations.

Unit - I:

Profit and Loss-Partnership (Chapters 11, 13)

Unit - II:

Problems on trains - Boats and streams (Chapters 18, 19)

Unit - III:

Problems on Calendars and Clocks (Chapters 27, 28).

Unit - IV:

Probability- True Discount (Chapters 31, 32).

Unit - V:

Data interpretation problems- Tabulation- Bar graphs (Chapters 36 and 37).

Book for Study:

1. Dr. R.S. Aggarwal, Quantitative Aptitude (for Competitive Examinations), Revised Edition, S. Chand and Company Ltd., Ram Nagar, New Delhi, Reprint 2012.

E-learning source: www.tcyonline.com/tests/mathematics-competitive-exam

Question Paper Pattern: 100 Objective type questions each carrying 0.75 mark for semester examinations.

Year/Semester: III Year/V Semester
Credit: 1*

Code: M

Mathematical Aptitude – I (SSP)

Unit – I:

Simplification – Square Roots and Cube Roots. (Chapters 4, 5).

Unit – II:

Problems on Numbers – Problems on Ages - Surds and Indices (Chapters 7, 8, 9).

Unit – III:

Percentage (Chapter 10).

Unit – IV:

Profit and Loss (Chapter 11).

Unit – V:

Time and Work (Chapter 15).

Book for Study:

1. Dr. R.S. Agarwal, Quantitative Aptitude (For Competitive Examinations), Revised Edition, S. Chand and Company Ltd., Ram Nagar, New Delhi, Reprint 2012.

Book for Reference:

1. R.V. Praveen, Quantitative Aptitude and Reasoning, Second Edition, Eastern Economy Edition, PHI Learning Private Limited, New Delhi, 2013.

Question Paper Pattern: There will be 50 objective type questions: each question carries 1 Mark.

E – Learning source: www.tcyonline.com/tests/mathematics-competitive-exam

Year/Semester: III Year/V Semester
Credit: 1*

Code: M

Mathematical Competence Course (SSP)

Objective: To train the students to acquire knowledge for appearing/ Preparing NBHM and all India PG entrance exams other competitive exams.

Unit – I: Calculus

Local minimum and maximum values – Extreme Values – Sequence series – Binomial, Exponential and Logarithmic series – Differentiation and Integration – Differential equation – Partial difference equations.

Unit – II: Vector Analysis

Gauss divergence theorem – Greens theorem – Stocks theorem – Line, Surface and Volume Integrals – Derivatives of vector valued function – Curl, divergence and grad.

Unit – III: Matrix

Linear transformations – vector space – Linear dependent and independent – Eigen values and Eigen vectors – Orthogonal – Rank of Matrix.

Unit – IV: Analysis

Sequences – Series – Convergence - divergence sequence – monotonically increasing and decreasing – Cauchy – uniform continuous – continuous - differentiable – Derivatives – Metric space – Radius of convergence – Compactness –Residue theorem –connectedness.

Unit – V: Algebra

Sets - Polynomials – Groups – Sub groups – Permutation group–finite group – Cyclic group – Ring – Ideal – Field.

Books for Reference: IIT - JAM model questions and solutions.

1. Abosos Ali Shaikh, Vector Analysis with Applications, Narosa publications, New Delhi, 2009.
2. B.L. Agarwal, Vector Analysis, Pragati Prakasham Publications, 1966
3. P.N. Arora and Ranjit Singh, First course in Real Analysis, Third edition, Sultan Chand and Sons Publishers, New Delhi, 1981.
4. S. Arumugam, Modern Analysis, New Gamma Publishers, Palayamkottai, 1993.
5. P. Duraipandian, Laxmi Duraipandian, Vector Analysis, Emerald Publishers, Chennai, Reprint 1987.
6. I.N. Herstein, Topics in Algebra, John Wiley and sons, 2-e, New Delhi, 2006.
7. T.K. Manicavachagom Pillay, T. Natarajan and K.S. Ganapathy, Algebra Volume I,
8. S.Narayanan and T.K.Manicavachagom Pillay, Calculus Volume I & II, S.Viswanathan Printers Pvt.Ltd, Chennai, 2012.
9. S. Narayanan and T.K. Manicavachagom Pillay, Trigonometry, S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai, 2011.
10. Tom M. Apostol, Mathematical Analysis, Indian student second edition, Narosa Publishing House, Chennai, 2002.

Year/Semester: III Year/VI Semester

Code: M

Credit: 1*

Mathematical Aptitude – II (SSP)

Objective: To prepare the Students for Competitive Examinations.

Unit – I:

Time and Distance – Problem on Trains. (Chapters 17,18).

Unit – II:

Boats and Streams – Simple Interest. (Chapters 19, 21).

Unit – III:

Compound Interest – Calendar (Chapters 22, 27).

Unit – IV:

Permutation and Combination - Probability (Chapters 30, 31).

Unit – V:

True Discount – Banker's Discount (Chapters 32, 33).

Book for Study:

1. Dr. R.S. Agarwal, Quantitative Aptitude (For Competitive Examinations), Revised Edition, S. Chand and Company Ltd., Ram Nagar, New Delhi, Reprint 2012.

Books for Reference:

1. R.V. Praveen, Quantitative Aptitude and Reasoning, Second Edition, Eastern Economy Edition, PHI Learning Private Limited, New Delhi, 2013.

Question Paper Pattern: There will be 50 objective type questions: each question carries 1 Mark.

E – Learning source: www.tcyonline.com/tests/mathematics-competitive-exam

Department of Physics, Sacred Heart College, Tirupattur
B. Sc. Physics [CBCS Pattern]
Programme structure (To be followed from 2017–18 onwards)

| Sem | Paper | Title of the Paper | Hours/ Week | Cre | Marks | |
|--|-------------------------|------------------------------|----------------|-------------------------|-------|-----|
| | | | | | CA | Sem |
| I | Main Core | Mechanics | 3 | 4 | 30 | 70 |
| | Main Core | Properties of Matter | 3 | 4 | 30 | 70 |
| | Allied | Allied Mathematics - I | 6 | 4 | 30 | 70 |
| | Main Core Practicals | Physics Main Practicals - I | 4 | 2 | 40 | 60 |
| | Language | Tamil | 5 | 3 | | |
| | Language | General English | 5 | 3 | | |
| | | Communicative English | - | 1 | | |
| | Life Education | Personal Skills | 2 | 1 | | |
| Christian Religion -1 /Value Education-1 | | 2 | 1 | | | |
| TOTAL | | | 30 | 23 | | |
| II | Main Core | Heat and Thermodynamics | 3 | 4 | 30 | 70 |
| | Main Core | Sound | 3 | 4 | 30 | 70 |
| | Main Core Practicals | Physics Main Practicals – I | 4 | 2 | 40 | 60 |
| | Allied | Allied Mathematics – II | 6 | 4 | 30 | 70 |
| | Language | Tamil - II | 5 | 3 | | |
| | Language | General English - II | 5 | 3 | | |
| | | Communicative English | | 1 | | |
| | Life Education | Social Skills | 2 | 1 | | |
| Christian Religion-2/Value Education-2 | | 2 | 1 | | | |
| TOTAL | | | 30 | 23 | | |
| III | Main Core | Electromagnetism | 3 | 4 | 30 | 70 |
| | Main Core | Optics | 3 | 4 | 30 | 70 |
| | Main Core Practicals | Physics Main Practicals – II | 4 | 2 | 40 | 60 |
| | Allied | Allied Chemistry -I | 6 | 4 | 30 | 70 |
| | Language | Tamil - III | 5 | 3 | | |
| | Language | General English - III | 5 | 3 | | |
| | Life Education | Employability Skills –1 | 2 | 1 | | |
| | | Human Rights | 2 | 1 | | |
| Extra credit Course | Special Project- I | - | 2 [#] | | 100 | |
| TOTAL | | | 30 | 22+2[#] | | |

| Sem | Paper | Title of the Paper | Hours/ Week | Cre | Marks | |
|--------------|-------------------------|--|----------------|-------------------------|-------|-----|
| | | | | | CA | Sem |
| IV | Main Core | Atomic Physics | 3 | 4 | 30 | 70 |
| | Main Core | Spectroscopy | 3 | 4 | 30 | 70 |
| | Main Core Practicals | Physics Main Practicals – II | 4 | 2 | 40 | 60 |
| | Allied | Allied Chemistry – II | 6 | 4 | 30 | 70 |
| | Language | Tamil - IV | 5 | 3 | | |
| | Language | General English - IV | 5 | 3 | | |
| | Life Education | Employability Skills –2 | 2 | 1 | | |
| | | Environmental Science | 2 | 1 | | |
| | Extra credit Course | Special Project II (Repair and Maintenance of Lab Equipments) | - | 2 [#] | | 100 |
| Extension | DEEDS | - | 2 | | | |
| | SHELTERS | - | 2 | | | |
| TOTAL | | | 30 | 26+2[#] | | |

| Semester | Paper | Title of the Paper | Hours/ Week | Credits | Marks | |
|--------------|-----------------------|--|----------------|--------------|-------|-----|
| | | | | | CA | SEM |
| V | Main Core | Classical mechanics and Statistical Physics | 4 | 4 | 30 | 70 |
| | Main Core | Basic Electronics | 4 | 4 | 30 | 70 |
| | Main Core | Solid State Physics | 4 | 4 | 30 | 70 |
| | Main Core | Mathematical Physics | 4 | 4 | 30 | 70 |
| | Main Core | Physics Main Practicals – III (General experiments) | 3 | 3 | 40 | 60 |
| | Main Core | Physics Main Practicals – IV (Electronic experiments) | 3 | 3 | 40 | 60 |
| | Subject Elective | 1. Crystal Growth & Nano Technology 2. Electronic communication systems 3. Renewable Energy and Energy Harvesting | 3 | 2 | 30 | 70 |
| | | 1. Applied optics 2. 8085 Microprocessor and its applications 3. Medical Physics | 3 | 2 | 30 | 70 |
| | Self Study Paper | Astrophysics | – | 1* | - | 100 |
| | Non Major Elective | Repair and maintenance of household appliances | 2 | 1 | 30 | 70 |
| TOTAL | | | 30 | 27+1* | | |

| Semester | Paper | Title of the Paper | Hours/ Week | Credits | Marks | |
|--------------|-----------------------|--|----------------|--------------|-------|-----|
| | | | | | CA | SEM |
| VI | Main Core | Applied Electronics | 5 | 5 | 30 | 70 |
| | Main Core | Nuclear Physics | 5 | 5 | 30 | 70 |
| | Main Core | Quantum Mechanics and Relativity | 4 | 4 | 30 | 70 |
| | Main Core | Physics Main Practicals – III (General experiments) | 2 | 2 | 40 | 60 |
| | Main Core | Physics Main Practicals – IV (Electronic experiments) | 2 | 2 | 40 | 60 |
| | Subject skill | Electrical circuits and Networks | 5 | 4 | 40 | 60 |
| | Subject skill | Basic Instrumentation | 5 | 4 | 40 | 60 |
| | Self Study Paper | Physics Revisited | – | 1* | - | 100 |
| | Non Major Elective | Physics in everyday life | 2 | 1 | 30 | 70 |
| Total | | | 30 | 27+1* | | |

Cumulative Hours and Credits

| SEMESTER | I | II | III | IV | V | VI | TOTAL |
|----------------|-----------|-----------|-------------------------|-------------------------|--------------|--------------|-----------------------------|
| HOURS | 30 | 30 | 30 | 30 | 30 | 30 | 180 |
| CREDITS | 23 | 23 | 22+2[#] | 26+2[#] | 27+1* | 27+1* | 148+4[#]+2* |

Department of Physics, Sacred Heart College, Tirupattur
B. Sc. [CBCS Pattern]
Scheme of Allied Physics Papers for Mathematics, Chemistry and Computer science
(To be followed from 2017–18 onwards)

| Semester | Paper | Title of the Paper | Hours/ Week | Credits | Total Credits/ Hours | Marks | |
|--------------|----------------------|---|----------------|-----------|----------------------------|-------|-----|
| | | | | | | CA | SEM |
| I | Allied – 1 | Allied Physics for Mathematics – I | 4 | 3 | 4/6 | 30 | 70 |
| | Allied Practicals | Allied Physics Practicals for Mathematics | 2 | 1 | | - | - |
| II | Allied – 2 | Allied Physics for Mathematics – II | 4 | 3 | 4/6 | 30 | 70 |
| | Allied Practicals | Allied Physics Practicals for Mathematics | 2 | 1 | | 40 | 60 |
| III | Allied – 1 | Allied Physics for Chemistry – I | 4 | 3 | 4/6 | 30 | 70 |
| | Allied Practicals | Allied Physics Practicals for Chemistry | 2 | 1 | | - | - |
| IV | Allied – 2 | Allied Physics for Chemistry – II | 4 | 3 | 4/6 | 30 | 70 |
| | Allied Practicals | Allied Physics Practicals for Chemistry | 2 | 1 | | 40 | 60 |
| III | Allied – 1 | Allied Physics for Computer science– I | 4 | 3 | 4/6 | 30 | 70 |
| | Allied Practicals | Allied Physics Practicals for Computer science | 2 | 1 | | -- | - |
| IV | Allied – 2 | Allied Physics for Computer science – II | 4 | 3 | 4/6 | 30 | 70 |
| | Allied Practicals | Allied Physics Practicals for Computer science | 2 | 1 | | 40 | 60 |
| Total | | | 36 | 24 | 24/36 | | |

Evaluation pattern

- (1) For Main core theory papers, Subject elective papers, Allied Physics theory papers and Non major elective papers

| Component | Marks |
|-------------------|-------|
| CA | 30 |
| End semester exam | 70 |
| Total | 100 |

CA components

| Component | Marks |
|---|-------|
| 2 CA tests | 20 |
| Assignment/ Problem solving / Quiz/ Open book test /Seminar | 5 |
| Attendance | 5 |
| Total | 30 |

(2) Evaluation patterns for Practicals

- (i) For I B. Sc. Physics and Allied Physics Practicals

| Component | Marks |
|----------------|-------|
| CA | 40 |
| Practical exam | 60 |
| Total | 100 |

CA components

| Component | Marks |
|------------|-------|
| Lab work | 25 |
| 2 CA tests | 15 |
| Total | 40 |

Practical exam components

| Component | Marks |
|----------------|-------|
| Practical exam | 50 |
| Record | 10 |
| Total | 60 |

- (ii) For II B. Sc. Physics and III B. Sc. Physics main practicals

| Component | Marks |
|-----------------|-------|
| CA | 40 |
| Practical exams | 60 |
| Total | 100 |

CA components

| Component | Marks |
|--|-------|
| Lab performance (preparation, performance, calculation, results) | 30 |
| Viva or other components | 10 |
| Total | 40 |

The practical exams for 60 marks may be conducted in the following manner

A practical exam may be conducted at the end of every semester. The course teacher and the Head of the department will be the examiners for the practical exam. The answer papers will be evaluated jointly by both the examiners for 60 marks. The average of the marks of the two practical exams will be taken as the practical exam mark.

(3) For Subject skill papers

Subject skill papers will be evaluated purely internally by the respective course teachers.

| Component | Marks |
|------------|-------|
| Theory | 60 |
| Practicals | 40 |
| Total | 100 |

Evaluation pattern for the Subject skill theory papers

| Component | Marks |
|---------------|-------|
| CA | 30 |
| Semester exam | 30 |
| Total | 60 |

CA components

| Component | Marks |
|---|-------|
| 2 CA tests | 20 |
| Assignment/ Problem solving / Quiz/ Open book test /Seminar | 5 |
| Attendance | 5 |
| Total | 30 |

Evaluation pattern for the Subject skill practicals

| Component | Marks |
|--|-------|
| Practical exam | 30 |
| Other components (Viva, Circuit fault finding, Circuit analysis, Quiz, Mini projects etc.) | 10 |
| Total | 40 |

(4) For self study papers

Self study papers will be evaluated **purely internally** by the respective course teachers for 100 marks. A minimum of 40% marks is essential for the award of extra credits.

(5) For extra credits courses

For the extra credits course, Special Project- I, students may do a physics project of their choice. On completion of the project the students should submit a project report. The project report submitted by the student will be evaluated by a team of two staff members appointed by the Head of the department. Based on their evaluation report, the students may or may not be awarded extra credits.

For the extra credits course, Special Project- II (Repair and maintenance of lab equipments), the students may choose some faulty equipments in the lab, identify the faults or problems in the equipments and rectify them. If a minimum of 20 hours is spent by the student in repairing the instrument, then based on their performance the staff in charge / lab director may recommend extra credits for the students.

Question Paper Pattern for Semester Exam

Main Core, Subject Elective papers, Allied Physics, subject skill elective and Non major elective theory papers

Maximum marks : 70

Section A (10 x 2 = 20 Marks)

Answer all the short answer type questions. Two questions from each unit. Each question carries 2 marks.

Section B (5 x 4 = 20 Marks)

Five either or type questions. Each question carries 4 marks. There should be one question from each unit and one subdivision (a or b) of any one of the questions should be a problem.

Section C (3 x 10 = 30 Marks)

Answer any Three out of Five essay type questions. Each question carries 10 Marks. There must be one question from each unit.

Question Paper Pattern for CA

Main Core, Subject Elective papers, Allied Physics, subject skill elective and Non major elective theory papers

Maximum marks : 50

Section A (5 x 3 = 15 Marks)

Answer all the short answer type questions. Each question carries 2 marks.

Section B (3 x 5 = 15 Marks)

Three either or type questions. Each question carries 5 marks.

Section C (2 x 10 = 20 Marks)

Answer any Two out of Three essay type questions. Each question carries 10 marks.

Classical Mechanics and Statistical Physics

Semester – V
Course Code:

Hours/ Week : 4
Credits 4

Objectives

- Providing in-depth knowledge in Lagrangian and Hamiltonian Principles and Central Force Motion.
- Familiarizing the students with the Fundamentals of Statistical mechanics, Statistical distribution laws and their applications.

Learning Outcomes

On successful completion of this course, the students will be able to

- Understand and apply the Lagrange's equation of motion to simple physical systems and solve dynamical problems involving classical particles by using the Lagrangian and Hamiltonian formulation.
- Apply this knowledge to solve physical problems, including simple pendulum, compound pendulum, linear harmonic oscillator, rigid body rotation, Atwood's machine and planetary motion,
- Develop the Maxwell–Boltzmann, Bose–Einstein and Fermi–Dirac distribution laws from first principles.

Classical Mechanics:

Unit – I: Lagrangian Formulation and Applications

Constraints – degrees of freedom – generalized co-ordinates – principle of virtual work – D'Alembert's principle – Lagrangian function – Lagrange's equation from D'Alembert's principle – applications: simple pendulum, compound pendulum and Atwood's machine.

Unit – II: Hamiltonian Formulation and Applications

Hamilton's principle – physical significance of the Hamiltonian function – Hamilton's canonical equations of motion from Hamilton's principle – Lagrange's equation from Hamilton's principle – applications of Hamilton's equations: simple pendulum, linear harmonic oscillator, motion of a disc.

Unit – III: Central Force Motion

Central force field – self energy motion of a particle under central force field – general properties of central force motion – two body central force problem – reduction to one body problem – first integrals – Lagrangian analysis – Kepler's problem: inverse square law of force.

Statistical Mechanics

Unit – IV: Classical Statistics

Phase space – microstate and macro state – ensembles – different types of ensembles – density of states – statistical postulates – entropy and thermo dynamical probability –

Maxwell-Boltzmann distribution law – Application of Maxwell-Boltzmann distribution law to a mono atomic gas – average, RMS and most probable velocities.

Unit – V: Quantum Statistics

Bose-Einstein distribution law – application of Bose - Einstein distribution law to photon gas (Black body radiation) – Fermi-Dirac distribution law – application of Fermi-Dirac distribution law to electron gas – Fermi energy – Fermi function – comparison of M-B, B-E and F-D statistics.

Books for study

1. G. Aruldas, Classical Mechanics, Prentice–Hall of India Pvt. Ltd, New Delhi, 2008.
2. Brijlal, N. Subramanyam, Thermal and Statistical physics, S. Chand & Company Ltd, New Delhi, 1989.
3. S. L. Gupta, V. Kumar, Statistical mechanics, Meerut, Pragati Prakashan, 2008.
4. Kamal Singh, S.P. Singh, Elements of Statistical mechanics, S. Chand & Company Ltd, New Delhi, 1999.

Books for reference

1. Goldstein Poole & Safko, Classical Mechanics, 3rd Edition, Addison wesley Pvt. Ltd., 2011.
2. Gupta, Kumar and Sharma, Classical Mechanics, Meerut, Pragati Prakashan, 2012.
3. K. Sankara Rao, Classical Mechanics, Prentice – Hall of India (P) Ltd, New Delhi, 2005.
4. Palash B. Pal, An Introductory Course of Statistical Mechanics, Narosa Publishers, New Delhi, 2008.
5. R. B. Singh, A primer of Statistical Mechanics, New Age International (P) Ltd, New Delhi, 2006.

Websites

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2. <http://www.colorado.edu/physics/EducationIssues/ClassicalMechanics/materials.html/>
3. <http://isites.harvard.edu/course/colgsas-2068/>
4. <http://ocw.mit.edu/courses/physics/>
5. en.wikibooks.org/wiki/Classical_Mechanics/
6. <http://ocw.mit.edu/courses/physics/8-333-statistical-mechanics-i-statistical-mechanics-of-particles-fall-2013/>
7. <http://www.compadre.org/stp/>

Basic Electronics

Semester– V
Course Code:

Hours/week : 4
Credits 4

Objectives

- Providing an overview of the principles, operation and applications of diodes, BJT, FET, MOSFET and UJT.
- Providing an overview of amplifiers, types of amplifier, feedback amplifiers and oscillators and their applications in different electronic fields.
- Introducing the students to operational amplifiers and their linear and non-linear applications.

Learning Outcomes

Upon completion of the course, the students will be able to

- Understand the implications of characteristics of PN junction diodes, Zener diodes, Transistors, FETs, MOSFETs and UJTs.
- Describe the purpose of multistage amplifiers and operating characteristics of R-C coupled transistor amplifier.
- Gain an understanding of operational amplifiers and their applications as integrators, differentiators, sign changers, summer and subtractor.
- Describe the purpose and working of various transistor oscillators and multivibrators.

Unit – I: Rectifiers, Power Supplies and Wave Shaping Circuits

Crystal diode rectifiers – Half wave, center-tap full wave and full wave bridge rectifiers – efficiency – ripple factor – types of filter circuits – capacitor filter – choke input filter – π filter – Zener diode – V-I characteristics – Zener diode as a voltage stabilizer – clipping and clamping circuits.

Unit – II: Special Devices

JFET: JFET biasing – JFET characteristics – parameters – MOSFET: enhancement MOSFET – construction and working of n-channel E-MOSFET – depletion MOSFET – construction and working of n-channel D-MOSFET – UJT – construction and working – UJT characteristics.

Unit – III: Amplifiers

Faithful amplification – transistor biasing: voltage divider method – performance analysis of single stage transistor amplifiers using hybrid parameters – expressions for current gain, voltage gain, input and output impedances – two stage RC coupled amplifiers - decibel gain, bandwidth and GBW product – classification of power amplifiers – transformer coupled class A power amplifier - difference between voltage and power amplifiers – heat sinks.

Unit – IV: Operational Amplifiers

Characteristics of ideal op. amp – differential amplifier – CMRR – voltage gain of op. amp in inverting and non-inverting modes – applications – sign changer, scale changer – voltage follower – inverting summing amplifier – subtractor – integrator – differentiator – analog computation: Solving simultaneous linear equation – solving second order differential equation.

Unit – V: Oscillators

Feedback amplifiers – types of feedback – Barkhausen criteria – construction and working of Hartley and Phase shift oscillators – expressions for frequency, conditions for oscillations and frequency stability of Hartley and Phase shift oscillator – Multivibrators – Astable multivibrators – UJT relaxation oscillator.

Books for study

1. V. K. Mehta, Principles of Electronics, S. Chand & Co. Ltd., New Delhi, 2003.
2. Atul P. Godse, Deepali A. Godse, Electronic Circuits, Technical Publications, Pune, 2009.

Books for Reference

1. J. Millman and C. Halkias, Integrated Electronics, Tata McGraw Hill, New Delhi, 2001.
2. Thomas L. Floyd, Electronic Devices, Kindersley (India) Pvt. Ltd., New Delhi, 2003.
3. Charles A. Schuler, Roger L. Tokheim, Electronic Principles and Applications, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
4. M. Arul Thalopathy, Basic and Applied Electronics, Comtek publisher, Chennai, 2005.
5. P. K. Palanisamy, P. Ramesh Babu, T. R. Ganesh Babu, Electronic Devices and Circuits, Scitech Publications (India) Pvt. Ltd., Chennai, 2005.
6. Allen Mottorshead, Electronic Devices and Circuits, Prentice Hall of India, New Delhi, 1996.
7. P. Arun, Electronics, Narosa Publishing House, New Delhi, 2008.
8. B. Basavaraj, A Text Book of Basic Electronics, Himalaya Publishing House, Mumbai, 2007.

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1. www.evilmadscientist.com/2012/basics-introduction-to-zener-diodes/
2. www.elprocus.com/working-theory-of-an-rc-coupled-amplifier/
3. www.circuitstoday.com/transistor-amplifier
4. www.visionics.a.se/html/.../RC%20Coupled%20Amplifier1.html
5. www.circuitstoday.com/ujt-uni-junction-transistors
6. www.electronics-tutorials.ws/power/unijunction-transistor.html
7. www.allaboutcircuits.com/textbook/semiconductors/chpt-5/junction-field-effect-transistors-jfet/
8. www.futureelectronics.com/en/transistors/jfet-transistor.aspx
9. www.electronics-tutorials.ws/transistor/tran_6.html
10. www.learnabout-electronics.org/Oscillators/osc10.php

Solid State Physics

Semester- V
Course Code :

Hours/week: 4
Credits: 4

Objectives

- To provide an understanding of the basics of crystal physics, metals, semiconductors, magnetic materials, superconductors and dielectric materials.
- To familiarise with the various theoretical models to study the properties of magnetic materials, superconductors.

Learning outcomes

- Students will learn and understand the crystal structure and Bragg's law.
- Understand the concept of band theory and classification of materials.
- Students able to learn about the properties of superconductors and magnetic materials.

Unit-I: Crystal Structure

Solids – amorphous and crystalline materials – lattice translation vectors – unit cell – primitive cell – reciprocal lattice – Miller indices – packing factor – SC – BCC – FCC structures – diffraction of X-rays by crystals – Coolidge tube – Bragg's law.

Unit–II: Elementary Lattice Dynamics

Lattice vibrations and phonons – acoustical and optical phonons – qualitative description of the phonon spectrum in solids – specific heat capacity – Dulong and Pettit’s law – Einstein and Debye theories of specific heat of solids.

Unit–III: Magnetic Properties of Matter

Dia – para – ferromagnetic materials – quantum mechanical treatment of paramagnetism – Curie’s law – Weiss’s theory of ferromagnetism – ferromagnetic domains – discussion of B-H curve – ferrites and their applications.

Unit–IV: Dielectric Properties

Polarization – dielectric constant – local electric field at an atom – depolarization field – electric susceptibility – polarizability – Clausius-Mosotti equation – frequency and temperature dependence of polarization – classical theory of electric polarizability – Langevin-Debye equation – complex dielectric constant.

Unit–V: Elementary band theory and Superconductivity

Elementary band theory: Conductors – semiconductors and insulators – conductivity of semiconductors – mobility – Hall Effect – Hall coefficient.

Superconductivity: Experimental results – critical temperature – critical magnetic field – isotope effect – Meissner effect – type I and type II superconductors – BCS theory (Qualitative treatment) – London’s equations – applications.

Books for study

1. Charles Kittel, Introduction to Solid State Physics, Wiley & Sons, New York, 1996.
2. A. J. Dekker, Solid State Physics, McMillan & Co, New Delhi, 2002.
3. S.O. Pillai, Solid State Physics, New age international publishers, New Delhi, 2003.

Books for reference

1. J.P. Srivastava, Elements of Solid State Physics, 2nd edition, Prentice–Hall, India, 2006.
2. Leonid V. Azaroff, Introduction to Solids, Tata Mc–Graw Hill, 2004.
3. Neil W. Ashcroft, N. David Mermin, Solid State Physics, Cengage Learning, 1976.
4. Rita John, Solid State Physics, McGraw Hill, 2014.
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6. M. Ali Omar, Elementary Solid State Physics, Pearson, India, 1999.
7. M.A. Wahab, Solid State Physics, Narosa Publications, 2011.

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3. http://ocw.mit.edu/courses/materials-science-and-engineering/3-091sc-introduction-to-solid-state-chemistry-fall-2010/syllabus/MIT3_091SCF09_aln03.pdf
4. <http://griffin.ucsc.edu/teaching/08Q1-155/download/Lecture%2019%20-%20Magnetic%20Order.pdf>
5. <http://www.eng.utah.edu/~lzang/images/lecture-11.pdf>
6. http://nptel.iitm.ac.in/courses/103104045/pdf_version/lecture20.pdf
7. <http://www.eng.utah.edu/~lzang/images/lecture-12.pdf>

Mathematical Physics

| | | | |
|-------------|-----|------------|---|
| Semester | : V | Hours/Week | 4 |
| Course Code | : | Credits | 4 |

Objectives

- To develop sensitivity towards various mathematical techniques in the minds of students which are useful in physics and engineering applications.
- To impart the basic concepts of mathematics and to make the students to realize the usage of mathematics in physics.

Learning Outcomes

- Students will understand the concept of vectors and will be able to resolve a vector in to components.
- Students will understand that the importance and application of Dirac delta function.
- Students will understand the primary use of Green's function to solve non-homogeneous boundary value problems.
- Students will understand the importance and applications of Fourier series.
- Students will acquire the ability to solve higher order partial differential equations by the method of separation of variables.

Unit – I: Vectors – I

Vector Algebra – gradient of a scalar field – divergence of a vector field– curl of a vector field – vector identities – Gauss's divergence theorem – Gauss's law in differential form – Poisson and Laplace equation – Stoke's theorem – Green's theorem (using Gauss's divergence theorem) – Green's theorem for a plane – Helmholtz's theorem.

Unit – II: Vectors – II

Orthogonal curvilinear coordinates – differential operators (gradient, divergence, Laplacian and curl in terms of orthogonal curvilinear coordinates – differential operators (gradient, divergence, Laplacian and curl in terms of spherical polar and cylindrical coordinates.

Unit – III: Dirac-Delta function and Green's function

Dirac-Delta function – representations of Dirac Delta function - Kronecker delta – properties of Delta function – Fourier transform delta function – Laplace transform delta function – derivative of delta function –Three dimensional delta function.

Green's function – Properties – Methods of solution in one dimension – symmetry property of Green's function – Eigen function expansion

Unit-IV: Fourier series

Periodic functions – evaluation of Fourier coefficients – Dirichlet's conditions (statement only) – Orthogonality of sine and cosine functions – even and odd functions and their Fourier expansions – applications: half and full wave rectifier.

Unit – V: Applications of Partial Differential Equations in Physics

Laplace's equation – solution in Cartesian coordinates – two dimensional steady flow of heat– solution in two dimensional cylindrical coordinates (circular harmonics) – solution in spherical polar coordinates – variable linear flow of heat – two dimensional heat flow.

Books for study

1. P. Satya Prakash, Mathematical Physics, S. Chand & Company Ltd, New Delhi, 2004.
2. H. K. Dass, Mathematical Physics, Sultan Chand and company, New Delhi, 2013.
3. B. D. Gupta, Mathematical Physics, Vikas Publishing House (P) Ltd., U.P, 2006.
4. R. Murugesan, Mechanics and Mathematical methods, S.Chand & Company Ltd, New Delhi, 2003.
5. P. K. Chattopadhyay, Mathematical Physics, New Age International (Pvt) Ltd., New Delhi, 2001.

Books for reference

1. G. B. Arfken and J. Weber, Mathematical methods for physicists, Elsevier academic press, 2005.
2. E. Kreyszig, Advanced Engineering Mathematics, Wiley India Pvt Ltd, New Delhi, 2015
3. K. F. Riley, H. P. Hobson and S. J. Bence, Mathematical methods for physics and Engineering, Cambridge university press, USA, 2006.
4. Rajput, Mathematical Physics, Meerut, Pragati Prakashan Publishers, 1985.
5. Charlie Harper, Introduction to Mathematical Physics, Prentice–Hall Pvt. Ltd., New Delhi, 1993.

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2. www.physics.uoguelph.ca/tutorials/vectors/vectors.html
3. <http://hyperphysics.phy-astr.gsu.edu/hbase/vect.html>
4. math.oregonstate.edu/home/programs/undergrad/CalculusQuestStudyGuides/vcalc/vcalc.html
5. en.wikipedia.org/wiki/Dirac_delta_function
6. <http://tutorial.math.lamar.edu/Classes/DE/DiracDeltaFunction.aspx>
7. <http://mathworld.wolfram.com/FourierSeries.html>
8. en.wikipedia.org/wiki/Fourier_series
9. <http://www.sosmath.com/fourier/fourier1/fourier1.html>
10. <http://nptel.ac.in/courses/111103021/>
11. <http://tutorial.math.lamar.edu/Classes/DE/IntroPDE.aspx>

Main Elective I: Crystal Growth and Nanoscience

Semester : V
Course Code :

Hours/Week : 3
Credits : 2

Objectives

- To provide an introduction to the relationship between nucleation and growth.
- To expose to the various theories of crystal growth.
- To familiarize solution growth and gel growth techniques.
- To introduce to the rapidly developing field of nanoscience and technology with special focus on the methods of synthesis, characterization techniques and applications of nanomaterials with interdisciplinary approach.

Learning outcomes

- The students will gain knowledge of different crystal growth techniques and the theories behind them.

- The students will get to know about Nanomaterials and different methods of synthesizing Nanomaterials.
- Students will gain a knowledge of different methods of characterizing the crystal samples and Nanomaterials.

Unit – I: Theories of Crystal Growth

Supersaturation – basic steps in crystal growth – nucleation – types of nucleation – energy of formation of a nucleus – spherical nucleus – cylindrical nucleus – classical theory of nucleation: Gibbs Thomson equation for vapor – Gibbs Thomson equation for solution – crystal growth theories: surface energy theories – adsorption layer theories – kinetics of crystal growth – singular and rough surfaces – KSV theory – BCF theory – BCF theory of solution growth – periodic bond chain theory – Muller-Krumbhaar model – diffusion – reaction theories.

Unit – II: Solution Growth

Low temperature solution growth – solubility and supersolubility – expression of supersaturation – solubility diagram – metastable zone width – pH and its control – different methods of low temperature solution growth: slow cooling method – slow evaporation method – temperature gradient method – crystal growth system: constant temperature bath – crystallizer – filtration assembly – seed, seed mount platform and crystal revolution unit – factors influencing the perfection of the final crystal – control of crystal morphology – high temperature solution growth.

Unit – III: Gel Growth

Basic gel growth procedure – gel preparation and properties – gelling mechanism and structure of silica hydrogels – functions of the gel – ultimate crystal size – reimplantation – cusp formation – nucleation (general principles) – nucleation control – Liesegang rings – qualitative features of Liesegang rings.

Unit – IV: Introduction to Nanoscience

Basics about nano – emergence of nanotechnology – top-down and bottom-up approaches – quantum dots – quantum confinement – core shell structures – self assembly – hydrophilic and hydrophobic property – reverse micelle technique – self assembly – self cleaning materials – carbon nanotubes.

Unit – V: Synthesis of Nanomaterials

Chemical methods for the synthesis of nanoparticles and nanostructures – sonochemical method – solgel – forced hydrolysis – hydrothermal/solvothermal – advantages and disadvantages of chemical methods – template based method – physical methods for the synthesis – vacuum – rotary pump – diffusion pump – thermal evaporation – sputtering – Chemical Vapour Deposition (CVD) – Pulsed Laser Deposition (PLD) – advantages and disadvantages of physical methods.

Books for study

1. Dr. P. Santhana Raghavan, Dr. P. Ramasamy, Crystal growth Processes and methods, KRU Publications, Kumbakonam, 2000.
2. Heinz K. Henisch, Crystals in Gels and Liesegang Rings, Cambridge University Pres, Cambridge, 1988.
3. Skoog, Holler and Nieman, Principles of Instrumental analysis, Fifth edition, Harcourt Asia PTE Ltd., Singapore, 2001.

4. Chattopadhyay K. K, Banerjee A. N, Introduction to Nanoscience and Technology, New Delhi, PHI learning Pvt. Ltd., 2009.
5. Charles. P. Poole, Frank. J. Owens, Introduction to nanotechnology, New Jersey, A John Wiley & Sons publications, 2003.

Books for reference

1. Govindhan Dhanaraj, Kullaiyah Byrappa, Vishwanath Prasad, Springer Handbook of Crystal Growth, Springer, 2010.
2. William F Smith, Javad Hashemi, Foundations of Materials Science and Engineering, NewDelhi, Tata McGraw Hill, 2005.
3. Vere A. W., Crystal Growth: Principles and Progress, Springer, 1987.
4. Ivan V. Markov, Crystal Growth for Beginners: Fundamentals of Nucleation, Crystal Growth and Epitaxy, World Scientific Publishing Company, 2003.
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6. D. Kealey & P. J. Haines, Analytical Chemistry, Viva Books Private Ltd, New Delhi, 2002.
7. Bernard Dennis Cullity, Stuart R Stock, Elements of X-ray diffraction, Prentice Hall, 2001.
8. Georg Muller, Jean–Jacques Metois, Peter Rudolph, Crystal Growth from Fundamentals to Technology, Elsevier, 2004.
9. Robert M. Silverstein, Francis X. Webster, Spectroscopic identification of Organic compounds, Sixth edition, John Wiley & Sons, New York, 1998.
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5. <http://chem.wzu.edu.cn/UploadFile/20094315104316.pdf>
6. <http://sharebooks21.com/crystals–in–gels–and–liesegang–rings/>
7. <http://filepost.com/files/7c371d78/Cryst>
8. http://shodhganga.inflibnet.ac.in/bitstream/10603/364/9/09_chapter%202.pdf
9. http://en.wikipedia.org/wiki/Top–down_and_bottom–up_design
10. http://publib.boulder.ibm.com/tividd/td/ITIM/SC32–170800/en_US/HTML/im460_plan76.htm
11. http://en.wikipedia.org/wiki/Chemical_vapor_deposition
12. <http://tss.asminternational.org/content/ASM/StoreFiles/ACFAA6E.pdf>

Main Elective – I: Electronic Communication Systems

Semester– V
Course Code:

Hours/week: 3
Credits: 2

Objective

- To enable the students understand the different types of communications and make them appreciate the flavor of physics in communication.

Learning outcome

- Students will be able to distinguish different sources and their applications in the field of communication.
- Students will able to explain the different elements of Mobile, Microwave and Satellite communication systems.

Unit–I: Fundamentals of Electronic Communication

Line communication – Wireless communication – Types of electronic communication
Simple X-Half duplex – Full duplex – Elements of electronic communication system
Transmitter – Channel – Receiver – Bandwidth – Noise – Signal – Analog and digital signal
Decibel – Signal-to – noise ratio–Electromagnetic Waves – Electromagnetic spectrum –
Extremely low frequencies – Voice – Very low – Ultra high – Super high frequencies – Radio
waves – Wave propagation –Ground waves – Space waves – Ionospheric layers – Sky waves
– Critical frequency and critical angle – Multiple hop transmission–Skip distance –
Maximum usable frequency.

Unit–II Modulation techniques

Modulation – Amplitude Modulation, modulation index – Frequency Modulation – Phase
Modulation – equivalence between FM and PM – Channel capacity, Sampling theorem
Multiplexing – Need for digital transmission– Pulse Code Modulation– Sampling,
Quantization and Encoding – Concept of Amplitude Shift Keying (ASK) – Frequency Shift
Keying (FSK) – Phase Shift Keying (PSK), and Binary Phase Shift Keying (BPSK)

Unit – III: Telephony and mobile communication

Telephone instrument (Block diagram) – Pulse dialing – Dual tone multi frequency (DTMF)
dialing – Basics of LAN and WAN – Subscriber line interface card (SLIC) or Line card –
Functions provided by SLIC – Principle and working of cellular communication system –
idea of GSM - simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts
(qualitative only).

Unit – IV: Fiber optic, Radar and Internet communication

Optical fiber – classifications – acceptance cone half angle – numerical aperture – fiber optic
communication system – Applications – Elements of a Radar System – Radar equation –
Radar Performance Factors – Radar Transmitting Systems – Radar Antennas–Duplexers –
Radar Receivers and Indicators – Other Radar Systems.

Internet–Role of telephone system – Internet service provider – Internet addressing–Internet
applications: E-mail – World Wide Web – E-commerce – On-line services – Bluetooth.

Unit – V: Microwave and Satellite Communication

Microwaves – Wave guides – Types of wave guides – Traveling wave tubes – Microwave
antennas – Horn antenna – Parabolic antenna.

Satellites – Natural and Artificial satellites – Types of active satellites – Passive satellites – Satellite spacing – Orbit fundamentals – Types of orbits – Launching of satellites – Station keeping – Attitude control – Tracking – Principles of satellite communication – Subsystems of a communication satellite – Advantages of satellite communication – Applications of satellite communication.

Books for study

1. Louis E. Frenzel, Communication Electronics Principles and Applications, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2002.
2. Wayne Tomasi, Electronic communication systems, Pearson publications, New Delhi, 2011.
3. William Schweber, Electronic communication systems A complete course, Prentice Hall of India Pvt. Ltd., New Delhi, 2002.

Books for reference

1. Dennis Roddy, John Coolen, Electronic communication, Prentice Hall of India Pvt. Ltd., New Delhi, 2002.
2. Roy Blake, Wireless communication Technology, Eastern Press Pvt.Ltd., Bangalore, 2001.
3. M. Mukundarao, Optical communication, Universities Press Ltd., Hyderabad, 2000.
4. Dennis Roddy, Satellite communications, McGraw Hill Publishing International edition, New Delhi, 2001.
5. Maroon Cole, Introduction to Telecommunication: Voice, data and Internet, New Age Publishers, New Delhi, 2002.

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2. www.radartutorial.eu
3. www.cdt21.com
4. www.radiotutorial.eu/07.waves
5. www.tutorvista.com
6. www.satellites.spacesim.org
7. www.en.wikipedia.org/wiki/telephony
8. www.electroschematics.com
9. www.mat.ucsb.edu
10. www.digitaltrends.com › Mobile
11. www.electronicshub.org › Electronics Tutorials
12. www.whatsag.com/

Main Elective - I: Renewable Energy and Energy Harvesting

Semester– V
Course Code:

Hours/week: 3
Credits: 2

Objectives

- To make the students to understand the importance of renewable energy and energy harvesting for future fulfillment of energy for mankind.

Learning Outcome

- Students will acquire knowledge about the various alternative sources and its importance apart from the fossil fuels
- Students will be able to construct and demonstrate working of energy conversion systems.
- Students will implement the idea in energy harvesting, consumption and saving of energy in day today life.

Unit– I: Conventional and Alternate Sources of energy

Fossil fuels and its limitations – Nuclear Energy – Advantages and disadvantages – Need of renewable energy – Non-conventional energy sources an overview: Solar energy – Wind Energy – Tidal Energy – Ocean energy – Geothermal — Hydroelectricity

Unit–II: Solar energy and its applications

Significance of Solar energy – solar energy collector – Types –Liquid Flat plate collector and concentrating collector – storage of solar energy – applications of solar energy – solar water heater – solar cooker Solar driers – solar pump

Unit– III: Wind Energy and its applications

Wind mill – Power from the wind – site selection for the installation – Principle and operation of WECS – Types – advantages and disadvantages – Energy storage – Applications of wind energy.

Unit– IV: Other Energy Sources

Biomass – Types – conversion technologies – wet process – photosynthesis – Biogas – Biogas plant – Types – KVIC – Biogas from plant wastes – Geothermal Resources – Energy from the ocean –OTEC – energy from tides –basic principles – hydrogen energy.

Unit– V: Energy Harvesting and Distribution:

Energy storage systems – Mechanical – electrical – chemical – electromagnetic – thermal – biological – Carbon captured technologies – power consumption – Environmental issues – sustainability – energy action planning – energy costing – data and information analysis.

Books for study

1. S. P. Sukhatme, Solar Energy, Principles of thermal collection and storage, Tata Mc.Graw Hills, New York, 1996.
2. G. D. Rai, Non conventional sources of Energy, Khanna publishers, New Delhi, 1996.
3. Kothari, Renewable energy sources and Emerging technologies, Prentice Hall India Learning Private Limited; 2 edition, 2011.

Books for reference

1. D. Yogi Gowswami, Principles of solar engineering, 3rd edition, CRC Press, 2015.
2. John Twidell and Tony weir, Renewable energy resources, 2005, 2 edition, Routledge.
3. Frank Kreith, D. Yogi Gowswami Energy conversion, CRC Press, 2007.
4. G.N.Tiwari, M. K. Ghoshal, Renewable energy sources: Basic Principles and Applications, Alpha Science International, 2005
5. D. Yogi Gowswami, Energy efficiency and renewable energy handbook, edition, CRC Press, 2015.

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2. en.wikipedia.org/wiki/Fuel
3. www.conserve-energy-future.com/alternativeenergysources.php
4. www.altenergy.org/
5. www.nuclearpower.net
6. www.renewableenergyworld.com/wind-power/tech.html
7. www.otecnews.org
8. www.geothermal.org
9. www.wgbn.wisc.edu › Conversion
10. www.build-a-biogas-plant.com
11. www.energyharvesting.net/
12. www.utilitydive.com/

Elective - II: Applied Optics

Semester– V
Course Code:

Hours/week: 3
Credits: 2

Objectives

- To impart the basic concepts of nonlinear optics and its applications.
- To understand the principle of optoelectronics and their applications.

Learning outcome

- Students can understand the behavior of materials in low and high intensity light.
- Students will realize the construction and reconstruction of images in holography.
- Students will understand the advanced communication systems.

Unit – I: Non-Linear Optics

Nonlinear optical susceptibility – wave equations of nonlinear optical interactions – Sum frequency generation – Difference frequency generation – Second Harmonic generation – Phase matching condition – Optical parametric Oscillators – self focusing collapse – optical breakdown – two beam coupling – electro-optics and photorefractive effects – optically induced damage and multiphoton absorption.

Unit – II: Lasers and Optoelectronics

Quantum Theory of Atomic Energy Levels – Radiative and Nonradiative decay of excited state atoms – Emission Broadening and linewidth – Radiation and Thermal equilibrium – Conditions for laser action – Laser Oscillation above threshold – Laser Amplifiers – Requirements for obtaining population inversion – Rate Equations for three and four level systems – Laser pumping requirements – Laser Cavity modes – Q-switching and Mode locking – pulsed Nd:YAG laser.

Unit – III: Holography

Basic principle – theory – coherence, resolution – types of holograms: white light reflection hologram, polarization holography – application of holography in microscopy, interferometry, and character recognition.

Unit – IV: Detection of Optical radiations

Basic Principle and working: Thermal detectors, Photo multipliers, photoconductive detectors, CCDs, Image Intensifiers.

Optoelectronic Modulators: Basic principle and working of Birefringence - Optical Activity – electro optic modulator.

Unit – V: Advanced optical communication

Optical transmitter: Basic concepts, characteristics of semiconductor injection LASER, LED, transmitter design.

Optical Receiver: Basic concepts, P-n and Pin photo detectors, Avalanche photo detectors, MSM photo detector.

Wavelength division multiplexing (WDM): multiplexing techniques, topologies and architectures, wavelength shifting and reverse, switching WDM demultiplexer, optical add/drop multiplexers.

Books for study

1. Robert W Boyd, Nonlinear optics, second Edition, Academic Press, 2003.
2. P. C. Mehta, V. V. Rampal, Lasers and Holography, World Scientific Publishing Co. Pvt. Ltd., 1993.
3. R. Murugesan, Modern Physics, S.Chand, 2008.

Books for reference

1. W.T. Silfvast, Laser Fundamentals, Second Edition, Cambridge University Press, 2004.
2. R . L. Sutherland, Handbook of Nonlinear Optics, Marcel Dekker, 1996.
3. O. Svelto, Principles of Lasers, Fourth edition, Springer, 1998.
4. Wilson and Hawkes, Optoelectronics – an Introduction , Prentice Hall, 1998.

Websites

1. <http://www.worldscientific.com/worldscibooks/10.1142/1866#t=aboutBook>
2. en.wikipedia.org/wiki/Holography
3. <http://www.springer.com/gp/book/9781468421620>
4. en.wikipedia.org/wiki/Nonlinear_optics
5. <http://shodhganga.inflibnet.ac.in/bitstream/10603/41/8/chapter%205.pdf>
6. <http://www.optics.rochester.edu/research/nonlinear.html>
7. <http://nptel.ac.in/courses/117101002/>

Elective - II: 8085 Microprocessor and its Applications

Semester– V
Course Code:

Hours/week: 3
Credits: 2

Objectives:

- To introduce the students to different number systems and to develop numerical skills.
- To achieve general understanding of the fundamentals of microcomputers and microprocessor.
- To familiarize students with instruction set and addressing modes of 8085 microprocessor.
- To enable students to write assembly language programs and to know the interfacing applications.

Learning outcomes:

On successful completion of this course, students will be able to

- Convert numbers from one number system to another

- Define characteristics that distinguish 8085 microprocessor from others.
- Identify different types of memory and describe how each is used.
- To write assembly language programs for simple problems.

Unit – I: Number System and Fundamentals of Microcomputer

Number System: Binary – Decimal – Hexa decimal number system and their mutual conversions.

Microcomputer Organization – memory – types - semiconductor memory – types: RAM – ROM – PROM – EPROM – E²PROM – Cache memory-Tristate logic-Buffer.

Unit-II: Architecture of 8085 and Interrupts

Microprocessor - Evolution of microprocessors – Applications of microprocessors - Main features of 8085 - Pin-out diagram of 8085 - Architecture of Intel 8085 Microprocessor – Bus – Address bus – Data bus – Multiplexed address/data bus – demultiplexing address/data bus - Control bus.

Interrupts of 8085: Classification of Interrupts – Hardware and Software interrupts – Vectored and Non-vectored interrupts – Maskable and Non-maskable interrupts.

Unit-III: Instruction set

Instruction Set: Data Transfer Instructions- Arithmetic instructions-Logical Instructions-Branch Instructions-Stack and Stack Related Instructions-I/O Instructions-Subroutines.

Addressing modes: Register addressing – Immediate addressing – Direct addressing – Register indirect addressing – Implied addressing.

Unit – IV: Timing diagram and delay routines

Timing sequences: Instruction cycle – Machine cycle – T-state – Fetch cycle – Execute cycle – Op-code fetch cycle – Memory read machine cycle – I/O read machine cycle – Memory write machine cycle – I/O write machine cycle – Time delay calculations.

Unit – V: Interfacing I/O Devices and Programming

Interfacing I/O devices: I/O Ports – Memory mapped I/O – I/O mapped I/O –Programmable Peripheral Interface Intel 8255 – LED interface.

Programming: Addition, subtraction, Multiplication and division, ascending and descending order (8-bit).

Books for study

1. NagoorKani A., Microprocessor and its Applications, Second Edition, Chennai, RBA Publications, 2006.
2. V.Vijayendran, Fundamentals of Microprocessor – 8085: Architecture, Programming and Interfacing, Chennai, S.Viswanathan (Printers & Publishers) Pvt. Ltd., 2009.
3. Senthilkumar N., Saravanan M., Jeevananthan.S, Microprocessors and Microcontrollers, Oxford University Press, 2010.

Books for reference

1. Ramesh S.Gaonkar, Microprocessor Architecture, Programming and applications with the 8085, New Delhi, New Age International Publishers Ltd., 2006.
2. Badri Ram, Fundamentals of Microprocessors and Microcomputers, New Delhi, Dhanpat Raj & Sons, 2000.
3. Godse A.P., Godse D.A., Microprocessor and Applications, Pune, Technical Publications, 2003.

4. Shah U.S, Microprocessor and Applications, New Delhi, Mc Millan Publishers India Ltd., 2011.
5. Muhammad Ali Mazidi, Janice Gillispie Mazidi – The 8051Microcontroller and Embedded Systems, Pearson Education, Delhi, 2012.

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2. <http://nptel.ac.in/courses/108107029/module1/lecture2/lecture2.pdf>
3. <http://tymkrs.tumblr.com/post/12328620000/rom-prom-eprom-eprom>
4. <http://ecomputernotes.com/fundamental/input-output-and-memory/what-is-harddisk-hdd>
5. <http://searchstorage.techtarget.com/definition/cache-memory>
6. www.tutorialspoint.com/microprocessor/microprocessor_8085_architecture.htm
7. www.tutorialspoint.com/microprocessor/microprocessor_8085_addressing_modes_and_interrupts.htm
8. www.tutorialspoint.com/microprocessor/microprocessor_8085_pin_configuration.htm
9. <http://www.daenotes.com/electronics/digital-electronics/instruction-set-intel-8085>
10. www.tutorialspoint.com/microprocessor/microprocessor_io_interfacing_overview.htm
11. www.tutorialspoint.com/microprocessor/microprocessor_intel_8255a_programmable_peripheral_interface.htm
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15. www.tutorialspoint.com/microprocessor/microcontrollers_8051_pin_description.htm
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17. <http://www.polyengineeringtutor.com/Introduction%20to%208051.pdf>

Elective - II: Medical Physics

Semester– V
Course Code:

Hours/week: 3
Credits: 2

Objectives

- To explore the fundamentals of physics in the areas such as, Physiology, Radiation physics and medical imaging physics.
- To provide an in–depth knowledge of radiation, its effects and radiation safety.

Learning outcomes

- Students will be able to explain physics principles behind the various systems in a human body.
- Students will be able to explain and analyse the interaction processes of different types of radiations with matter, their roles in medical imaging, radiation therapy and medical imaging.

Unit – I: Physics of the body

Mechanics of the body: Skeleton – forces – body stability – Muscles and dynamics of body movement.

Energy household of the body: Energy balance in the body – Energy consumption of the body – Heat losses of the body – Thermal Regulation.

Pressure system of body: Breathing – cardiovascular system – blood and circulatory system – blood pressure

Acoustics of the body: Nature and characteristics of sound – Production of speech – Physics of the ear.

Optical and electrical system of the body: Physics of the eye – Central and autonomic nervous system – Electrical signals and information transfer.

Unit – II: Radiation physics, Accelerators and Detectors

Radiation Exposure – Absorbed dose – Units: rad, rontgen – REM – GRAY – KERMA – CEMA – stopping power – relative biological effectiveness – effective dose – photon fluence and energy fluence.

Accelerators – Types of accelerators – Pelletron –Thimble chamber – condenser chambers – GM counter – Scintillation counter

Unit – III: Diagnostic Systems

X-ray tube– Rotating anode – Tube rating – quality and intensity of X-ray – X-ray film – Diagnostic applications of X-rays (Skeletal system and soft tissues) – mobile and dental X-ray machine.

CT scan – principle and working – Interaction of ultrasound with tissues (A Scan and B Scan) – Bio sensors applications (Diabetics, cardiovascular, cancer) – Radioactive tracers – Nanobio sensors.

Unit – IV: Bio Medical Imaging and Instrumentation

MRI – Radiological imaging – Ultrasound imaging in Tomography – ECG (Electrocardiography) – EEG (Electroencephalography) – EMG (Electromyography) – ENG (Electroneurography) – Cardiac pacemakers (Natural and Artificial) – AC and DC synchronized defibrillators – Endoscope.

Unit – V: Radiation hazards and protection

Radiation effects – Radiation dose from natural radioactivity in the environment and manmade sources – Effects of time and distance – Radiation accidents emergencies in the use of radiation sources in medicine – Biological effects of radiation (somatic, genetic stochastic and deterministic effect).

Radiation protection – shielding materials – permissible level of radiation – chemical protection – disposal of radioactive wastes safety rules and facilities – Dosimeter: TLD film badge, pocket dosimeter monitors – Radiation limits – Steps to reduce radiation to Patient, Staff and Public.

Books for study

1. J. P. Woodcock, Ultrasonic, Medical Physics Handbook series 1, Adam Hilger, Bristol, 2002
2. Medical Physics, J.R. Cameron and J.G. Skofronick, Wiley (1978)

Books for reference

1. Basic Radiological Physics Dr. K. Thayalan – Jayapee Brothers Medical Publishing Pvt. Ltd., New Delhi, 2003

2. Christensen's Physics of Diagnostic Radiology: Curry, Dowdey and Murry – Lippincot Williams and Wilkins (1990)
3. F M Khan – Williams and Wilkins, Physics of Radiation Therapy, Third edition, 2003.
4. Irving P. Herman, Physics of the human body, Springer, 2007.
5. Bushberg, Seibert, Leidholdt and Boone Lippincot Williams and Wilkins The essential physics of Medical Imaging, Second Edition, 2002.
6. R.S. Livingstone, Handbook of Physics in Diagnostic Imaging, B.I. Publication Pvt Ltd.

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2. www.boundless.com › ... › Boundless Physics › Fluids › Density and Pressure
3. www.medphys.org
4. www.britannica.com/science/cellbiology
5. www.openbiomedia.org
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8. en.wikipedia.org/wiki/Category:Units_of_radiation_dose
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11. www.radiatioanswers.org
12. www.mona.uwi.edu › Mona › Physics

Astrophysics (Self Study Paper)

Semester– V
Course Code:

Hours/week: —
Credits: 1*

Objectives

- Providing a broad view of heavenly bodies.
- Improving the understanding of solar system and the astronomical instruments.

Learning Outcomes

By the end of this course, the student will be able to

- Gain a qualitative knowledge of the Universe and its content.
- Demonstrate familiarity with the principal observational properties of stars and planets.
- Explain stellar evolution, including red giants, supernovas, neutron stars, white dwarfs and black holes.
- Describe the features of objects in the solar system: sun, planets, moons, asteroids, comets, planetary interiors, atmospheres, etc.

Unit – I: Cosmology and Galaxies

Origin of the universe – theories of Universe – structure of the universe – galaxy – types – galaxy collisions– clusters of galaxies.

Unit – II: Solar System

Origin – The Sun – physical characteristics– sources and transport of energy – solar atmosphere – Planets and Satellite of solar system – minor planets.

Unit – III: Stellar Evolution

Nebulae – types – Birth and Death of a star – supernovae explosion – binary stars – variable stars – white dwarfs – Chandrasekhar limit–neutron star – black holes.

Unit – IV: Magnitudes, Distance and Spectral Classification of Stars

Magnitude and brightness – apparent and absolute magnitude of stars – light year – geometrical parallax method – Harvard system of spectral classification – HD catalogue – HR diagram.

Unit – V: Astronomical instruments

Radio telescope – optical telescopes – refracting telescope – reflecting telescope: types, advantages – Hubble’s space telescope – mounting of telescope – filar micrometer.

Books for study

1. K.S. Krishnaswamy, Astrophysics a modern perspective, New Age International (p) Ltd, New Delhi, 2002.
2. BaidyanathBasu, An Introduction to Astro Physics, Prentice – Hall of India Private limited, New Delhi, 2001.

Books for reference

1. R.Murugesan, Modern Physics, S. Chand & Company Ltd, New Delhi, 2009.
2. S.Kumaravelu, Astronomy, Jankicalendar corporation, Sivakasi, 1993.
3. M. Smart, Foundations of Astronomy, Longmans, Green and Co, London,1944

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1. <http://science.nasa.gov/astrophysics/>
2. http://www.sciencedaily.com/news/space_time/astrophysics/
3. <http://physicsworld.com/cws/CategoryHome.do?categoryName=astro>
4. <http://www.astrophysical.org/>
5. <http://www.stargazing.net/David/websites/index.html>

Repair and Maintenance of Household Appliances (Non–Major Elective –I)

Semester– V

Hours/week: 2

Course Code :

Credits: 1

Objectives

- To expose the students to the principles and working of home appliances.
- To train the students in Repairing and Maintenance of home appliances.

Learning Outcomes

At the end of the course the students will have

- A knowledge of Importance of observing the safety precautions
- The ability to test the continuity of electrical lines with multimeter

- The ability to dismantle and reassemble an electric iron
- The ability to install a ceiling fan and the regulator
- The ability to check a fluorescent lamp chock, starter and install it

Unit – I Electricity and Electrical safety

Introduction to electricity

Electric charge – Voltage – current – resistance – resistor – capacitance – capacitor – inductor – Ohm’s Law – power.

Electrical safety

Safety – Tools for electrical safety – circuit breakers–fuse– Precaution during maintenance of home appliances - safety rules.

Unit – II: Earthing, Crimping and Soldering

Earthing

Need for earthing – Types of earthing – working of earthing–Advantage of earthing,

Crimping and soldering

Crimping– crimping tool, how to use– RJ – 11 connector – telephone wire – UTP cable – crimping technique – precaution during crimping – Soldering – Soldering method, Zero defect soldering –De soldering.

Unit – III: Home Appliances – I

Principle and working: electric iron, water heater, kettle, fault finding – removal of faulty component in electric iron, water heater, kettle.

Unit – IV: Home Appliances – II

Principle and working: mixer grinder, Wet grinder, ceiling and table fans – fault finding – removal of faulty component in mixer grinder, Wet grinder, ceiling and table fans.

Unit – V: Lamps and Electrical Insulation

Lamps: Working principle of fluorescent, CFL and LED lamps.

Electrical Insulation: Need of electrical insulation - Insulating Materials- Types of Insulating Materials.

Books for study

1. Bernard Grob, Basic Electronics, McGraw Hill Kogakusha Ltd., New Delhi, 1977
2. B.L. Theraja Electrical Technology, Chand Publishers, New Delhi., 2012
3. K.B.Bhatia, Study of Electrical Appliances and Devices, Khanna Publishers, New Delhi., 2000.
4. Eric Kleinert., Troubleshooting and Repairing Major Appliances., 3rd Edition., McGraw–Hill Professional Publishing., 2012
5. Indulkar C.S., Thiruvengadam S., An Introduction to Electrical Engineering Materials., S. Chand., 2006
6. Charles I. Hubert (Author) Preventive Maintenance of Electrical Equipment, McGraw–Hill Inc.,1969

Books for reference

1. Bhatia., Study of Electrical appliances and devices, Khanna publishers., 2014.
2. Robert Rosenberg., Electric Motor Repair., Augie hand., 2011.
3. S.L.Uppal, J.M.Larcia., Electrical Wiring, Estimating and Costing, Khanna Publishers., 2004.

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1. <http://www.hse.gov.uk/electricity/>
2. www.advanced-energy.com/upload/file/white_papers/eng-grounding-260-01.pdf
3. <http://www.fixitclub.com/small-appliances-repairs/electric-iron-repair/>
4. www.repairfaq.org/sam/tshoot.htm
5. energy.gov/energysaver/insulation-materials

Applied Electronics

Semester– VI
Course Code:

Hours/week: 5
Credits: 5

Objectives

- To acquaint the students to the principles and working of logic gates, sequential circuits, combinational circuits, and Television.
- To introduce the students to the principles involved in analog and digital communication.

Learning Outcomes

After completing the course the student will be able to

- Use and explain the functionality of logic gates AND, NAND, OR, NOR, XOR, NOT
- Use DeMorgan.'s Theorems to simplify a negated expression.
- Employ a Karnaugh Map to reduce Boolean expressions.
- Gain knowledge of fundamental digital design and systematic methods of analysing digital systems.
- Explain the concept of logic family to build digital circuits.

Unit – I: Logic gates and Boolean Algebra

Binary concept – Basic logic gates using diodes and transistors – truth tables – NAND and NOR gates – NAND and NOR as Universal gates – Boolean algebra: Basic postulates and fundamental theorems of Boolean

Algebra – De Morgan's laws and their circuit implications – Standard representation of logic functions (SOP and POS) – Min term – Max term - Simplification of Boolean equations – Karnaugh map minimization up to 4 variables for SOP) – NAND-NAND circuits.

Unit – II: Combinational circuits and Logic families

Data processing circuits: Multiplexers – Demultiplexers – Decoders – 1-of-4 decoder – BCD to Decimal decoder – Seven segment decoder (7447) – Encoders – Decimal to BCD encoder – EX-OR gates – Arithmetic circuits: Half adder – Full adder – Parallel binary adder – Half subtractor– Full subtractor – Logic families: TTL NAND –ECL OR/NOR–MOS logic– CMOS inverter, NAND and NOR.

Unit – III: Flip flops, Shift Register and Counters

RS flip flop–D flip flop – level checking and edge triggering – J-K flip flop – Preset and Clear operations – Race-around conditions in JK Flip – Flop-JK M/S flip flop – T type flip flop – 4-bit shift registers – types: serial in serial out–serial in parallel out – parallel in serial out –parallel in parallel out – Ring counter – asynchronous and synchronous counters: Mod 8 and decade counter – decoding gates.

Unit – IV: Signal conversion and Timer IC Applications

D-A and A-D Conversion: Variable resistor and binary ladder D/A converters – Accuracy and Resolution – A/D converter – Successive approximation and Simultaneous A/D converters.

Timer (IC 555) and its applications: Internal architecture of IC 555 (Block diagram)–Pin configuration of 555 – Astable and Mono-stable multivibrator circuits.

Unit – V: Modulation, demodulation and Colour Television Principles

Need for modulation – Types of modulation – amplitude modulation – expression for AM wave – Power in side bands – Limitations of amplitude modulation – Frequency modulation –Expression for FM wave – AM diode detector – Block diagrams of AM and FM transmitters and superhet receiver.

Colour Television: Principles of colour TV – Primary colours and their mixing – Colour TV cameras – Principles of colour TV transmission and Reception (block diagrams).

Books for study

1. V. Vijayendran, Introduction to Integrated Electronics–Digital and Analog, S. Viswanathan (Printers & Publishers), Pvt. Ltd., Chennai, 2007.
2. Bernard Grob, Basic Television and Video Systems, McGraw Hill, New Delhi, 1999.

Books for Reference

1. Thomas L. Floyd, Digital Fundamentals, 10th edition, Pearson education, New Delhi, 2009.
2. Atul P. Godse, Deepali A. Godse, Digital Electronics, Technical Publications, Pune, 2010.
3. Anil Kumar Maini, Digital electronics : principles, devices and applications, Wiley, New Delhi, 2008.
4. John Watkinson, Television Fundamentals, Oxford Butterworth–Heinemann, 1996.
5. R. R. Gulati, Colour Television Principles and Practice, New Age International, New Delhi, 1992.
6. A. P. Malvino, D. P. Leach Digital principles and Applications, Tata McGraw Hill, New Delhi, 2006.
7. Albert Paul Malvino, Digital computer Electronics, Tata McGraw Hill Education Private Ltd., New Delhi, 2011.

Websites

1. <http://macao.communications.museum/eng/exhibition/secondfloor/MoreInfo/FlipFlop.html>
2. www.st-andrews.ac.uk/~www_pa/Scots_Guide/RadCom/part9/page1.html
3. books.google.co.in/books/about/Television_and_Video_Engineering.html?id=cChPIg6iWPoC&redir_esc=y
4. <http://www.ee.surrey.ac.uk/Projects/Labview/minimisation/karnaugh.html>
5. <http://www.32x8.com/>
6. www.utdallas.edu/~dodge/EE2310/lec5.pdf

Nuclear Physics

Semester– VI
Course Code :

Hours/week: 5
Credits: 5

Objectives

- To explore the basic properties of nucleus, nuclear models and the process of radioactivity.
- To enable the students to acquire knowledge of the nuclear energy and its applications.

Learning outcome

- Students will be able to explain the fundamental concepts of different nuclear models and their predictions.
- Students will develop a strong physical reasoning and problem solving skill and will be able to find solutions to the problems related with nuclear physics.
- Students will understand the importance of Nuclear power

Unit – I: Nuclear Properties and Radioactivity

Basic properties of a nucleus; charge, mass, size, density, spin, parity, magnetic moment and electric quadrupole moment – mass defect – packing fraction – binding energy – nuclear forces – characteristics of nuclear forces – Yukawa's theory.

Properties of alpha, beta and gamma rays – determination of e/m and charge of alpha particles – range of alpha particles – experimental measurement of range – Geiger-Nuttal law – disintegration energy – Gamow's theory of alpha decay-beta ray spectra – origin of line and continuous spectrum.

Unit – II: Particle Detectors and Accelerators

Particle detectors – ionization chamber – proportional counter – GM counter – scintillation counter – nuclear emulsions – radiation units – mean lethal dose and permissible radiation dose – personal dosimeter and survey dosimeter – chemical – Thermo luminescent dosimeter(TLD) – biological effects of radiation – protection from radiation hazards
Particle accelerators – cyclotron – theory – limitations – synchrotron – proton synchrotron – betatron.

Unit – III: Nuclear Reactions and Nuclear Models

Nuclear reactions – types of reactions – conservation laws – Q-value – nuclear transmutations – by alpha particles, protons, deuterons and neutrons – scattering cross section.
Nuclear models – liquid drop model – semi empirical mass formula – shell model – evidence for magic numbers – predictions of shell model – Fermi gas model – collective model.

Unit – IV: Nuclear Energy

Nuclear fission – energy released in fission – chain reaction fissile and fertile materials – deformation of liquid drop – Bohr Wheeler's theory of nuclear fission – four factor formula – the critical size – nuclear reactors – pressurized water reactor – fast breeder reactor – power reactors – applications of nuclear reactor – nuclear fusion and thermonuclear reactions – sources of stellar energy – controlled thermonuclear reactions – plasma confinement – Advantages and disadvantages of nuclear energy.

Unit – V: Elementary Particles

Elementary particles – classification – particles & antiparticles – the fundamental interactions – elementary particle quantum numbers – conservation laws and symmetry – the quark model of nucleons – quantum chromo dynamics – standard model – unification of interactions – grand unified theories (no detailed theory is required).

Books for study

1. D. C. Tayal, Nuclear Physics, Mumbai, Himalaya Publishing house, 2011
2. R. Murugesan, Modern Physics, New Delhi, S.Chand&Co.Ltd, 2009.

Books for reference

1. V. Devanathan, Nuclear and particle physics, New Delhi, Narosa publishing house, 2007.
2. S. N. Ghoshal, Introduction to Nuclear physics, S.Chand&Co.Ltd, New Delhi, 2004.
3. Suresh Chandra, MohitK.Sharma, Nuclear and Particle Physics, Alpha Science International publishers, 2012.
4. N. Subrahmanyam, Brijlal, Atomic and nuclear physics, New Delhi, S. Chand & Co.Ltd, 2008.
5. R. R. Roy, B.P. Nigam, Nuclear physics, New Delhi, New age International (P)Ltd Publishers, 2005.

Websites

1. www.nucleusproperties.in
2. www.nuclearscienceweek.org
3. www.teachnuclear.ca
4. www.particle.central.com/accelerator
5. www.britannica.com/science/dosimeter
6. www.crbtsm.eu
7. www.nuclearpower.net
8. www.ncrponline.org
9. www.space.com
10. en.wikipedia.org/wiki/Particle_detector

Quantum Mechanics and Relativity

Semester – VI

Hours/ week: 4

Course Code:

Credits : 4

Objectives

- To make the students understand the basic concepts of Quantum Mechanics and fundamental postulates of Relativity
- To enable the students acquire the problem solving ability and to apply the Schrödinger's wave equation for the situation of different physical problems.

Learning Outcomes

On completion of this course students will be able to

- Understand the wave nature of matter and demonstrate an understanding of the nature of the quantum mechanical wave function and its basic properties.
- Interpret the wave function and apply operators to it to obtain information about a particle's physical properties such as position, momentum and energy.

- Understand the basic principles of quantum mechanics and operator formulation of quantum mechanics.
- Explain the concepts of frame of reference and inertial frames and state the fundamental postulates of Special theory of relativity.

Unit – I: Matter waves and Uncertainty Principle

Wave – particle duality – matter waves – de-Broglie’s wave length – wave packet –relation between phase velocity and group velocity – G.P Thomson’s experiment – Davisson and Germer’s experiment.

Heisenberg’s uncertainty principle – Heisenberg’s gamma ray microscope – diffraction of a beam of electrons by a slit – Applications: Non-Existence of electron inside the nucleus of an atom.

Unit – II: Schrodinger’s formulation

Postulates of quantum mechanics – Linear, Momentum and Energy operators – Eigen functions and Eigen values – Stationary states – Expectation values – Physical interpretation of the wave function – Limitations on the wave function – Probabilities and normalization condition – Time independent Schrodinger’s equation – Time dependent Schrodinger’s equation – Ehrenfest theorem – statement and proof.

Unit – III: Applications of Schrodinger’s Equation

Particle in one dimensional box – One dimensional linear harmonic oscillator – Quantum mechanical scattering and tunneling in one dimensional rectangular potential barrier – Scanning Tunneling Electron Microscope.

Unit – IV: Relativity Galilean Transformation equation

Frame of reference – inertial frames – non-inertial frames – fictitious forces – frame of reference and uniform motion – Galilean transformations – Velocity, acceleration and force – invariance of acceleration and force under Galilean transformation – Ether Hypothesis – Michelson–Morley experiment – Explanation of the Negative results – Special theory of relativity: Postulates – Lorentz transformation – length contraction – time dilation – twin paradox – relativity of simultaneity.

Unit –V: Relativistic Mechanics and General Theory of Relativity

Relativistic addition of velocities –Variation of mass with velocity – equivalence of mass and energy – Evidences confirming mass – energy relation – energy– momentum of a particle with zero rest mass – Minkowski’s space – space-time continuum – postulates of general theory of relativity – gravitational red shift – advance of the perihelion of mercury – deflection of light by the gravitational field.

Books for study

1. R. Murugesan, Modern Physics, New Delhi, S. Chand & Co. Ltd, 2009.
2. SathyaPrakash, Advanced Quantum Mechanics, Meerut, Kendra Nath Ram Nath, 2009.
3. Albert Einstein, Relativity: The Special and the General Theory, General press, 2012

Books for reference

1. Leonard Schiff, Quantum Mechanics, Mcgraw Hill Education, 4th Edition, 2014.
2. V. Devanathan, Quantum Mechanics, New Delhi, Narosa Publishing House, 2005.
3. G. Aruldas, Quantum Mechanics, NewDelhi, Prentice Hall of India Pvt. Ltd.,2007.

4. S.P. Singh, M. K. Bagde, Kamal Singh, Quantum Mechanics, NewDelhi, S. Chand and company Ltd, 2000.
5. Brijlal, Subrahmanian, Mechanics and Relativity, New Delhi, S. Chand & Co. Ltd, 2006.
6. A.P. French, Special Relativity, United Kingdom, English Language Book Society, 2007

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2. <http://www.upscale.utoronto.ca/PVB/Harrison/SpecRel/SpecRel.html>
3. <http://www.space.com/17661-theory-general-relativity.html>
4. <http://www.hep.man.ac.uk/u/roger/PHYS10302/lecture15.pdf>
5. www.navipedia.net/index.php/Phase_%26_Group_Velocity
6. <http://www.einstein-online.info/elementary>
7. http://www.bbc.co.uk/science/space/universe/questions_and_ideas/
8. <http://hyperphysics.phy-astr.gsu.edu/hbase/quacon.html#quacon>
9. <http://quantumphysics.iop.org/>
10. <http://www.quantum-physics.polytechnique.fr/en/>

Physics Main Practicals – III (General Experiments) Any 20 Experiments

Semester – V&VI
Course Code:

Hours/week : 6
Credits 5

1. Viscosity of a liquid – Variable pressure head (ungraduated burette)
2. Comparison of viscosities of two liquids (constant time method)
3. Young's modulus – Uniform bending (telescope and optic lever)
4. Young's modulus – Koenig's method – non uniform bending
5. Young's modulus – Koenig's method – Uniform bending
6. Torsional pendulum – Dynamic method – i & n
7. Compound pendulum – Determination of g
8. Joule's colorimeter – Specific heat capacity of a liquid – Half time correction
9. Spectrometer – ($i - i'$) curve
10. Narrow angled prism – Determination of μ
11. Field along the axis of circular coil – Deflection magnetometer – m and B_H
12. Spectrometer- Dispersive power of a prism
13. Spectrometer – Cauchy's constants determination
14. Hydrogen spectrum – Determination of wavelengths – Rydberg's constant
15. Carey foster's bridge – Temperature co-efficient of resistance
16. Conversion of a galvanometer into a voltmeter
17. Conversion of a galvanometer into an ammeter
18. EMF of a thermocouple – Potentiometer method
19. Absolute capacitance of a capacitor – B. G
20. Absolute mutual inductance – B.G
21. Comparison of mutual inductance - B.G
22. Field along the axis of a coil – Deflection magnetometer
23. Measurement of Dielectric Constant of a dielectric Materials with frequency
24. Spectrometer – Resolving power of grating
25. SVP of water – Joly's apparatus

26. Fresnel's Biprism – Determination of wavelength of Sodium light
27. Determination of wavelength of Laser light using diffraction at a single slit.
28. Determination of Boltzmann's constant using V–I characteristics of PN diode
29. Determination of ionization potential of Mercury
30. Determination of Planck's constant using black body radiation

Books for reference

1. C.C. Ouseph, U. J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan Pvt. Ltd., Chennai, 2012.
2. M. N. Srinivasan, S. Balasubramaniam, R. Ranganathan, A Text Book of Practical Physics, 2nd Ed., S. Sultan Chand & Sons Publications, New Delhi, 2014.
3. Jerry D. Wilson, CBS college., 1986
4. D. Chattopadhyay, P.C. Rakshit, New central book agency (p) LTD., 1987
5. C. Isenberg, S.S Chomet, Viva books Private Limited., 1998
6. Narasimhan & Ramamoorthy, B.G. Paul & Co., 1961

**Physics Main Practicals – IV (Electronic Experiments)
Any 20 Experiments**

Semester – V&VI

Hours/week : 6

Course Code:

Credits 5

1. Half subtractor and Full subtractor
2. R–S, J–K, and D–Flip Flops using NAND gates
3. Simplification of Boolean expression using Karnaugh map (NAND- NAND Logic)
4. Seven Segment Display using IC 7447
5. Multiplexer and Demultiplexer
6. Single stage common emitter transistor amplifier
7. Emitter Follower
8. Static characteristics of UJT
9. Hartley Oscillator
10. Relaxation Oscillator using UJT
11. Astable and Bistable Multivibrators
12. Designing inverting and non–inverting amplifiers of given gain using Op–amp.
13. Operational amplifier (IC741)– Inverting and Non– Inverting summer and Subtractor
14. Operational amplifier (IC741) – Differentiating and Integrating circuits.
15. Microprocessor – Arranging an array in ascending and descending order
16. Microprocessor – 8 bit Addition and Subtraction
17. Microprocessor – Double and Triple precision addition and subtraction
18. Microprocessor – 8 bit Multiplication and Division
19. Modulus counters (Mod: 4, Mod: 5, Mod:6, Mod:8 and Decade counter) using IC 7490
20. Frequency response characteristics of Op–amp inverting amplifier
21. Design of digital to analog converter (DAC) of given specifications
22. 4 bit binary adder and subtractor
23. Shift Register (serial–in and serial–out) using D–type/JK Flip–Flop ICs
24. RC Phase Shift Oscillator
25. JFET characteristics

Books for reference

1. C.C. Ouseph, U. J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan Pvt. Ltd., Chennai, 2012.

2. M. N. Srinivasan, S. Balasubramaniam, R. Ranganathan, A Text Book of Practical Physics, 2nd Ed., S. Sultan Chand & Sons Publications, New Delhi, 2014.
3. Jerry D. Wilson, CBS college., 1986
4. D. Chattopadhyay, P.C. Rakshit , New central book agency (p) LTD., 1987
5. C. Isenberg, S.S Chomet, Viva books Private Limited., 1998
6. Narasimhan & Ramamoorthy, B.G. Paul & Co., 1961

Subject Skill – I
Electrical Circuits and Networks

Semester: VI
Course Code

Hours/ Week: 3
Credits : 3

Objectives

- To develop a skill towards designing and trouble shooting of electrical circuits
- To introduce them to the various circuit analysis theorems
- To develop an understanding of single phase and three phase AC
- To impart a knowledge of Transformers and Motors to the students

Learning Outcomes

On completion of this course, students will be able to

- Locate, identify and rectify faults in simple electrical circuits
- Use electrical instruments skillfully
- Explain the effects of shorts and opens in series and parallel circuits
- Analyse an electrical circuit with the help of circuit theorems

Unit – I: Basics of Electrical circuits

Voltage – Current (AC and DC) – Resistance – Electrical resistivity and conductivity – Ohm's law – Power – expression for power using Ohm's law – series and parallel circuits – voltage drop in series circuit – sign convention – circuit loads– combination of resistors, inductors and capacitors in series and parallel – Kirchoff's laws: Current law and voltage law – applications of series and parallel circuits – electrical graphical symbols of common circuit elements.

Unit – II: Electrical Circuit theorems (with DC circuits)

Network – branches – nodes – mesh current and node voltage analysis – voltage source and current source transformation – star and delta transformation – Thevenin's theorem – Norton's theorem – superposition theorem – maximum power transfer theorem.

Unit – III: AC circuits

Single phase AC – instantaneous, peak, R.M.S. and Average values and form factor - concept of Reactance, Impedance, Susceptance and Admittance - Phase and Phase difference - concept of Power Factor.

Three phase AC – generation - importance of three phase circuits – star, delta connections – relation between voltages, currents of line and phase values in star and delta connections - live and neutral wire – Domestic electric circuits –electrical appliances in parallel – current through appliances .

Unit – IV: Transformers and Electrical safety

Transformers – Types – energy losses – methods of testing transformers – methods of cooling transformers – voltage control by tap changing – source of vibration and noise in transformers.

Short circuit – fuse – circuit breaker – earthing – Reasons for earthing-system earthing-equipment earthing-Safety in electrical work, accidents and treatment for electric shock, first aid.

Unit – V Electric Motors and Electrical Wiring

Electric Motors: Single-phase, three-phase & DC motors. Basic design. Interfacing DC or AC sources to control heaters & motors. Speed & power of ac motor.

Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star and delta connection. Voltage drop and losses across cables and conductors. Instruments to measure current, voltage, power in DC and AC circuits. Insulation. Solid and stranded cable. Conduit. Cable trays. Splices: wirenuts, crimps, terminal blocks, split bolts, and solder. Preparation of extension board.

Books for study

1. B. L. Theraja, R..S. Sedha, Principles of Electronic devices and circuits, S.Chand and company Limited, New Delhi, 2008.
2. K. A. Smith and Alley R E, Electrical Circuits, Cambridge University press, USA, 2014.
3. K. S. Suresh Kumar, Electrical Circuits and Networks, Dorling Kindersley Pvt Limited, New Delhi, 2009.
4. Austin Hughes, Electric Motors and drives, Fundamentals, types and applications,

Books for reference

1. Dinesh C. Dube, Electronics circuits and analysis, New Delhi, Narosa publishing house Pvt Limited, 2006.
2. S. L. Kakani, K. C. Bhandari, A Text book of Electronics, New Age International (P) Limited, 2014.
3. James J. Brophy, Basic electronics for scientist Mc Graw –Hill Kogakusha Limited, New Delhi, 1977.

Websites

1. <http://www.nescol.ac.uk/courses/engineering/electrical-networks-and-resonance>.
2. www.coursehero.com/file/p5dp8ms/73-ELECTRICAL-CIRCUITS-AND-NETWORK-SKILLS.
3. www.rajagiritech.ac.in/home/EEE/Pdf/CourseHandoutS3.pdf
4. www.google.co.in/searchELECTRICALCIRCUITSANDNETWORK
5. books.google.co.in/books/about/NETWORK_THEORY

Subject Skill Practicals – I
Electrical Circuits and Networks Practicals

Semester – VI
Course Code :

Hours/week: 2
Credits: 1

Objectives

- To develop the skill of establishing electrical circuits and measuring electrical quantities
- To verify the various circuit laws like Ohm's Law, KVL, KCL, etc.
- To understand the various network theorems such as Superposition, Thevenin, Norton and Maximum Power Transfer through hands on training.

Experiments

1. Testing continuity of conductors using multimeter
2. Study of series and parallel lamp circuits
3. Determining the value of resistors from Colour code
4. NULL OFFSET adjustment for the voltmeter, Ammeter and Multimeter
5. Current measurement by direct and indirect methods (using ammeter and Ohm's law)
6. Voltage measurement by direct and indirect methods (using voltmeter and Ohm's law)
7. Experimental verification of Kirchhoff's voltage law
8. Experimental verification of Kirchhoff's current law
9. To verify superposition theorem experimentally for a given resistive circuit consisting two independent sources
10. To verify Thevenin's theorem experimentally for a given circuit
11. To verify maximum power transfer theorem experimentally for a given circuit
12. Studying circuit schematics, identifying the faults and rectifying the faults of a regulated power supply
13. Studying and Testing different transformers
14. Domestic wiring

Subject Skill-2
Basic Instrumentation

Semester– VI
Course Code :

Hours/week: 3
Credits: 3

Learning Objective

- To develop knowledge of principles and working of Analog and Digital Instruments used in the measurement of various physical quantities.

Learning Outcomes

On completion of the course, the students will be able to understand

- The working principle of electrical and optical instruments used in the measurement of various physical quantities.
- The measurements with a variety of instruments.

Unit -I: Electrical Instruments - I

Construction and working: voltmeter, ammeter, wattmeter–galvanometer and ohmmeter - Working principle of potentiometer – Analog Multimeter – Analog IC tester.

Unit - II: Electrical Instruments - II

Principle and Usage: AFO – VTVM – Q-meter – Transistor tester – Eliminator – Dual Power Supply – Transformers – Vibrometers – tachometers – CRO.

Unit - III: Digital Instruments

Block diagram and working: Digital voltmeter–digital Multimeter –Digital frequency counter — Digital conductivity meter – Digital pH meter – Digital Balance.

Unit - IV: Optical Instruments

Principle and usage: Compound Microscope Telescope: Terrestrial and Astronomical – Binocular– Spectrometer – direct vision spectroscope–spherometer – Michelson’s interferometer– polarimeter – periscope.

Unit V: Environmental Instrumentation

Principle and usage: Hygrometers – anemometer – noise dosimeters – pyranometers and pyrhemometers – Turbidity meter – pH meter – conductivity meter – Thermometer – pyrometer–Hydrometers – manometer – viscometer – Barometer –Lactometer

Books for study

1. Rajendra Prasad, Electronic Measurements and Instrumentation, Khanna Publications, Chennai, 2004.
2. S. Ramambhadran, Electronic Measurements and Instrumentation, Khanna Publications, Chennai, 2003.

Books for reference

1. W. D. Cooper, A. D. Helfrick, Electronic Instrumentation and Measurement Techniques, New Delhi, Prentice Hall of India Pvt., Ltd, 1987.
2. A. J. Bouwens, Digital instrumentation, New Delhi, McGraw Hill international, 1987.
3. Randy D. Down, Jay. H. Lehr, Environmental Instrumentation and Analysis Handbook, 2004

Websites

1. <http://www.explainthatstuff.com/hygrometers.html>
2. www.jma.go.jp/jma/jma-eng/jma-center/ric/material/1...Notes/CP7-Sunshine.pdf
3. http://nptel.ac.in/courses/112104118/lecture-4/4-5_mano_vacuum.htm
4. <http://www.brookfieldengineering.com/products/viscometers/>
5. <http://amrita.olabs.edu.in/?sub=1&brch=5&sim=168&cnt=1>
6. <http://www.polarimeter.eu/>
7. <http://www.chem.ucla.edu/~bacher/General/30BL/tips/Polarimetry.html>
8. <http://www.ei-instrument.com/digital-conductivity-meter-601-611.htm>
9. http://www.uniquecarsandparts.com.au/how_it_works_tachometer

Subject Skill Practicals – 2
Basic Instrumentation

Semester– VI
Course Code:

Hours/week: 2
Credits: 1

Objectives

- To provide an opportunity for applying the skills they have developed by studying the basic instrumentation paper.

Experiments

1. Measurement of voltage, current and resistance using multimeter
2. Measurement of resistance and testing of active and passive components by multimeter
3. Studying the function/purpose of different knobs and buttons in a CRO
4. Measurement of voltage, frequency, Period and Phase of AC using CRO
5. Testing resistors, capacitors diodes and transistors using multimeter
6. Measurement of radius of an object by microscope
7. Study of parts of a telescope and using it to view distant objects
8. Studying the functions of parts of a spectrometer and measuring the wavelength of a spectral line.
9. Measurement of pH of various liquids
10. Measurement of viscosity by viscometer
11. Measurement of density by Hydrometer
12. Measurement of pressure by manometer
13. Measurement of resistance using a bridge(Post office box)
14. Designing electrical circuits on bread board

Physics Revisited
(Self–Study Paper)

Semester– VI
Course Code :
Objective

Hours/week: —
Credits: 1*

- Enabling the students to revise the concepts of mechanics, oscillations, waves, Black body radiation, thermodynamics, statistical physics, Quantum numbers, semiconductor devices and their applications, which would help them to perform better in competitive examinations.

Learning outcomes

By the end of this course, the students should be able to

- Recollect and explain the various physics concepts they have studied in their curriculum.

Unit - I: Mechanics, oscillations and waves

Laws of motion – Work – Kinetic and potential energy – Friction – terminal velocity in air– Conservation of linear momentum and Angular momentum – Moment of inertia – Rotation about one axis – Planetary motion and Kepler's laws – Simple pendulum – simple harmonic motion– damped and forced oscillation– Transverse and Longitudinal waves – interference – beats – sound waves in air – Doppler effect.

Unit - II: Thermodynamic and Statistical Physics

Laws of thermodynamics – Thermodynamic potentials– Maxwell relations–Phase space – micro and macro states –Ensembles– Classical and quantum statistics – Ideal Bose and Fermi gases – Blackbody radiation and Planck's distribution law.

Unit - III: Atomic and Nuclear Physics

Quantum numbers – Pauli's exclusion principle – Electron spin – LS & JJ couplings – Photo electric effect – X-ray – Binding energy – semi-empirical mass formula – nuclear force – liquid drop model – shell model– alpha, beta and gamma decays – Fission and fusion– Elementary particles.

Unit - IV: Quantum mechanics

Wave-particle duality – De Broglie concepts – Uncertainty principle – Schrödinger equation – Eigen value problems (particle in a box, harmonic oscillator, etc) - Tunneling through a barrier – Wave function in coordinate and momentum representations.

Unit - V: Electronics

Semiconductor devices (diodes, transistors, field effect devices) – Opto-electronic devices (solar cells, photo-detectors, LEDs) – Operational amplifiers and their applications – Digital techniques and applications (registers, counters, comparators and similar circuits).

Books for study

1. R Murugesan, Mechanics And Mathematical Physics, New Delhi, S.Chand Company, 2012.
2. Brij Lal, Dr.N. Subrahmanyam & Dr. P.S. Hemne, Heat Thermodynamics And Statistical Physics, New Delhi, S.Chand company, 2012.
3. R.Murugesan, Modern Physics, New Delhi, S.Chand and Company Ltd., Ram Nagar, 2009.
4. Tayal. D.C., Nuclear Physics, Mumbai, Himalaya Publishing house,2011.
5. Mehta V. K, Principles of Electronics, New Delhi, S. Chand & Co. Ltd., 2003.

Books for reference

1. D Halliday, R. Resnick, J Walker, Fundamentals of Physics, Wiley New York 2001.
2. J. B. Rajam and C.L.Arora, Heat and Thermodynamics, New Delhi, S. Chand Company, 1984.
3. B. Basavaraj, A Text Book of Basic Electronics, Mumbai,Himalaya Publishing House, 2007.
4. G. Aruldhas, Quantum Mechanics, NewDelhi, Prentice Hall of India Pvt. Ltd.,2007.
5. S.P. Singh, M.K. Bagde, Kamal Singh, Quantum Mechanics, NewDelhi, S.Chand & company Ltd, 2000.

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2. http://www.physicscatalyst.com/heat/thermodynamics_3.php/
3. <http://physics.info/X-ray/>
4. <http://www.allaboutcircuits.com/textbook/semiconductors/chpt-5/junction-field-effect-transistors-jfet/>
5. <http://www.quantum-physics.polytechnique.fr/en/>
6. <http://www.futureelectronics.com/en/transistors/jfet-transistor.aspx>

Physics in Everyday Life

Semester– VI
Course Code :

Hours/week: 2
Credits: 1

Objectives

- To provide insights about how much of everyday life is governed by physics principles.
- To create an interest towards science

Learning outcomes

On successful completion, the students will be able to

- Demonstrate an understanding of how physics is applied to real life situations.

Unit-I: Mechanics

Laws of Motion – skating and falling balls-wind turbines and bumper cars- seesaws - dynamics of rotating objects-running-jumping-motion of spinning ball-Pressure-Applications: action of knife, dam construction-Physics behind soccer-Physics of rockets-flying balloons-air bag

Unit - II: Light

Electromagnetic spectrum – Light – Sunlight – Rayleigh scattering - blue and red colours of sky - reflection: colours of objects - houses in hot countries painted white - dark uniforms in winter and light ones in summer - refraction and dispersion of light -rainbow - Doppler Effect - colours of stars.

Unit - III: Sound

Production of sound - Music and noise - propagation of sound in different media – echo - acoustics of buildings - audible limit - Ultrasound: use of ultrasound by bats – SONAR - depth of sea.

Unit - IV: Fluids

Fluids – density - Archimedes’s principle - Applications: floating of ships, balloons -surface tension and viscosity - applications.

Unit - V: Electric devices

Electricity – current-voltage - heating effect of current: electric iron, electric heaters-induction stove - Electromagnetism: Faraday’s laws – dynamo – motor – generator – transformers - Electric bells

Books for study

1. Louis A. Bloomfield, How Things Work the physics of everyday life 5th Edition, The University of Virginia. 2013
2. Jay Newman, Physics of the Life Sciences, Springer Science+Business Media, 2008.

Books for reference

1. J.B.S.Haldane, Science and everyday life, Vigyan prasar, 2002.
2. Stan Gibilisco, Alternative Energy Demystified, the McGraw-Hill Companies, 2007.
3. Glen S. Aikenhead. Science Education for Everyday Life, Teachers College Press, 1234 Amsterdam Avenue, New York, NY, 2006.

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1. http://labman.phys.utk.edu/phys135/modules/m8/rot_dynamics.htm
2. www.real-world-physics-problems.com/hot-air-balloon-physics.html
3. www.allaboutcircuits.com/textbook/direct-current/chpt-14/electromagnetism
4. www.ucsusa.org/clean-vehicles/electric-vehicles/how-do-hybrids-work#.WFN_3WgW0IQ
5. www.cancer.org/cancer/cancercauses/radiationexposureandcancer/radiofrequency-radiation
www.foe.org.au/anti-nuclear/issues/nfc/power-weapons/civmil
6. <http://savannah.nongnu.org/projects/ffsft>

Department of Chemistry (UG)
B. Sc Chemistry - Scheme of papers (CBCS) - From 2017 – 18 onwards

| Year / Semester | Part | Subject | Title of the Paper | Hrs / Week | Credits | Exam hours | Max Marks | | |
|------------------------|------|-----------------------|--------------------------------|------------|---------|------------|-----------|-----|-------|
| | | | | | | | CIA | Sem | Total |
| I Year / I Semester | I | Tamil | Tamil - I | 5 | 3 | 3 | 30 | 70 | 100 |
| | II | English | English - I | 5 | 3 | 3 | 30 | 70 | 100 |
| | II | | Communicative English | | 1 | | | | |
| | III | Core | General Chemistry - I | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | Core | General Chemistry - II | 3 | 3 | 3 | 30 | 70 | 100 |
| | III | Core Practical | Volumetric Analysis | 3 | 3 | | | | |
| | III | Allied | Allied Mathematics - I | 6 | 4 | 3 | 30 | 70 | 100 |
| | IV | | FC | 2 | 1 | | | | |
| I Year / II Semester | IV | | Religion & Ethics - I | 2 | 1 | 3 | 30 | 70 | 100 |
| | I | Tamil | Tamil - II | 5 | 3 | 3 | 30 | 70 | 100 |
| | II | English | English - II | 5 | 3 | 3 | 30 | 70 | 100 |
| | II | | Communicative English | | 1 | | | | |
| | III | Core | General Chemistry - III | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | Core | General Chemistry - IV | 3 | 3 | 3 | 30 | 70 | 100 |
| | III | Core Practical | Volumetric Analysis | 3 | 3 | 3 | 40 | 60 | 100 |
| | III | Allied | Allied mathematics - II | 6 | 4 | 3 | 30 | 70 | 100 |
| II Year / III Semester | IV | | FC | 2 | 1 | 3 | 40 | 60 | 100 |
| | IV | | Religion & Ethics - II | 2 | 1 | 3 | 30 | 70 | 100 |
| | I | Tamil | Tamil - III | 5 | 3 | 3 | 30 | 70 | 100 |
| | II | English | General English - III | 5 | 3 | 3 | 30 | 70 | 100 |
| | III | Core | Organic Chemistry - I | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | Core | Analytical Chemistry - I | 3 | 3 | 3 | 30 | 70 | 100 |
| | III | Core Practical | Qualitative Inorganic Analysis | 3 | 3 | | | | |
| | III | Allied | Allied Physics - I | 6 | 4 | 3 | 30 | 70 | 100 |
| | IV | | FC | 2 | 1 | | | | |
| | IV | | Human Rights | 2 | 1 | 3 | 30 | 70 | 100 |
| II Year / IV Semester | V | | DEEDS | | | | | | |
| | V | | SHELTERS | | | | | | |
| | | | Certificate course - I | | 2* | | | | |
| | I | Tamil | Tamil - IV | 5 | 3 | 3 | 30 | 70 | 100 |
| | II | English | English - IV | 5 | 3 | 3 | 30 | 70 | 100 |
| | III | Core | Inorganic Chemistry - I | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | Core | Physical Chemistry - I | 3 | 3 | 3 | 30 | 70 | 100 |
| | III | Core Practical | Qualitative Analysis | 3 | 3 | 4.5 | 40 | 60 | 100 |
| | III | Allied | Allied Physics - II | 6 | 4 | 3 | 30 | 70 | 100 |
| | IV | | FC | 2 | 1 | | 40 | 60 | 100 |
| IV | | Environmental Studies | 2 | 1 | 3 | 30 | 70 | 100 | |
| V | | DEEDS | | 2 | | | | | |
| V | | SHELTERS | | 2 | | | | | |

| | | | | | | | | | |
|-------------------------------|-----|-----------------------|-------------------------------------|------------|----|---|----|----|-----|
| | | | | | | | | | |
| III Year / V Semester | III | Core | Organic Chemistry - II | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | Core | Inorganic Chemistry - II | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | Core | Physical Chemistry - II | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | Core | Analytical Chemistry -II | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | Main Elective | Elective – I | 4 | 2 | 3 | 30 | 70 | 100 |
| | III | Main Elective | Elective – II | 2 | 2 | 3 | 30 | 70 | 100 |
| | | SSP | Chemistry for Competitive Exam - I | | 1* | | | | |
| | III | Core Practical | Gravimetric & Organic Analysis | 3 | 3 | | 40 | 60 | 100 |
| | III | Core Practical | Physical Chemistry Practicals | 3 | 3 | | 40 | 60 | 100 |
| | | NME | Chemistry of Drugs and Disease | 2 | 1 | | 30 | 70 | 100 |
| | | | Certificate Course - II | | 2* | | | | |
| III Year / VI Semester | III | Core | Organic Chemistry - III | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | Core | Inorganic Chemistry - III | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | Core | Physical Chemistry - III | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | Subject Skill (SS-I) | Paper - I | 5 | 4 | 3 | 30 | 70 | 100 |
| | III | Subject Skill (SS-II) | Paper - II | 5 | 4 | 3 | 30 | 70 | 100 |
| | IV | NME | Chemistry in Everyday Life | 2 | 1 | 3 | 30 | 70 | 100 |
| | III | SSP | Chemistry for Competitive Exam - II | | 1* | | | | |
| | III | Core Practical | Gravimetric & Organic Analysis | 3 | 3 | 6 | 40 | 60 | 100 |
| | III | Core Practical | Physical Chemistry Practicals | 3 | 3 | 3 | 40 | 60 | 100 |
| | | | Project* | | 2* | | | | |
| | | Total | 180 | 148 +2+ 2* | | | | | |

* Extra credits

Note:

- SSP/Project/Certificate course - optional

Abbreviations

| | |
|-----------|--|
| FC | Foundation Course |
| Comm. Eng | Communicative English |
| ET | Ethics |
| RE | Religion |
| DEEDS | Dept. of extension and educational services. |
| HR | Human Rights |
| SSP | Self study paper |
| NME | Non-major Elective |

List of Electives

Elective - I

4 Hours

1. Pharmaceutical Chemistry
2. Clinical Biochemistry
3. Bio-Inorganic Chemistry

Elective - II

2 Hours

1. Applied Chemistry
2. Protein Chemistry
3. Computer for Chemists

Subject Skill Papers

5 Hours

1. Polymer Chemistry
2. Industrial and Environmental Chemistry
3. Green Chemistry
4. Materials Chemistry
5. Inorganic Materials of Industrial Importance
6. Reaction Mechanisms and Reagents in Organic Chemistry

Certificate Courses

2 Hours

1. Organic Farming
2. Industrial Safety

Objectives

- To learn the stereochemical factors that influence the chemical reactions
- To appreciate the importance and applications of photochemical reactions and understand the basic concepts of organic chemistry.

Unit - I: Photochemistry**12 Hours**

- 1.1 Organic photochemistry: Types of Photochemical reactions – photodissociation- gas phase. Photolysis – isomerisation – cyclisation – dimerisation and oxetane formation.
- 1.2 Norrish - I and II reactions.
- 1.3 Barton reaction – photo Fries rearrangement. Photochemical formation of smog.
- 1.4 Photochemistry of vision.

Unit - II: Stereochemistry**12 Hours**

- 2.1 Stereoisomerism: definition – classification into optical and geometrical isomerism. Projection formulae: Fischer, Flying Wedge, Sawhorse and Newmann projection formulae – Rotation of optical isomers – Cahn – Ingold – Prelog rules – R, S notation of optical isomers with one and two asymmetric carbon atoms – D, L notations.
- 2.2 Optical activities in compounds not containing asymmetric carbon atoms: biphenyl, allenes and spiranes. Geometrical isomerism: cis – trans, syn – anti and E, Z notations – geometrical isomerism in maleic and fumaric acid and unsymmetrical ketoximes .
- 2.3 Methods of distinguishing geometrical isomers using melting points, dipole moment, solubility, dehydration, cyclisation, heat of hydrogenation and combustion.
- 2.4 Conformational analysis : Introduction of terms – conformers, configuration, dihedral angle, torsional strain, conformational analysis of ethane and n-butane including energy diagrams. Conformers of cyclohexane – axial and equatorial bonds – ring flipping – conformers of mono and dimethylcyclohexane – 1,2 and 1,3 interactions.

Unit - III: Pericyclic Reactions**12 Hours**

- 3.1 Classification of pericyclic reactions. Theoretical basis of pericyclic reactions: F.M.O theory, Molecular orbitals of conjugated dienes.
- 3.2 Cyclo addition reactions: (2+2) and (4+2) cycloadditions
- 3.3 Electrocyclic reactions: cyclisation of $4n$ systems and $(4n+2)$ systems.
- 3.4 Sigmatopic rearrangement: Claisen and Cope rearrangements: mechanism.

Unit - IV: Heterocyclic Chemistry**12 Hours**

- 4.1 Aromaticity of heterocyclic compounds. Preparation, properties and uses of furan, Pyrrole, and thiophene.
- 4.2 Preparation, properties and uses of pyridine and piperidine. Methods of opening of Heterocyclic rings – oxidation, reduction, Hoffman's exhaustive methylation.
- 4.3 Comparative study of basicity of pyrrole, pyridine and piperidine with amines.
- 4.4 Synthesis and reactions of quinoline, isoquinoline and indole with special reference to Skraup, Bilsler- Napieralski and Fischer indole synthesis.

Unit - V: Polynuclear Hydrocarbons and Dyes**12 Hours**

- 5.1 Polynuclear hydrocarbons – synthesis, properties and uses of naphthalene, anthracene, Phenanthrene.
- 5.2 Dyes – Theory of colour and constitution – classification according to the structure and method of application.

- 3.2 Crystal field theory- crystal field splitting in octahedral, tetragonal, square planar and tetrahedral complexes- CFSE calculation of octahedral complexes.
- 3.3 Low spin and high spin complexes, spectrochemical series, and explanation of magnetic properties, colour and geometry using CFT. Jahn Teller distortion and *trans* effect.
- 3.4 Labile and inert complexes, thermodynamic stability, kinetic stability, factors affecting the stability of complexes.

Unit - IV: Organometallic Compounds

12 Hours

- 4.1 Metal carbonyls: 18 electron rule, mono and binuclear carbonyls of Ni, Fe, Co and Mn- preparation, structure, chemical properties and uses.
- 4.2 Structure and bonding in π -metal alkenyl, alkynyl and cyclopentadienyl complexes. Olefin organometallics: preparation and uses. Allyl organometallics: preparation and uses.
- 4.3 Cyclopentadienyl organometallics: preparation and reactions.
- 4.4 Synthetic applications of organometallic compounds as homogenous catalyst- Wilkinson catalyst, Fischer-Tropsch reaction.

Unit - V: Bioinorganic Chemistry

12 Hours

- 5.1 Porphyrin ring systems: cytochromes, structure and functions of Haemoglobin and Myoglobin.
- 5.2 Chlorophyll: structure, functions and Photosynthesis. Structure and functions of Vitamin B₁₂.
- 5.3 Biochemistry of Iron. Metalloenzymes- Carboxypeptidase and Carbonic anhydrase.
- 5.4 Biological fixation of Nitrogen and Nitrogen cycle.

References

1. J. D. Lee, *Concise Inorganic Chemistry*, Chapman and Hall: London, 1961.
2. B. R. Puri, L. R. Sharma and K. C. Kalia, *Principles of Inorganic Chemistry*, 33rd Edition, Vishal Publishing Co, Jalandar, 2004.
3. R. D. Madan, *Modern Inorganic Chemistry*, Second edition, S. Chand publications, New Delhi, 2000.
4. James, E. Huheey, Ellen A. Keiter, Richard, L. Keiter. *Inorganic Chemistry Principles Structure and Reactivity*, Harper and Row: Newyork, 1999.

Semester – V

Physical Chemistry – II

4 Hrs/Week (4 Credits)

Objectives

- To understand the basic concepts of quantum chemistry and statistical thermodynamics
- To learn the concepts regarding chemical kinetics and apply them for kinetics related problems in photochemistry

Unit - I: Quantum Mechanics

12 Hours

- 1.1 Postulates of Quantum mechanics – significance of wave function – Eigen value – Eigen function – normalisation of Ψ and Expectation value (Definition only). Schrodinger's wave equation(with respect to space and with respect to time)
- 1.2 Operators – Algebra of operators – commutative property – Linear operator and Hermitian property – momentum operator, Hamiltonian operator.
- 1.3 Solution of Schrodinger's wave equation for simple systems: Particle in one dimensional box and particle in three dimensional box.

- 1.4 Schrodinger equation for One dimensional simple Harmonic Oscillator and Rigid rotor. Schrodinger equation for hydrogen atom (No derivation)

Unit - II: Group Theory

12 Hours

- 2.1 Symmetry elements and symmetry operations- group postulates- Types of group
2.2 Point groups- representation of molecular point group- Great orthogonality theorem
2.3 Important properties of Irreducible representations- Uses of G.O.T. to construct character tables for the molecular point groups
2.4 Character table for C_{2V} and C_{3V} point group.

Unit - III: Chemical Kinetics

12 Hours

- 3.1 Definitions of terms – Derivations of Zero, First, Second and Third order reactions ($3A \rightarrow$ products)–study of kinetics by Volumetric, Polarimetric and dilatometric methods.
3.2 Determination of order of the reactions-Graphical method, rate equation method, half-life method and Ostwald's method.
3.3 Complex reactions-consecutive, parallel and reversible reactions (no derivation. only examples) – Effect of temperature on reaction rate – temperature coefficient - concept of activation energy- Arrhenius equation.
3.4 Theories of reaction rates: Bimolecular collision theory – Transition state theory – Lindemann's unimolecular theory. catalysis-concept of active sites-Enzyme catalysis: theory – Mechanism and kinetics of enzyme catalysed reaction-Michaleis-Menton equation.

Unit - IV: Photochemistry

12 Hours

- 4.1 Interaction of radiation with matter- Difference between thermal & photochemical processes – Laws of photochemistry: Grothus – Draper law, Stark Einstein law- Jablonski diagram depicting various processes occurring in the excited state.
4.2 Qualitative description of fluorescence, phosphorescence, non-radioactive processes (internal conversion, inter system crossing), quantum yield, photosensitized reactions.
4.3 Kinetics of photochemical combination of $H_2 - Br_2$ and $H_2 - Cl_2$.

Unit - V: Adsorption

12 Hours

- 5.1 Adsorption – Distinction between physical and chemical adsorption-Factors influencing adsorption-
5.2 Adsorption isotherm – Freundlich isotherm. Langmuir isotherm- theory and derivation.
5.3 Postulates of B.E.T isotherm – equation(No derivation) – determination of surface area-
5.4 Gibb's adsorption isotherm– Types and Significance of isotherms-Applications of adsorption.

References

1. B. R. Puri, L. R. Sharma and K. C. Kalia, *Principles of Inorganic Chemistry*, 33rd Edition, Vishal Publishing Co, Jalandar, 2004.
2. B. R. Puri, L. R. Sharma and M. S. Pathania, *Principles of Physical Chemistry*, 47th Edition, Vishal Publishing Co, Jalandar, 2016.
3. B. S. Bahl, Tuli and ArunBahl, *Essentials of Physical Chemistry*, 19th edition, S.Chand publications, New Delhi, 2012.
4. A.S. Negi and S.C. Anand, *A text book of Physical Chemistry*, Wiley Eastern Ltd, New Delhi, 1984.
5. P. L. Soni, O. P Dharmarha and U. N. Dash, *Text Book of Physical Chemistry*, Sultan

Chand & Company Ltd., New Delhi, 2001.

6. S. Glasstone, *Text book of physical chemistry*, 2nd revised edition, Macmillan, United Kingdom, 1980.

Semester - V

Analytical Chemistry - II

4 Hrs/Week (4 Credits)

Objectives:

- To study the basics, principles and instrumentation of spectroscopy.
- To learn the basics, principles of polarography and amperometry techniques.

Unit - I: Colorimetric Analysis and UV-Visible Spectroscopy

12 Hours

- 1.1 Introduction to spectroscopy-spectrum-electromagnetic radiation-Planck's equation-wavelength-frequency-wave number.
- 1.2 Distinction between line and band spectrum-Classification-based on frequency.
- 1.3 Colorimetric analysis-laws of colorimetry-photoelectric colorimeter-Estimation of Fe and Ni. Determination of composition of complex Job's methods-Example:Ni-EDTA complex.
- 1.4 UV-Visible spectroscopy-Types of transition in organic compounds-Types of absorption band-chromophore-auxochrome-bathochromic shift, hypsochromic shift, hyperchromic shift and hypochromic shift.Instrumentation-single and double beam and applications of simple systems.

Unit - II: IR and Raman Spectroscopy

12 Hours

- 2.1 IR Spectroscopy-theory-types of vibrations-Example: H₂O and CO₂.
- 2.2 Instrumentation and sampling techniques.
- 2.3 Applications: Structure of NO₂, study of hydrogen bonding-Identification of simple organic compounds: alcohols, acids, amines, esters, ketones and unsaturated compounds.
- 2.4 Raman Spectroscopy-theory-advantages over IR Spectroscopy. Instrumentation and sample handling-Depolarization effect-Mutual Exclusion principle, applications-structure of CO₂, nitrous oxide and mercurous chloride.

Unit - III: NMR and ESR Spectroscopy

12 Hours

- 3.1 NMR Principle: theory-allowed orientation-spin states and relaxation- chemical shift.
- 3.2 Factors affecting chemical shift, spin-spin coupling, and hydrogen exchange.
- 3.3 Instrumentation and sample handling-Applications: Structural identification-Examples:1-Bromo Propane, 2-Bromo Propane, Toluene, Phenol and Vinyl Chloride.
- 3.4 ESR Principle-Theory-Selection rule for transition-Instrumentation- Zero field Splitting-Hyperfine splitting. Applications-ESR of simple organic radicals: CH₃-ESR of V⁴⁺, Mn²⁺ and Cu²⁺ ions.

Unit - IV: AAS and AES

12 Hours

- 4.1 Atomic absorption spectroscopy-principle-Advantages and disadvantages of AAS.
- 4.2 Instrumentation of AAS, Interferences in AAS. Applications of AAS-Determination of Mg in water and Lead in Petrol.
- 4.3 Atomic Emission Spectroscopy- Principle of Flame photometry, AES-Principle-Advantages and Disadvantages.
- 4.4 Instrumentation of AES, Applications- Comparison of AAS and AES.

Unit - V: Polarography and Amperometry**12 Hours**

- 5.1 Polarography-principle and instrumentation -current-voltage curves
- 5.2 Evaluation of Polarographic waves-half-wave potential, Ilkovic equation..
- 5.3 Applications of polarography for organic and inorganic systems.
- 5.4 Amperometry- Principle-Instrumentation-Types of curves. Advantages of amperometric titrations-applications of amperometric titrations.

References

1. R.Gopalan, P. S. Subramanian and K. Rengarajan, *Elements of analytical chemistry*, 3rd Edition., Sultan Chand, New Delhi, 2003
2. A. K. Srivatsava and P. C. Jain, *Chemical Analysis and Instrumental Approach*, 3rd Edition, S.Chand and Company Ltd., New Delhi, 2010.
3. A. I. Vogel, *A text book of quantitative inorganic analysis*, Longman, New York, 1985.
4. H. H. Willard, L. L. Merritt and J. A. Dean, *Instrumental methods of analysis*, 7th Edition., East West Press, New Delhi, 1986.
5. D. A. Skoog and D. M. West, *Principles of instrumental analysis*, Holt Saunders, Tokyo, 2001.
6. Gurdeep R Chatwal, *Instrumental Methods of Chemical Analysis*, 5th Edition. Himalaya Publications, 2005.
7. S. M. Khopkar, *Basic Concepts of Analytical Chemistry*, New Age Publishers, 2nd Edition. 2000.
8. V. Suryanarayananrao, *Polarography and Allied techniques*, University Press, 2002.

Elective Paper - I**Semester - V****Pharmaceutical Chemistry****4 Hrs/Week (4 Credits)****Objectives**

- To acquire a sound knowledge about the chemistry of drugs and their mechanism of action.
- To learn about various types of diseases, their cause and cure through conventional and modern medicine.

Unit - I: Pharmacology**12 Hours**

- 1.1 Introduction: Important terminologies used in medicinal chemistry – Drugs, Dose, Pharmacology, Pharmacopoeia, therapeutics, toxicology, chemotherapy, pharmacophore, metabolite, antimetabolite and mutation.
- 1.2 Naming of drugs: Chemical name, proprietary name and non – proprietary name with suitable examples.
- 1.3 Modes of administration of drugs: Enteral routes : oral, buccal , rectal. Parenteral routes: intradermal, subcutaneous, intramuscular, intravenous, intraarterial, intrathecal, intraperitoneal, intramedullary, intraarticular, inhalation, topical (meanings Only) - Enteral dose forms. Disadvantages of enteral and parenteral routes -Definition of LD50, ED50 and therapeutic index.
- 1.4 Drug Stability – Shelf life – definition and importance.
Need for the study of Drug Stability – causes of drug degradation and their prevention.
 - Hydrolysis (procaine, Chloramphenicol, aspirin)
 - Oxidation (ascorbic acid, adrenaline)
 - Free radical reaction (rancidity of Oils)
 - Polymerisation (formaldehyde)

- Decarboxylation (procaine)

Unit - II: Viral Infections

12 Hours

- 2.1 General Pharmacology: Meaning of receptor, agonist, antagonist, partial agonist, pharmacodynamics and pharmacokinetics. Process of drug adsorption, distribution, metabolism and excretion – Plasma half life period and its significance.
- 2.2 Viral diseases and antiviral drugs: Small pox, jaundice, rabies, influenza and AIDS – causes, symptoms and treatment. Antiviral Drugs – obstacles in antiviral therapy – Structure and uses of acyclovir, idoxuridine, amantadine and zidovudine (AZT).
- 2.3 Protozoal Infections: malaria – the four malarial parasites – life cycle of malarial parasites – antimalarials: chloroquine, primaquine and quinine.
- 2.4 Helminthic diseases – filaria – anthelmintics: piperazine, Diethyl carbamazepine and mebendazole.

Unit - III: Bacterial Infections

12 Hours

- 3.1 Bacterial Infections: Meaning of bacteriostat and bacteriocide, Gram positive and Gram negative bacteria. Antibacterial agents: Structure, uses, mode of action and side effects of penicillins, cephalosporin, streptomycin, chloramphenicol and tetracyclines.
- 3.2 Sulphonamides: Preparation and uses of sulphanilamide, sulphapyridine, sulphadiazine, Sulphathiazole, sulphaguanidine and prontosil-mode of action of sulphadiazine – General side effects of sulphadiazine.
- 3.3 Bacterial diseases: Leprosy – Impossibility of culture growth of Leprosy bacillus invitro-meaning of culture, invitro and invivo.
- 3.4 Tuberculosis – cause, symptoms and treatment of TB, tetanus and typhoid

Unit - IV: Types of Drugs

12 Hours

- 4.1 Inflammation and anti-inflammatory drugs: Examples for steroidal and non-steroidal anti-inflammatory drugs, Antihistamines - Uses and side effects,
- 4.2 Analgesics : Narcotic analgesics- Exaction, physiological action, uses and side effects of morphine. Synthetic analgesics : preparation and uses of pethidine and methadone. Antipyretic analgesics: preparation, physiological action, uses and side effects of aspirin and paracetamol.
- 4.3 Anaesthetics: Definition – Classification – General anaesthetics – Preparation , advantages and disadvantages of diethyl ether, chloroform, Nitrous oxide, halothane. Local anaesthetics: Preparation and uses of procaine and benzocaine.
- 4.4 Sleep and hypnotics: Meaning of sleep, somnambulism, insomnia hypnotics, sedatives, tranquilisers. Preparation, uses and side effects of benzodiazepines and barbiturates. Psychotropic drugs: Psycho stimulants – Caffeine, Amphetamine Psychodysleptics – structure, adverse effects and detection of LSD, Drug abuse, Evil effects of alcohol, tobacco, cannabis.

Unit - IV: Miscellaneous Diseases

12 Hours

- 5.1 Epilepsy, Parkinsonism and Tetanus : Meaning, causes, Symptoms and treatment (two drugs for each).
- 5.2 Cancer : Meaning of cancer – causes and symptoms – Treatment-Surgery, Radiation Therapy, Chemotherapy – Anti neoplastic agents, Alkylating agents (Nitrogen & Sulphur Mustards), Antimetabolites (mercaptapurines, Fluorouracil), Hormones, Antibiotics.
- 5.3 Diabetes: Meaning, kind, cause and symptoms. Hyperglycaemia and hypoglycaemia-carbohydrate metabolism, Insulin and its action, Types of diabetes mellitus, Treatment of diabetes- Insulin therapy. Hypoglycaemic agents (Sulphonyl urea and biguanidines).

- 5.4 Blood: composition – blood grouping – Rh factor – blood pressure-Anaemia:causes and treatment. Haematological agents-coagulants and anticoagulants. Antigens, Antibodies

References

1. A. Jayashree Ghosh, *Textbook of Pharmaceutical chemistry*, Rajendra ravindra printers pvt. Ltd., New Delhi, 2010.
2. James Cross land, Lewis, *Pharmacology*, 5th Edition, Churchill Livingstone Publications, New York.1980
3. D. Sriram, P. Yogeeswari, *Medicinal Chemistry*, Second edition, Pearson publications, 2007
4. Alex Gringauz, *Introduction to Medicinal chemistry*, Wiley India Pvt Ltd., New Delhi, 2011.
5. Burger. *Medicinal Chemistry and Drug Discovery*, Vol-1, Ed. M. E. Wolff, John Wiley, 1994.
6. Goodman & Gilman. *Pharmacological Basis of Therapeutics*, McGraw-Hill, 2005.
7. S. S. Pandeya & J. R. Dimmock, *Introduction to Drug Design*, New Age International, 2000.
8. D. Lednicer, *Strategies for Organic Drug Synthesis and Design*, John Wiley, 1998.
9. Graham & Patrick. *Introduction to Medicinal Chemistry*, 3rd edition, OUP, 2005.
10. Rama Rao Nadendla, *Principles of Organic Medicinal Chemistry*, 2nd Edition, New Age Publications, 2008.
11. Ashutosh Kar, *Medicinal Chemistry*, 2nd Edition, New Age Publications, 2000.

Elective Paper - I

Semester - V

Clinical Biochemistry

4 Hrs/week (3credits)

Objectives:

- To understand the basics of clinical biochemistry
- To learn the various techniques for the biofluid analysis.

Unit - I: Introduction to Clinical Biochemistry

12 Hours

- 1.1 Clinical biochemistry: Test for Sugar, salt and cholesterol in serum and bilirubin.
- 1.2 Organic diagnostic agents: sodiumiodohippurate, telepaque, aminohippuricacid, sulphabromophthalein blue, fluorescein sodium, evansblue, iocetamic acid and metyrapone.
- 1.3 Medicinally important compounds of Al, Mg, Fe, and Hg: Alum, aluminium hydroxide gel, MgSO₄, milk of magnesia, Ferrous gluconate, FeSO₄, Phenyl mercuric nitrate and Thiomersal. Biological role of Na, K, Ca, Zn and Cu and their salts.
- 1.4 Mechanism of action of drugs at extracellular sites and cellular sites

Unit - II: Analysis of Blood

12 Hours

- 2.1 Blood: Normal constituents of blood and their variation in pathological conditions
- 2.2 Procedure for testing of urea, uric acid, creatinine,
- 2.3 Testing of total protein, albumin/globulin ratio.
- 2.4 Methods to test Lipid, profile – cholesterol, Triglycerides, lipoproteins - HDL and LDL. Blood count test – haemocytometer.

Unit - III: Analysis of Urine

12 Hours

- 3.1 Analysis of Urine: Normal composition of urine – Volume, pH, colour, specific gravity. Constituents urea, uric acid, creatinine, pigment.

- 3.2 Abnormal constituents – glucose, albumin, ketone bodies, variations in urea, creatinine, pigments and their clinical significance in brief.
- 3.3 Functional anatomy of kidney, Structure & Function of Kidney, renal blood flow and its peculiarities. Glomerular filtration rate - Definition, Measurement & Factors affecting GFR.
- 3.4 Activity and effects of diuretics; free water, clearance; alkalosis, Proteinuria, Acute and chronic renal insufficiency, nephritis, nephrotic syndrome, clearance tests,

Unit - IV: Analysis of Liver and Heart **12 Hours**

- 4.1 Liver function tests: the exocrine functions of the liver and pancreas, Hydrochloric acid, bicarbonate and bile secretion.
- 4.2 Liver and biliary tract, Normal and disturbed functions of liver; metabolism; synthesis, biotransformation; Alkaline phosphatase, SGOT and SGPT.
- 4.3 Cardiac injury profile CPK and LDH. Inborn errors of Metabolism: Causes, symptoms and treatment of Sickle cell anaemia, phenyl ketonuria,
- 4.4 Causes, symptoms and treatment of Neimann – Pick disease, Type III glycogen storage disease (Cori's disease).

Unit - V: Collection of Samples and Analytical Techniques **12 Hours**

- 5.1 Analytical Principles and Techniques - Separation techniques including gas and liquid chromatography, paper, thinlayer chromatography. Ion exchange, affinity, gel filtration, gas liquid, HPLC, electrophoresis and dialysis.
- 5.2 Blood: Collection, anticoagulants, preservatives, deproteinisation, Specimen collection, handling and storage.
- 5.3 Effects of Collection and Storage of Specimens. Place and time of sample collection, preservation, influence of nutrition, drugs, posture, etc. Choice and correct use of anticoagulants;
- 5.4 Care of the specimens, identification, transport, storage, influence of temperature, freezing/thawing

References

1. T.M. Delvin, *Text book of biochemistry with clinical correlation*, John Wiley & Sons Inc. USA, 1982.
2. Rodney R. Rhodes and David R. Bell, *Medical Physiology: Principles for Clinical Medicine*, 4th Edition, Lippincott Williams & Wilkins, 2012.
3. Gradwohl, *Clinical Laboratory-methods and diagnosis*, Vol-I. 8th edition, Mosby, 1970.
4. Jayashree Ghosh, *Textbook of Pharmaceutical chemistry*, Rajendra ravindra printers pvt. Ltd., New Delhi, 2010.

Semester - V

Elective Paper - I
Bioinorganic Chemistry

4 Hrs/Week (3 Credits)

Objectives:

- To understand the scope of bioinorganic chemistry
- To learn the chemistry of metalloporphyrin, metalloenzymes.
- To know the significance of metals in medicine.

Unit - I: Scope of Bioinorganic Chemistry

12 Hours

- 1.1 Introduction to Inorganic elements in biological systems and cells.
- 1.2 Biologically important compounds amino acids, proteins, nucleotides, carbohydrates and lipids, basic bioenergetics.
- 1.3 Classification of enzymes. Biochemistry: Distribution, biological roles, active transport of cations across membranes, the sodium pump.
- 1.4 Biology of calcium carriers, role in muscle contraction, enzyme stabilization, blood clotting and biological calcification

Unit - II: Metalloporphyrins

12 Hours

- 2.1 Structure and optical spectra; heme proteins.
- 2.2 Magnetic susceptibility, epr and electronic spectra; hemoglobin and myoglobin: molecular structures.
- 2.3 Thermodynamics and kinetics of oxygenation, electronic and spatial structures, synthetic oxygen carriers
- 2.4 Model systems; iron enzymes, peroxidase, catalase and cytochrome P-450

Unit - III: Metalloenzymes

12 Hours

- 3.1 Copper enzymes, superoxide dismutase, cytochrome oxidase and ceruloplasmin.
- 3.2 Coenzymes; Molybdenum enzyme: xanthine oxidase;
- 3.3 Zinc enzymes: carbonic anhydrase, carboxy peptidase and interchangeability of zinc and cobalt in enzymes.
- 3.4 Vitamin B12 and B12 coenzymes; Iron storage, transport, biomineralization and siderophores, ferritin and transferrins..

Unit - IV: Metals in Medicine

12 Hours

- 4.1 Metal deficiency and disease; toxicity of mercury, cadmium, lead, beryllium, selenium and arsenic.
- 4.2 Biological defence mechanisms; chelation therapy; metals used for diagnosis.
- 4.3 Enzyme and chemotherapy, platinum complexes as anticancer drugs, Pt-DNA binding.
- 4.4 Complexes of gold, copper, zinc, mercury, arsenic and antimony as drugs.

Unit -V: Nitrogen fixation and photosynthesis

12 Hours

- 5.1 Nitrogenase enzyme: reactivity, reduction involving nitride / diazene intermediate,
- 5.2 Dinitrogen complexes and their reactivity in vitro nitrogen fixation.
- 5.3 Photosynthesis: Structure of chlorophyll, in green plants (Z- scheme), ATP synthesis,
- 5.4 Role of Mn complex in oxygen evolution, Calvin cycle.

References

1. S. J. Lippard & J. M. Berg. *Principles of Bioorganic Chemistry*, Panima Publ. Corpn., 2005.

2. E.-I. Ochiai. *Bioinorganic Chemistry – An Introduction*, Allyn and Bacon Inc., 1977.
3. M. N. Hughes. *The Inorganic Chemistry of Biological Processes*, Wiley, 1981.
4. R.P. Hanzlik. *Inorganic Aspects of Biological and Organic Chemistry*, Academic Press, 1976.
5. K. Hussain Reddy, *Bioinorganic chemistry*, New Age International Publishers, 2007.
6. H. Kraatz & N. Metzler-Nolte, *Concepts and Models in Bioinorganic Chemistry*, Wiley, 2006.
7. I. Bertini, H. B. Gray, S. J. Dippard & J. S. Valentine, *Bioinorganic Chemistry*, Viva Books Pvt. Ltd., 2004.
8. A.W. Addison, W.R. Cullen, D. Dolphin & B.R. James, *Biological Aspects of Inorganic Chemistry*, John Wiley, 1977.
9. R.J.P. Williams & J.R.R.F. Dasilva. *New Trends in Bioinorganic Chemistry*, Academic Press, 1978.
10. A. E. Martel. *Inorganic Chemistry in Biology and Medicine*, ACS Symp. Series, ACS, 1980.
11. S. J. Lippard. *Progress in Inorganic Chemistry: Bioinorganic Chemistry*, Vol. 38, John Wiley, 1990.
12. N. Kaim & B. Schwederski. *Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life*, John Wiley, 1994.

Elective Paper - II

Semester - V

Applied Chemistry

2 Hrs/week (2 Credits)

Objectives:

- To inculcate the latest sophisticated analytical techniques
- To characterize the solid state materials which found applications in day-to-day life.

Unit - I: Analysis of Redox Potentials

6 Hours

- 1.1. Basic Principles of Voltammetry-Nernst Equation-Applications of Voltammetry-Applications of cathodic and anodic peak potentials and current.
- 1.2. Linear sweep voltammetry, differential pulse voltammetry, square-wave voltammetry, stripping methods-electrode materials, hydrodynamic effects, microelectrodes, and voltammetric sensors. Determination redox potentials of some inorganic samples.

Unit - II: Analysis of Soil

6 Hours

- 2.1. Analysis of soil: Composition of soil, Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents, use of indicators
- 2.2. Estimation of Calcium and Magnesium ions as Calcium carbonate by complex ometrictitration. (Theory only)

Unit - III: Analysis of Water

6 Hours

- 3.1. Analysis of water: Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods.
- 3.2. Dissolved oxygen in water. Determination of dissolved oxygen (DO) of a water sample. Determination of pH, acidity and alkalinity of a water sample.(Theory only)

Unit - IV: Analysis of Food Products

6 Hours

- 4.1. Analysis of food products: Nutritional value of foods, idea about food processing-food preservations, Methods of food preservations and adulteration.

- 4.2. Identification of adulterants in some common food items like coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses, etc. Analysis of preservatives, flavorants, and colouring matter. (Theory only)

Unit - V: Analysis using Chromatographic Techniques

6 Hours

- 5.1. Chromatography: Definition, general introduction on principles of chromatography, paper chromatography, TLC-Identification and comparison of samples using TLC method (Organic, inorganic, paints, etc.,)
- 5.2. Separation of compounds using Column (Neutral, acidic and basic columns), ion exchange chromatography.

References

1. H. H. Willard, L. L. Merritt, J. Dean, & F. A. Settoe, *Instrumental Methods of Analysis*, 7th Ed. Wadsworth Publishing Co. Ltd., Belmont, California, USA, 1988.
2. Douglas A. Skoog,; F. James Holler,; Stanley R. Crouch, *Principles of Instrumental Analysis*, 6th Edition; Cengage Learning, 2006.
3. D. A. Skoog, D. M. West, & F. J. Holler, *Fundamentals of Analytical Chemistry*, 6th Ed., Saunders College Publishing, Fort Worth, 1992.
4. Harris, D. C. *Quantitative Chemical Analysis*, W. H. Freeman, 2010.
5. Dean, J. A. *Analytical Chemistry Notebook*, 2nd edition, McGraw Hill, 2004.
6. Reuben Alexander Day,; Arthur Louis Underwood, *Quantitative Analysis*, 6th Edition; Prentice Hall India Learning Private Limited, 1992.
7. D. Freifelder, *Physical Biochemistry*, 2nd Edition, W.H. Freeman and Co., N.Y. USA, 1982.
8. T. G. Cooper, *The Tools of Biochemistry*, John Wiley and Sons, N.Y. USA, 1977.
9. Vogel, A. I. *Vogel's Qualitative Inorganic Analysis* 7th Ed., Prentice Hall, New Delhi, 2009.
10. Robinson, J.W. *Undergraduate Instrumental Analysis*, 5th Ed., Marcel Dekker, Inc., New York, 1995.

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| Semester-V | Elective Paper - II Protein Chemistry | 2 Hrs /week 2 Credits |
|-------------------|--|------------------------------|

Objectives

- To learn the chemistry of Amino acids and proteins.
- To learn the importance of enzymes and enzyme catalysis

Unit - I: Introduction to Proteins

6 Hours

- 1.1 Amino acids-properties and classification of 20 amino acids-Isoelectric point-titration curve-peptide bond-polypeptide-protein-N-ter and C-ter-protein sequence
- 1.2 Primary, secondary-Ramachandran plot- tertiary structure Stability of protein structure-protein folding

Unit - II: Purification of Proteins

6 Hours

- 2.1 Separation of proteins-dialysis-column chromatography-ion-exchange chromatography-size-exclusion chromatography-Affinity chromatography,
- 2.2 Electrophoresis-Isoelectric focussing-two-dimensional electrophoresis. Determination of proteins sequence – N-terminal amino acid analysis-Sanger's Method-Edman degradation-C-terminal amino acid-carboxypeptidases

Unit - III: Enzymes**6 Hours**

- 3.1 Definition-classification of enzymes. Thermodynamics model for enzyme catalysis-Proximity effects-transition state stabilisation-Acid/base catalysis in enzymatic reactions-use of strain energy in enzyme catalysis-
- 3.2 Enzyme Kinetics-Michaelis - Menton Equation; Lineweaver-Burk plot-Factors affecting catalytic activity of enzymes-temperature-pH-concentration. Allosteric enzymes.

Unit - IV: Chemistry of Enzyme Catalysis**6 Hours**

- 4.1 Mechanism of chymotrypsin (hydrolytic peptide cleavage)-catalytic triad (nucleophilic addition/hydrolysis)Lysosyme-mechanism-cleavage of peptidoglycans (S_N1/S_N2)
- 4.2 Mechanism of Alcohol dehydrogenase-Oxidation of alcohol (Redox reaction) Mechanism of Class I fructose-1,6-bisphosphate aldolase (Carbon-Carbon Bond Formation).

Unit -V: Chemistry of Co-Enzymes**6 Hours**

- 5.1 The pyridine nucleotide coenzyme-niacin deficiency-the flavin nucleotide coenzyme.
- 5.2 Structure and significance of Thiamine phosphate-Biotin-pyridoxal phosphate-tetrahydrofolate.

References

1. Lehninger, Nelson, Cox, *Biochemistry*, 6th edition, W H Freeman & Co, USA, 2013.
2. Berg, Stryer, Tymoczko, *Biochemistry*, 3rd edition, W H Freeman & Co, USA, 2015.
3. T. D. H Bugg, *Introduction to enzyme and coenzyme chemistry*, 3rd edition, Wiley-Blackwell, 2012.
4. Paula Yurkanis Bruice, *Organic chemistry*, 6th edition, Pearson Edition, New York, 2006.

Elective Paper - II**Semester - V****Computers for Chemists****2 Hrs/week 2 Credits****Objectives**

- To enable the students to understand the basics of computers
- To enable them to operate computers draw chemical structures using some chemistry software's
- To make chemical calculations using computer programs.

Unit - I: Fundamentals of computer**6 Hours**

- 1.1 Types of computer, components of computer, input devices, output devices, main components of CPU,
- 1.2 Computer languages, high level and low level languages, binary systems, Operating systems, applications and software's, drivers, algorithm and flow charts

Unit - II: MS-Office**6 Hours**

- 2.1 MS-Word, type setting tools, Drawing tools for drawing equations and structures, tables and images in word and its properties, alignment, page setting, macros, bullets and numbering, headers, footers, foot notes, etc
- 2.2 MS-Excel – cell, cell address, formatting of cell, data types in a cell, tables and images in excel, use of address bar in excel, MS – Power point – types of presentations, slides, images videos in ppt, designs, and animations of slides.

Unit - III: Chemical calculations and graphs**6 Hours**

- 3.1 MS – Excel for numerical calculations, formulas, applications to volumetric analysis, energy of Hydrogen atom, de Broglie wavelength, molecular velocities, emf calculation using electrochemical series, and calculations involved in physical chemistry practicals.
- 3.2 Drawing graphs using excel, types of graphs, graphs in physical chemistry practicals

Unit - IV: Packages for Chemists**6 Hours**

- 4.1 ChemDraw, Chem sketch, ISIS draw, OriginLab, essential FT IR etc, kinetics.
- 4.2 Search Engines (google scholar), NPTEL, Inflightnet, shodganga, EDUSAT, Youtube. E-books, Video lectures, online courses, journals in learning, khan academy. Practical based on UNIT III

Unit - V: Practicals**6 Hours**

- 5.1 Draw the structure of simple organic molecules-derive name using the softwares-NMR.
- 5.2 Drawing curves of one dimensional box, potentiometric titrations, Conductometric titrations using excel.

References

1. K.V. Raman, *Computer Applications in Chemistry*, Tata McGraw Hill, New Delhi, 2008.
2. Vikas Gupta, *Computer Course Kit*, Dream Tech Press, 2010.
3. <http://insideinformatics.cambridgesoft.com/webinars/info/Default.aspx?webinarID=632>
4. <http://www.acdlabs.com/resources/freeware/chemsketch/>
5. http://www.acdlabs.com/download/technotes/2016/technote_chemsketch_advanced.pdf
6. accelrys.com/products/pdf/isis-draw.pdf
7. <http://www.originlab.com/doc/Tutorial>
8. <http://www.inflightnet.ac.in/>
9. <https://www.khanacademy.org/>

Semester - V**Self-Study Paper****1 Credit****Objectives:**

- To motivate the students for self study
- To prepare them for the competitive exams

Chemistry for Competitive Examinations - I**Unit - I: Structure of Matter and Periodic Table**

Elementary atomic structure Ionic and covalent bonding Octet rule Periodic trends Inorganic nomenclature.

Unit - II: Chemical Formulas

Percentage composition the mole formula calculations Empirical formula calculations molecular formulas

Unit - III: Electronic structure of atom

Shells sub shells orbitals electronic structure of ions consequences of electronic structure.

Unit - IV: Organic Molecules

Organic nomenclature and classification – structural isomerism – Geometrical and stereo isomerism

Unit - V: Gas Laws

Boyle's law, Charles law, combined gas law, and ideal gas law-molecular weights of gases

References

1. R.L.Madam, *Organic Chemistry – Questions and Answers*, S. Chand's success guides, 3rd Edn. 2012.
2. I.L.Finar, *Problems and their solution in organic chemistry*, Pearson edition, 2002.
3. R.L. Madan & G.D Tuli, *Inorganic chemistry, Questions and answers*, S. Chand success guides, 2012
4. Anil Kumar De, Arnab de, *Inorganic Chemistry and analysis through problems*, New Age international, New Delhi, 2002.

Semester - VI

Organic Chemistry – III

4 Hrs / week (4 Credits)

Objectives:

- To learn the chemistry of biomolecules.
- To understand the significance of biomolecules and natural products.

Unit - I: Carbohydrates

12 Hours

- 1.1 Carbohydrates: Classifications – reactions of glucose and fructose- osazone formation, mutarotation and its mechanism.
- 1.2 Structural elucidation of glucose and fructose – pyranose and furanose forms.
- 1.3 Determination of ring size – Haworth projection formula – configuration of glucose and fructose – epimerisation – chain lengthening and chain shortening of aldoses – inter conversion of aldoses and ketoses.
- 1.4 Disaccharides and polysaccharides: reactions and structural elucidation of sucrose and maltose. Properties and uses of starch and cellulose.

Unit - II: Protein Chemistry

12 Hours

- 2.1 Amino acids: Classification of amino acids – preparations with special reference to Gabriel phthalamide synthesis, Strecker synthesis, Erlenmeyer synthesis and properties of alpha amino acids – zwitterion, isoelectric point.
- 2.2 Poly peptides and proteins: Classification of proteins based on physical and chemical properties and physiological functions.
- 2.3 Peptides synthesis – Bergmann synthesis and Curtius synthesis.
- 2.4 Primary structure of proteins – end group analysis – Akabori method, reduction method, Edman method. Secondary structure of protein–helical and sheet structures– Denaturation of proteins.

Unit - III: Natural Product Chemistry

12 Hours

- 3.1 Nucleic acids: Nucleoside, nucleotide, degradation of nucleotide chain – structure of nucleic acids – RNA and DNA. Elementary idea about protein synthesis.
- 3.2 Synthesis of pyrimidine and purine bases – guanine, adenine, uracil, cytosine and thymine.
- 3.3 Terpenes – isoprene rule – structure elucidation of menthol, alpherpeniol and alpha pinene.

- 3.4 Alkaloids-General methods of isolation - structural elucidation of piperine and nicotine.

Unit - IV: Lipids

12 Hours

- 4.1 Introduction to lipids, classification. Oils and fats: Common fatty acids present in oils and fats, Omega fatty acids, Trans fats.
- 4.2 Hydrogenation, Saponification value, Iodine number. Rancidity of oils and RM value
- 4.3 Classification and Biological importance of triglycerides, phospholipids, and glycolipids.
- 4.4 Structure and elucidation of Cholesterol.

Unit - V: Metabolism

12 Hours

- 5.1 Calorific value of food. Standard caloric content of carbohydrates, proteins and fats. Oxidation of foodstuff (organic molecules) as a source of energy for cells. Vitamins- Sources, functions, Vitaminoses and deficiency disease
- 5.2 Introduction to Metabolism (catabolism, anabolism), ATP: the universal currency of cellular energy, ATP hydrolysis and free energy change.
- 5.3 Conversion of food into energy. Outline of catabolic pathways of Carbohydrate- Glycolysis, Fermentation, Krebs Cycle.
- 5.4 Overview of catabolic pathways of Fats and Proteins. Interrelationships in the metabolic pathways of Proteins, Fats and Carbohydrates.

References

1. R. T. Morrison, and R. N. Boyd, *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), New Delhi, 2008.
2. I. L. Finar, *Organic Chemistry* Volume I, 6th edition, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), 1973.
3. I. L. Finar, *Organic Chemistry* Volume 2, 5th edition, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), 1956.
4. O.P. Agarwal, *Organic Chemistry of Natural Products Vol I & II*, Goel Publishing House, New Delhi, 2002.
4. Nelson, D. L. & Cox, M. M. *Lehninger's Principles of Biochemistry*, 7th Edition, W. H. Freeman, USA, 2013.
5. Berg, Stryer, Tymoczko, *Biochemistry*, 3rd edition, W H Freeman & Co, USA, 2015.
6. A. Bahl and B. S. Bahl, *Advanced Organic Chemistry*, S.Chand publications, New Delhi, 2006.
7. Gurdeep chatwal, *Organic Chemistry Of Natural Products Vol 1 & 2*, Himalaya Publishing House, New Delhi, 2015.

Semester - VI

Inorganic Chemistry - III

4 Hrs/Week (4 Credits)

Objectives

- To understand the chemistry of rare earths elements and their importance.
- To learn the fundamental concepts of nuclear chemistry.
- To understand the fundamentals of solid state chemistry and acids and bases.

Unit - I: Lanthanides and Actinides

12 Hours

- 1.1 Electronic structure and position of lanthanides and actinides in the periodic table.

- 1.2 Extraction from monazite and separation of the lanthanides (Precipitation, fractional crystallization, complex formation, solvent extraction, valency change).
- 1.3 Chemical properties of lanthanides and actinides-oxidation state, magnetic properties, colour and spectral properties.
- 1.4 Lanthanide contraction and its consequences. Comparative studies of 3d and 4f block elements

Unit - II: Acids and Bases

12 Hours

- 2.1 Arrhenius concept. Lowry Bronsted concept-conjugate acid-base pairs, relative strengths of acid-base pairs.
- 2.2 Lux-flood concept.
- 2.3 Lewis concept, limitations of lewis concept.
- 2.4 Pearson concept-HSAB principle.

Unit - III: Nuclear Chemistry

12 Hours

- 3.1 Fundamental particles of the nucleus- nucleon, nuclides, isotopes, isobars, isotones.
- 3.2 Nuclear radius, nuclear mass, nuclear density, nuclear forces operating between the nucleons, and packing fraction.
- 3.3 Natural radioactivity- nuclear reactions, radioactive decay, group displacement law, N/P ratio, curves, stability belts and rate of radioactive disintegration.
- 3.4 Nuclear binding energy. Mass defect, simple calculations involving mass defect and B.E per nucleon, Q value determination, magic numbers.

Unit - IV: Applications Nuclear Chemistry

12 Hours

- 4.1 Detection and measurement of radioactivity- G. M counter, and scintillation counter. Application of radioisotopes as tracers: Rock and Carbon dating.
- 4.2 Artificial radioactivity: artificial transmutation of elements and Particle accelerators-cyclotron. Induced radioactivity and preparation of transuranic elements.
- 4.3 Nuclear fission reactions: concept of critical mass-liquid drop model - shell model.. Nuclear energy production: components of reactors, types of nuclear reactors. Atom and plutonium bomb.
- 4.4 Nuclear fusion reactions and applications: nuclear fusion in the sun and hydrogen bomb. Safe disposal of radioactive waste.

Unit-V: Chemistry of Solids

12 hours

- 5.1 Crystalline and amorphous solids-Definition and differences. Symmetry in solid crystals-Basic crystal systems with example to each system.
- 5.2 Structure of solids- close packing of spheres- Primitive cube-BCC-FCC- Radius ratio rule.
- 5.3 Types of crystals-ionic-covalent-metallic and molecular crystal with one example. and shape of ionic crystals ($AB = NaCl$, $AB_2 = CaF_2$).
- 5.4 Defects in solids-stoichiometric defects (Schottky, Frenkel) and nonstoichiometric defects (metal excess and metal deficiency).

References

1. J. D. Lee, *Concise Inorganic Chemistry*, Chapman and Hall: London, 1961.
2. James, E. Huheey.; Ellen A. Keiter.; Richard, L. Keiter. *Inorganic Chemistry Principles Structure and Reactivity*, Harper and Row: Newyork, 1999.
3. A. R. West, *Basic Solid State Chemistry*, John Wiley: Newyork, 1991.

- 4.2 Reversible electrodes –representation, construction and reaction of metal –metal ion electrode, gas electrode (hydrogen, oxygen, chlorine), calomel electrode, single electrode potential and its determination.
- 4.3 Derivation of Nernst equation for EMF of the cell and single electrode potential. Standard electrode potential, sign and convention.
- 4.4 Electrochemical series and its significance. Derivation of relationship between thermodynamic quantities ΔG , ΔH , ΔS , and cell EMF.

Unit - V: Applications of EMF

12 Hours

- 5.1 Application of EMF measurements: Determination of activity coefficient, transport number, valence of doubtful ions, solubility of sparingly soluble salts and equilibrium constant. Determination of P^H using hydrogen electrode, quinhydrone electrode and glass electrode. Potentiometric titrations. (Acid base titration, precipitation titration and redox titration).
- 5.2 Chemical cell with and without transport. Concentration cells with and without transport. Expressions for EMF-Liquid junction potential.
- 5.3 Applications of concentration cells. Decomposition potential, polarization and overvoltage, fuel cells.
- 5.4 Storage cells- Lead storage battery and Lithium ion battery Li polymer battery.

References

1. B. R. Puri, L. R. Sharma and M. S. Pathania, *Principles of Physical Chemistry*, 47th Edition, Vishal Publishing Co, Jalandar, 2016.
2. D. N. Bajpai, *Advanced Physical Chemistry*, 2nd Edn., S. Chand & Company, New Delhi, 1998.
3. A.S. Negi and S.C. Anand, *A text book of Physical Chemistry*, Wiley Eastern Ltd, New Delhi, 1984.
4. P. L. Soni, O. P Dharmarha and U. N. Dash, *Text Book of Physical Chemistry*, Sultan Chand & Company Ltd., New Delhi, 2001.
5. S. Glasstone, *Text book of physical chemistry*, 2nd revised edition, Macmillan, United Kingdom, 1980.

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| | Subject Skill | |
| Semester - VI | Polymer Chemistry | 5 Hrs/week (4 Credits) |

Objectives

- To understand the mechanism of polymerization, various techniques of polymerization
- To learn about the characterization of polymers by molecular weight, reactions and degradation of polymers.
- To learn the applications and appreciate the recent developments of polymers.

Unit - I: Introduction to Polymers and Mechanism of Polymerization **15 Hours**

- 1.1 Polymer: introduction, classification of polymers: natural, synthetic, organic, inorganic, elastomers, fibers, resins, and plastics: thermoplastic and thermosetting.
- 1.2 Copolymers and its types.
- 1.3 Polymerisation methods: Addition- radical and ionic polymerization, Coordination polymerization.
- 1.4 Step polymerization-poly condensation, poly addition and ring opening.
- 1.5 Miscellaneous polymerization reactions: electrochemical, metathetical, group transfer.

Unit - II: Molecular Weight, Structure and Properties of Polymers **15 Hours**

- 2.1 Molecular weight of polymers: number average, weight average, sedimentation and viscosity average molecular weight, degree of polymerization and practical significance of polymer molecular weight.
- 2.2 Molecular weight determination methods: ultracentrifugation and viscometry.
- 2.3 Physical properties of Polymers: Mechanical properties (Impact resistance, Tensile strength and Melt viscosity)-Tacticity- nature of chain packing-Chain flexibility.
- 2.4 Glass transition temperature-Factors affecting Tg- Molecular weight and Tg-Plasticisers and Tg- Importances of Tg.
- 2.5 Reactions-Hydrolysis, Hydrogenation, addition, substitution, cross linking, vulcanization and cyclisation.

Unit - III: Polymerisation Techniques and Polymer Processing **15 Hours**

- 3.1 Polymerisation techniques: Bulk, solution, suspension and emulsion polymerization – melt polycondensation.
- 3.2 Polymer processing- Calendaring -Casting methods: Die casting, rotational casting and Film casting.
- 3.3 Moulding techniques-Compression, Injection, Blow and Extrusion Moulding.
- 3.4 Thermoforming-Foaming- Reinforcing (hand Lay-up, Filament winding and Spray-up Techniques).
- 3.5 Fibre spinning methods: (Melt spinning-Dry spinning and Wet spinning)

Unit - IV: Commercial Polymers **15 Hours**

- 4.1 Preparation, properties and uses of the following: Polyethylene, Polystyrene, TEFLON and PVC.
- 4.2 Preparation, properties and uses of the following:-Polyesters, Polyamides, Polycarbonates Polyurethanes, Polypropylene Glycols (PPG).
- 4.3 Preparation of Epoxy resins, Styrene butyl rubber, Rayon and Carboxy Methyl cellulose.
- 4.4 Polymer additives: Fillers (Wood, Flour, Asbestos, Graphite and Mica).
- 4.5 Plasticizers (Tricresyl phosphate, Dimethyl Phthalate and Camphor)-Fire Retardants and Colourants.

Unit -V: Introduction to Recent Trends in Polymer **15 Hours**

- 5.1 Biodegradable polymers: Polyhydroxyalkonates (Biodegradation and application), Poly Lactic acid (synthesis and application), Aliphatic and aromatic polyesters(Degradation)-Ecoflex, Eastar Bio and Enpol.
- 5.2 Conducting Polymers: Poly sulphur nitride, Polyacetylene and Poly phenylene.
- 5.3 Polymers as Biomaterials: artificial heart, Artificial skin, contact lenses, Artificial kidneys.
- 5.4 Fire retardant Polymers: Pyro Check 68PB, Bisphenol, Polybutylene terphthalate and Polyphenylenesulphone.
- 5.5 Inorganic Polymers: Preparation and properties of Silicones, polyphosphates.

References

1. F.W. Bill Meyer, *Text Book of polymer science*, Wiley & Sons, 1984.
2. Gowariker. V.R. Viswanathan, N.V. Jayader Sreedhar. *Polymer*, Wiley Eastern Ltd., New Delhi, 1978.
3. B.K. Sharma, *Polymer Chemistry*, Goel Publishing house, Meerut, 1989.

4. M.G.Arora, M.S.Vadar, *Polymer Chemistry*. Anmol publication (p) Ltd., New Delhi, 1989.
5. Jagadamba Singh and R.C.Dubey, *Organic Polymer chemistry*- Pragati Publishers Meerut, 2012.

Subject Skill

Semester - VI Industrial and Environment Chemistry 5 Hrs/week (4 Credits)

Objectives:

- To introduce the students about industrial extraction processes.
- The pollution induced by the industrial development and the care towards the environment is focused.

Unit - I: Chemical Technology

15 Hours

- 1.1. Basic principles of distillation, solvent extraction, Solid-Liquid Leaching and liquid-liquid leaching, separation by absorption and adsorption.
- 1.2. An introduction into the scope of different types of equipment needed in chemical technology, including reactors, distillation columns, extruders, pumps, mills, emulgators.
- 1.3. Scaling up operations in chemical industry. Problems involving the scaling up of the process. Scale up and process development-Scale up and modeling-
- 1.4. Introduction to clean technology for speciality chemicals-economic, environment and safety needs.
- 1.5. Clean technology route to waste management

Unit - II: Industrial Metallurgy

15 Hours

- 2.1. General Principles of Metallurgy
- 2.2. Hydrometallurgy, Methods of purification of metals (Al, Pb, Ti, Fe, Cu, Ni, Zn): electrolytic, oxidative refining, Kroll process, Parting process, van Arkel-de Boer process and Mond's process.
- 2.3. Preparation of metals (ferrous and nonferrous)
- 2.4. ultrapure metals for semiconductor technology.
- 2.5. Alloys Composition and its importance.

Unit - III: Eco systems and Air Pollution

15 Hours

- 3.1. Ecosystems. Biogeochemical cycles of carbon, nitrogen and sulphur.
- 3.2. Air Pollution: Major regions of atmosphere. Chemical and photochemical reactions in atmosphere. Air pollutants: types, sources, particulate size and chemical nature;
- 3.3. Photochemical smog: its constituents and photochemistry. Environmental effects of ozone, Major sources of air pollution.
- 3.4. Pollution by SO₂, CO₂, CO, NO_x, H₂S and other foul smelling gases. Methods of estimation of CO, NO_x, SO_x and control procedures. Effects of air pollution on living organisms and vegetation.
- 3.5. Greenhouse effect and Global warming, Ozone depletion by oxides of nitrogen, chlorofluorocarbons and Halogens, removal of sulphur from coal. Control of particulates.

Unit - IV: Aquatic Ecosystems and Purification Systems **15 Hours**

- 4.1. Water Pollution: Hydrological cycle, water resources, aquatic ecosystems, Sources and nature of water pollutants, Techniques for measuring water pollution, Impacts of water pollution on hydrological and ecosystems.
- 4.2. Water purification methods. Effluent treatment plants (primary, secondary and tertiary treatment).
- 4.3 Industrial effluents from the following industries and their treatment: electroplating, textile, tannery, dairy, petroleum and petrochemicals, agro, fertilizer, etc.
- 4.4. Industrial waste management, incineration of waste. Water treatment and purification (reverse osmosis, electro dialysis, ion exchange).
- 4.5. Water quality parameters for waste water, industrial water and domestic water.

Unit - V: Energy & Environment **15 Hours**

- 5.1. Classification renewable and non-renewable. Sources of energy: Coal, petrol and natural gas. Uses and its impact on environment.
- 5.2. Nuclear Fusion/Fission. Process, its uses and its environmental impacts to aquatic life.
- 5.3. Nuclear Pollution: Disposal of nuclear waste, nuclear disaster and its management.
- 5.4. Clean energy: Solar energy, Wind Energy, Hydrogen, geothermal, Tidal and Hydraulic energy, etc.
- 5.5. Fuel cells, bio mass, bio gas preparation and its environmental impacts

Books for Reference

1. E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK. 1990.
2. R.M. Felder, R.W. Rousseau: *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi, 2015
3. K. De, *Environmental Chemistry*, New Age International Pvt., Ltd, New Delhi, 2006
4. S. M. Khopkar, *Environmental Pollution Analysis*: Wiley Eastern Ltd, New Delhi, 2007
5. W. Hoyle, *Clean Technology for the Manufacture of Speciality Chemicals*, Royal Society of Chemistry, Manchester, UK, 2001

Subject Skill

Semester -VI **Green Chemistry** **5 Hrs / week (4 Credits)**

Objectives

- To understand the environmental concern and shrinking resources
- To learn the environmental friendly products and procedure.
- To take a natural view of different chemical processes

Unit - I: Introduction to Green Chemistry **15 Hours**

- 1.1 Introduction to Green chemistry- What is Green chemistry?- Need for green chemistry
- 1.2 Goals of green chemistry- Limitations in the pursuit of green chemistry
- 1.3 Principles of green chemistry
- 1.4 Designing chemical synthesis using these principles- Prevention of waste, prevention of Hazardous/toxic products
- 1.5 Atom economy- calculation of atom economy of the rearrangements, addition, substitution and elimination reaction.

Unit - II: Development of Green Chemistry **15 hours**

- 2.1 Designing safer chemicals- Green solvents- supercritical fluids, PEG, water as a solvent for organic reactions, fluoros biphasic solvent, solvent less processes, immobilized solvent and ionic liquids

- 2.2 Energy required for green synthesis- alternative source-uses of microwaves, ultrasonic energy and selection of starting material
- 2.3 Microwaves assisted reactions-liquid: Hofmann elimination, Methyl benzoate to benzoic acid, Oxidation(toluene and alcohols), esterification. Solid: saponification of ester, organic solvent-Diels-alder reaction, decarboxylation
- 2.4 Ultrasound assisted reactions- sonochemical simmons, smith reactions (ultrasonic alternative to iodine)
- 2.5 Selection of starting material- Avoidance of unnecessary derivation- careful use of blocking or protecting groups

Unit - III: Green Synthesis - I

15 Hours

- 3.1 Green synthesis – compounds like adipic acid, catechol, aromatic amines, disodium iminodiacetate, paracetamol, and ibuprofen.
- 3.2 Use of catalytic reagent – stoichiometric reagents, catalysis and green chemistry
- 3.3 Comparison of heterogeneous and homogenous catalysis, bio catalysis, asymmetric and photo catalysis.
- 3.4 Development of analytical techniques to prevent and minimize generation of hazardous substance in chemical processes.
- 3.5 Prevention of chemical accidents designing greener processes-inherent safer design, Bhopal gas tragedy (safe route to carcarbary), Flixiborough accident (safe route to cyclohexnol), minimization, simplification, moderation and limitations

Unit - IV: Green Synthesis - II

15 Hours

- 4.1 An efficient, green synthesis of a compostable and widely applicable plastic made from corn.
- 4.2 Healthier fats and oil by green chemistry: Enzymatic inter esterification for Production of no trans fats and oils
- 4.3 Development of fully recyclable carpet: Cradle to cradle carpeting.
- 4.4 Rightfit pigment- Synthetic azo pigment to replace toxic organic and inorganic pigments.
- 4.5 Designing of environmental safe marine anti-foulant

Unit - V: Future of Green Chemistry

15 Hours

- 5.1 Future trends in green chemistry-Oxidation reagents and catalysts
- 5.2 Biomimetic, Multifunctional reagents, combinatorial green chemistry
- 5.3 Proliferation of solventless reactions
- 5.4 Co-crystal controlled solid state synthesis (C₂S₃)
- 5.5 Green chemistry in sustainable development

References

1. V. K. Ahluwalia & M. R. Kidwai, *New trends in Green chemistry*, Kluwer Academic Publishers., 2005
2. M. A. Ryan & Tinnesand, *Introduction to Green chemistry*, Amerian chemical society, Washington, 2002.
3. A. S. Matlack, *Introduction to Green Chemistry*, Mercel Deckkar, 2001.
4. M. C. Cann & M. E. Connely, *Real world in green chemistry*, ASC, Washington, 2000.
5. P. T. Anastas & J. K. Warners, *Green chemistry- Theory and practical*, Oxford University press, 1998.
6. Rashmi sanghi & M M Srivastava, *Green chemistry, Environmental friendly alternatives*, Alpha Science International, 2003

Subject Skill

Semester - VI

Materials Chemistry

5 Hrs / week (4 Credits)

Objectives

- To understand the basic concepts of crystal structures and their characterization
- To learn about different properties of solid state materials and their characteristic structural features

Unit - I: Solid State

15 Hours

- 1.1 Structure of solids- close packing of spheres- Primitive cube-BCC-FCC- structure type AX-NaCl.
- 1.2 Types of cubic systems- simple, BCC and FCC.
- 1.3 Metallic bond-Electron gas and band theories.
- 1.4 Defects in solids-stoichiometric and non-stoichiometric defects.
- 1.5 X-ray diffraction-Principle-Bragg's equation.(Repetition)

Unit - II: Analysis of Solid States

15 Hours

- 2.1 Neutron diffraction – Principle-Comparison of X-ray and Neutron Diffraction.
- 2.2 Structure of AX₂-CaF₂, Rutile, CdI₂, nickel arsenide
- 2.3 Structure of pyroovskite and spinels
- 2.4 Electrical, Magnetic and optical properties of solids, semiconductors, superconductors,
- 2.5 Solid-state electrolytes-Semi conductors and Super conductors - BCS theory

Unit - III: Magnetic Properties

15 Hours

- 3.1 Magnetic dipole moment- Magnetization-magnetic flux density-magnetic permeability, susceptibility.
- 3.2 Types of magnetic behaviour: Dia, para, ferro, antiferro and ferrimagnetism: Hysterisis.
- 3.3 Pyroelectricity-piezo electricity- relationship between ferro, piezo and pyroelectricity.
- 3.4 Reactions of solid state and phase transitions, Diffusion, Diffusion coefficient, Diffusion mechanisms, Vacancy and interstitial diffusion, Formation of spinels.
- 3.5 Solid state lasers, inorganic phosphors, Ferrites, Garnets.

Unit - IV: Nanomaterials

15 Hours

- 4.1 Nanomaterials-Size dependent properties- melting points, magnetism, colors, conductivity-applications of nanometals-colors-catalysis, electronics
- 4.2 Synthesis of nanometals-gasphase and chemical synthesis.
- 4.3 Semiconductor nanocrystals, quantum dot conductors, syntheses-CdTe, CdS-spherical and triangular nanocrystals.
- 4.4 Introduction-topical areas-pharmacy, therapeutic drugs, ceramics, insulators, metals, environmental chemistry, catalysts, polymers, paints, batteries.
- 4.5 Size relationships of chemistry, nanoparticles and condensed matter-classification of nanomaterials.

Unit - V: Nanocrystals

15 Hours

- 5.1 Ceramic nanocrystals-synthesis-physical methods-vapor condensation, spray pyrolysis
- 5.2 Chemical methods-sol-gel technique, reverse micro emulsions/micelles method, mechanochemical synthesis
- 5.3 Chemical and physical properties. Chemical and catalytic aspects of nanocrystals
- 5.4 Catalytic properties of metals-metal oxides, sulfides and halides,
- 5.5 Nanostructured adsorbents-nanoparticles as new chemical reagents.

References

1. A. R. West, *Basic Solid state chemistry*, John Wiley, 1991.
2. W. E. Addison, *Structural Principle in inorganic chemistry*, Longman, 1961.
3. D. M. Adams, *Inorganic solids*, John Wiley Sons, 1974.
4. C. N. R. Rao, *Advances in Solid State Chemistry*, Cambridge University Press, 1997

Subject Skill

Semester-VI Inorganic Materials of Industrial Importance 5 Hrs/Week (4 Credits)

Objectives

- To learn the principles of Nanotechnology
- To understand the principles and properties of Inorganic materials of Industrial importance.
- To study the significance and its applications of Inorganic materials of Industrial importance.

Unit - I: Nanomaterials and Catalysis

15 Hours

- 1.1 Introduction to nanomaterials-nano and nature. Synthesis of Nanomaterials-Principles- Nucleation and growth, processing and synthesis of nanomaterials. Topdown and bottom-up synthesis, one dimensional(1D) growth.
- 1.2 Experimental methods-Investigating and manipulating materials in the nanoscale. Electron microscopy-SEM-Basics-resolving power-instrumentation-application.
- 1.3 Catalysis: General principles and properties of catalysts-Catalyst Synthesis
- 1.4 Homogenous catalysis (catalytic steps and examples) and heterogenous catalysis (catalytic steps and examples) and their industrial applications.
- 1.5 Deactivation or regeneration of catalysts.Phase transfer catalysts, application of zeolites as catalysts. Catalyst Synthesis,[Catalytic poison]

Unit - II: Silicate and Ceramics

15 Hours

- 2.1 *Glass*: Glassy state and its properties, classification (silicate and non-silicate glasses).
- 2.2 Manufacture and processing of glass.
- 2.3 Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.
- 2.4 *Ceramics*: Important clays and feldspar, ceramic, their types and manufacture.
- 2.5 Hightechnology ceramics and their applications, superconducting and semiconducting oxides. Composites: fullerenes, carbon nanotubes and carbon fibre.

Unit - III Cements and Fertilizers

15 Hours

- 3.1 Cements: Classification of cement, ingredients and their role.
- 3.2 Manufacture of cement and the setting process, quick setting cements.
- 3.3 *Fertilizers*: Ammonia Synthesis: Haber's process and Contact Process:Sulphuric acid Nitric acids.
- 3.4 Different types of fertilizers. Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates;
- 3.5 Manufacture of the following fertilizers: polyphosphate, superphosphate, compound and mixed fertilizers, potassium chloride, potassium sulphate.

Unit - IV: Surface Coatings and Batteries**15 Hours**

- 4.1 *Surface Coatings*: Objectives of coatings surfaces, preliminary treatment of surface, classification of surface coatings. Paints and pigments-formulation, composition and related properties.
- 4.2 Oil paint, Vehicle, modified oils, Pigments, toners and lakes pigments, Fillers, Thinners, Enamels, emulsifying agents. Special paints (Heat retardant, Fire retardant, Eco-friendly paint, Plastic paint),
- 4.3 Dyes, Wax polishing, Water and Oil paints, additives, Metallic coatings, metal spraying and anodizing.
- 4.4 *Batteries*: Primary and secondary batteries, battery components and their role.
- 4.5 Characteristics of Battery. Working of following batteries: Pb acid, Li-Battery, Solid state electrolyte battery. Fuel cells, Solar cell and polymer cell.

Unit -V: Alloy and Chemical Explosives**15 Hours**

- 5.1 *Alloys*: Classification of alloys, ferrous and non-ferrous alloys, Specific properties of elements in alloys.
- 5.2 Manufacture of Steel (removal of silicon decarbonization, demanganization, desulphurization, dephosphorisation) and surface treatment (argon treatment, heat treatment, nitriding, carburizing).
- 5.3 Composition and properties of different types of steels.
- 5.4 *Chemical explosives*: Origin of explosive properties in organic compounds, preparation and explosive properties of lead azide, PETN, cyclonite (RDX).
- 5.5 Introduction to rocket propellants.

References

1. E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK, 1990.
2. R. M. Felder, R. W. Rousseau: *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi, 2015.
3. W. D. Kingery, H. K. Bowen, D. R. Uhlmann: *Introduction to Ceramics*, Wiley Publishers, New Delhi, 2007.
4. J. A. Kent: *Riegel's Handbook of Industrial Chemistry*, CBS Publishers, New Delhi, 2010.
5. P. C. Jain & M. Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi, 1998.
6. R. Gopalan, D. Venkappayya, S. Nagarajan: *Engineering Chemistry*, 4th edition, Vikas Publications, New Delhi, 2013.
7. B. K. Sharma: *Engineering Chemistry*, Goel Publishing House, Meerut, 1998.
8. T. Pradeep, *Nano: The Essentials*, McGraw-Hill Professional, 2008.

Subject Skill**Semester – VI****Reaction Mechanisms and Reagents in Organic Chemistry****Objectives****5 Hrs / week (4 Credits)**

- To learn the basic types of organic reaction and their mechanisms.
- To acquire sound knowledge about different types of reagents involved in organic synthesis.

Unit - I: Aliphatic Nucleophilic & Electrophilic substitution Reactions**15 Hours**

- 1.1 Aliphatic Nucleophilic Substitution Mechanisms- Direct displacement process SN_2 .
- 1.2 Carbonium ion Process- SN_1 Mechanism- comparison of SN_1 and SN_2 mechanisms
- 1.3 Factors affecting the reactivity of substitution reactions- SN_i mechanism

- 1.4 Effect of neighbouring group participation in substitution reactions
- 1.5 Aliphatic Electrophilic substitutions: SE1 SE2 and SEi mechanisms

Unit - II: Aromatic Electrophilic and Nucleophilic Reactions **15 Hours**

- 2.1 Aromatic electrophilic substitution-Isotopic effects- σ and π complexes
- 2.2 Mechanism of nitration, halogenations and Friedal Craft's Reaction
- 2.3 Effects of substituents and steric effects
- 2.4 Aromatic nucleophilic substitution-Unimolecular and bimolecular mechanisms
- 2.5 Benzyne mechanism-comparison of Electrophilic and nucleophilic aromatic substitution

Unit - III: Addition and Elimination Reactions **15 Hours**

- 3.1 Addition Reactions- Mechanisms: Addition to carbon – carbon multiple bonds
- 3.2 Addition reactions involving electrophiles, nucleophiles and free radicals
- 3.3 Elimination Reactions-Mechanism of elimination E1,E2 and E1CB
- 3.4 Orientation of the double bond - Hofmann and Saytzeff rule, dehydration and dehydrohalogenation reactions
- 3.5 Stereochemistry of E2 eliminations in cyclohexane ring systems, mechanism of pyrolytic eliminations, Chugaev reaction and Cope elimination.

Unit - IV: Oxidation and Reduction Reactions **15 Hours**

- 4.1 Study of the following oxidation reactions with mechanism: Oxidation of alcohols by CrO₃, DMSO alone, DMSO in combination with DCC; acetic anhydride and oxalyl chloride
- 4.2 Oxidation of arylmethane, oxidation of methylene alpha to carbonyl, allylic oxidation of olefins.
- 4.3 Oxidative cleavage of glycols, oxidative cleavage of double bonds by ozonolysis.
- 4.4 Study of the following reduction reactions with mechanism: Reduction of carbonyl compounds by hydrides.
- 4.5 Clemmensen and Wolff Kishner reductions, Birch reduction.

Unit - V: Reagents in Organic Synthesis **15 Hours**

- 5.1 Synthesis of simple organic molecules using standard reactions like acylation and alkylation of enamines and active methylene compounds.
- 5.2 Sulphur ylides, Robinson annulation, protection and deprotection of functional groups (R-OH, R-CHO, RCOR, R-NH₂ and R-COOH)
- 5.3 Synthesis and reactions of : Aluminium isopropoxide, NBS, Wittig reagent, LTA.
- 5.4 Organotransition metal reagents-Wilkinson's and Zeigler Natta catalysts.
- 5.5 Synthesis and applications of Grignard and organosilicon and organoboranes reagents

References

1. Ahluwalia and Parashar, *Organic Reaction Mechanisms*, 4th Edition., Narosa Publications, 2012.
2. P.S.Kalsi, *Organic Reaction and their Mechanism*, 3rd Edition. New Age Publications, 1994.
3. A. Bahl and B. S. Bahl, *Advanced Organic Chemistry*, S. Chand & Co., 2006.
4. S. M. Mukerjee and S.P Singh, *Reaction Mechanism in Organic Chemistry*, 3rd Edition, 2001.
5. Gurdeep Chatwal, *Reaction Mechanism and reagents in Organic Chemistry*, 3rd Edition., 1995.

Self-Study Paper - II
Semester - VI **Chemistry for Competitive Examinations – II** **1 Credit**

Objectives

- To motivate the students for self study
- To prepare them for the competitive exams

Unit - I: Oxidation and Reduction

Oxidation number-oxidizing and reducing agents-balancing redox equations

Unit - II: Concentration Units

Normality- acid base reactions-Normality-redox reactions-mole fraction and molality.

Unit - III: Thermodynamics

Heat-internal energy-enthalpy, free energy change and entropy.

Unit - IV: Chemical Kinetics

Rate laws-order-molecularity-half life-collision theory.

Unit - V: Electrochemistry

Electrical units-electrolysis-galvanic cells-Nernst equation.

References

1. R.L. Madan & G.D Tuli, *Physical chemistry*, Questions and answers, S. Chand success guides, 2012.
2. Pearson, *Super course in physical Chemistry*, Dorling Kindersley, 1st edition, 2004.
3. Estelle K Meislich, *3000 problems in organic chemistry vol 1 & 2*, Tata McGraw Hill, 2004.
4. Mc Graw Hill education series, Complete Chemistry, JEE – Main, 2014.

Chemistry Lab Work – III
Semester - V & VI **Gravimetric Estimations and Organic Analysis**

Objectives

3 Hrs/week (4 Credits)

- To acquire sound practical knowledge in the gravimetric estimations.
- To prepare the students for analysing various organic compounds through systematic analysis.
- To enable the student to understand the principles behind the preparations of different organic compounds.

Gravimetric Estimations

1. Estimation of water of crystallization of hydrated Barium chloride
2. Estimation of Barium as Barium sulphate
3. Estimation of Sulphate as Barium sulphate
4. Estimation of Barium as Barium chromate
5. Estimation of Lead as Lead chromate
6. Estimation of Calcium as Calcium oxalate monohydrate

Organic Analysis

Analysis of organic compounds containing one functional group and characterization with a derivative.

Reactions of the following functional groups:

Aromatic aldehydes, ketones, Aromatic carboxylic acids, esters, carbohydrates, phenols, aromatic primary amines, amides, nitro compounds and anilides.

Organic Preparations

1. Acetylation:

7. Acetanilide from aniline

(or)

8. Aspirin from salicylic acid

2. Benzoylation:

a) Benzanilide from aniline

(or)

b) 2-Naphthyl Benzoate from 2-Naphthol

3. Bromination:

a) p-Bromoacetanilide from acetanilide

(or)

b) 2,4,6-Tribromoaniline from aniline

4. Oxidation:

a) Benzoic acid from benzaldehyde

(or)

b) Benzoic acid from Toluene

5. Nitration:

a) m-dinitrobenzene from nitrobenzene

(or)

b) Picric acid from phenol

6. Hydrolysis:

a) Benzoic acid from ethylbenzoate

(or)

b) Salicylic acid from methyl salicylate

References

1. Arthur I. Vogel, *A Textbook of Practical Organic Chemistry*, 4th Edition. ELBS, 1986.
2. N.S. Gnanaprasadam and B. Ramamoorthy, *Organic Chemistry Lab Manual*, S. Visvanathan Printers & Publishers, 2006.
3. A.O, Thomas. *Practical Chemistry*, 6th Revised Edition, Sharada Press, 1995.
4. J. N. Gurtu And R. Kapoor, *Advanced Experimental Chemistry, Vol. I Physical Chemistry, Vol. II Inorganic Chemistry, Vol. III Organic Chemistry, Organic Reactions & Reagents* [B.Sc., (Hons.)& M.Sc.], Himalaya Publications, 1974.

Scheme of Valuation for Gravimetric Estimations and Organic Analysis

| | |
|-----------------|----------|
| Internal | 40 Marks |
| External | 60 Marks |

A. Internal assessment (40 Marks)

| Component | Marks |
|---|-------|
| Regular practical (Average of best 60% of the practicals) | 20 |
| Model exam | 10 |
| Theory of practical (At least one per semester) | 5 |
| Viva(At least one per semester) | 5 |
| Total | 40 |

B. External assessment (60 Marks)

| Component | Marks |
|---------------------|-------|
| Gravimetric | 30 |
| Record(Gravimetric) | 10 |
| Organic analysis | 30 |
| Record(Organic) | 10 |
| Preparation | 20 |
| Total | 100 |

The total marks 100 to be converted into 60 marks.

Gravimetric Experiments: Maximum 30 Marks

| % of error | Marks |
|------------|-------|
| <2 | 30 |
| 2-3 | 30-25 |
| 3-4 | 25-20 |
| 4-5 | 20-15 |
| >5 | 10 |

Analysis of organic compound: Maximum of 30 Marks

| Component | Marks |
|--------------------------------------|-------|
| Preliminary tests | 5 |
| Aliphatic/Aromatic | 2 |
| Saturated/Unsaturated | 2 |
| Special elements | 6 |
| Tests for detecting Functional group | 5 |
| Confirmative tests | 5 |
| Derivative | 5 |
| Total | 30 |

Preparation of organic compounds: Maximum of 20 Marks

| | |
|--------------------------|------------|
| Crude sample | : 15 marks |
| Recrystallization | : 5marks |
| Total | : 20marks |

Semester - V & VI **Chemistry Lab Work - IV**
Physical Chemistry Experiments **3 Hrs / week (4 Credits)**

Objectives

- To understand about physical behaviour of compounds.
- To impart sound practical knowledge in understanding the reaction pathways and calculations involved in them.
 1. Phenol - Water system
 2. Determination of Transition temperature of hydrated salts
 3. Determination of molecular weight of a solute – Rast method
 4. Determination of rate constant of acid catalysed ester hydrolysis
 5. Determination of rate constant of inversion of sucrose-polarimetry
 6. Determination of distribution coefficient of iodine between water and CCl₄ (or) benzoic acid between water and benzene
 7. Determination of λ_{∞} of a strong electrolyte
 8. Determination of dissociation constant of a weak electrolyte
 9. Phase Diagram
 10. Measurement of Viscosity
 11. Conductometric titration (strong acid and strong base)
 12. Flame photo meter (Estimation of Na, K, Li)
 13. Potentiometric titration (Redox titration)
 14. pH Meter (strong acid and strong base)
 15. Colorimeter- Determination of concentration of given solution

References

1. V. Venkateswaran, R. Veerasamy, A.R. Kulandaisamy, *Basic principles of Practical Chemistry*, S.Chand publications, New Delhi, 2002.
2. J. N. Gurtu And R. Kapoor, *Advanced Experimental Chemistry, Vol. I Physical Chemistry, Vol. II Inorganic Chemistry, Vol. III Organic Chemistry, Organic Reactions & Reagents* [B.Sc., (Hons.)& M.Sc.], Himalaya Publications, 1974.
3. V. D. Athavale and Parul Mathur, *Experimental Physical Chemistry*, 1st Edition., New Age Publishers, 2008.
4. R. C. Das, *Experimental Physical Chemistry*, Tata McGraw-Hill Publications, 1986.
5. S. Giri, D. N. Pandey, O. P Pandey, *Practical Chemistry*, S.Chand& Company, 1998.

Scheme of Valuation for Physical Chemistry Experiments

| | |
|-----------------|----------|
| Internal | 40 Marks |
| External | 60 Marks |

A. Internal assessment 40 marks)

| Component | Marks |
|---|-------|
| Regular practical (Average of best 60% of the practicals) | 20 |
| Model exam | 10 |
| Theory of practical (At least one per semester) | 5 |
| Viva(At least one per semester) | 5 |
| Total | 40 |

B. External Assessment (60 Marks)

| Component | Marks |
|--|-------|
| Experiment (manipulation 10marks accuracy 40 Marks) | 50 |
| Record | 10 |
| Total | 60 |

Kinetic Experiments

| | |
|-------------------------|------------|
| Below a factor of 10 | = 40 Marks |
| By a factor of 10 | = 20 Marks |
| By a factor of 10^2 | = 10 Marks |
| Error higher than above | = NIL |

Distribution coefficient. / Molecular weight determination. / CST / Effect of electrolyte

| | |
|----------------|------------|
| Error upto 10% | = 40 Marks |
| Error upto 20% | = 20 Marks |
| Error upto 30% | = 10 Marks |
| Above 30% | = 5 Marks |

Transition temperature

| | |
|---------------------------|------------|
| Error upto 2°C difference | = 40 Marks |
| Error upto 7°C difference | = 20 Marks |
| Above 7°C difference | = 10 Marks |

Equivalent conductance

| | |
|---------------------------|------------|
| Calculating cell constant | = 5 Marks |
| Specific conductance | = 10 Marks |
| Equivalent conductance | = 10 Marks |

Accuracy

| | |
|----------------|------------|
| Error upto 10% | = 15 Marks |
| Above 10% | = 5 Marks |

Dissociation constant

| | |
|---------------------------|------------|
| Calculating cell constant | = 5 Marks |
| Specific conductance | = 15 Marks |
| Equivalent conductance | = 10 Marks |
| Dissociation constant | = 5 Marks |

Accuracy

Error upto 10% = 15 Marks

Above 10% = 5 Marks

Conductometric/ potentiometric/pHmetric

Error upto 10% = 40 Marks

Error upto 15% = 20 Marks

Error upto 20% = 10 Marks

Above 20% = 5 Marks

Colorimeter, Flame photometer and Polarimeter

Error upto 5% = 40 Marks

Error upto 10% = 20 Marks

Error upto 15% = 10 Marks

Above 15% = 5 Marks

Certificate Course

Organic Farming

2 Hrs/week/2Credits

Objectives:

- To know the evil effects of Chemical farming
- Need for organic farming
- To know merits of Bio-nutrients
- To learn the process of certification of organic farming

Unit - I: Chemical Farming: Demerits

6 Hours

Impact on soil - Impact on surface water and ground water- Pesticides in aquatic ecosystem- Pesticide residues in bottled water - Impact of pesticides on biodiversity- Effect on food chain- Destruction of pollinators - Ecological significance-Chemical farming: Damage to health and nutrition-Impact of chemical farming on health-evils of pesticides -Impacts of some of the pesticides on human health- Organic farming increases nutrition while chemical farming robs us of it.

Chemical farming: Damage to the environment

Unit - II: Organic farming

6 Hours

Meaning of Ideological differences between organic agriculture and conventional agriculture, History of Organic Farming, Principles, Need for Organic Farming in India, Some Other forms of Organic Management Close to Nature and Tradition

Biodynamic Agriculture, Rishi Krishi, Panchgavya Krishi, Natural farming, Basic Principals of Natueco farming, Homa Farming

Unit - III: Organic Production

6 Hours

Organic production requirements, conversion requirements, maintenance of organic management, landscape, crop production: Duration of conversion period, diversity in crop production, fertilization policy, pest, disease and weed management including growth regulators, contamination control, collection of non cultivated material of plant origin.

Unit - IV: Bio-Nutrients

6 Hours

Bio-intensive nutrient management: Principles of microbial degradation, organic manures, Quality and composition of FYM, Improved methods of handling farm yard manure, ways to minimize these losses from FYM during handling, Sheep and Goat manure, , compost, stages of composting, methods of composting, activated compost process, Indore process, Bangalore

process, The Coimbatore process. Vermicompost: Types of earthworms in vermicomposting, vermicompost preparation, harvesting of the vermicompost from the pit, precautions, Nutrient composition of vermicompost, advantage of vermicompost, green manure, crop residues

Biofertilisers: Symbiotic Bacteria-free living organisms, Blue-green Algae (BGA), Azotobacter and Azospirillum, Mycorrhiza and Phospho-micro Organisms, Saprophytes
Integrated pest management, Cultural methods, Behavioural methods, Biological methods, Bio-pesticides, Botanicals, Trap cropping, Bird perches.

Unit - V: Organic Farming- Certification

6 Hours

Integrated weed management: Ecological management, Biological management:
Quality considerations-Quality standards, Health Benefits of Organic Food, Organic certification, Purpose of certification, Third party certification process, Participatory certification, Certification & product labeling, ORGANIC LOGO, Manipulation of regulations, Misrepresentation of the term *organic*, Accreditation, Position of Accreditation in India, Marketing and Organic Food Exports from India.

References

1. S.S,Rana. *Teaching Manual: Organic Farming.*, CSK Himachal,Pradesh Krishi Vishvavidyalaya, Palampur (2016)
2. Ilka Gomez and Lisa Thivant, *Food and Agriculture Organization of the United Nation (FAO)*(2015)
3. Paul Kristiansen, *Organic Agriculture*, CSIRO Publishing, 2006.

Certificate Course

Industrial Safety

2 Hrs/week/2credits

Objectives:

- To learn the basics of industrial safety
- To identify the general risks in the factory
- To create the awareness about the hazards of chemicals
- To know the important industrial safety laws

Unit - I: Introduction to Industrial Safety

6 Hours

History and development of safety movement, Need for safety, Safety legislation: Acts and rules, Safety standards and codes, Safety policy: safety organization and responsibilities and authorities of different levels. Causes of accidents, Accident prevention and control techniques, Plant safety inspections, Job safety Analysis and investigation of accidents

Unit - II: Risk Assessment & Hazard Identification

6 Hours

Checklist procedure, Preliminary hazard analysis, What if analysis, Failure mode effect analysis, Hazard and operability (HAZOP) studies, Hazard analysis techniques: Fault tree analysis, Event tree analysis, General outline of DOW index, Risk estimation and management, Major hazard control, On-site and Off-site emergency preparedness.

Unit - III: Industrial Hygiene

6 Hours

Industrial Hygiene: Principles of industrial hygiene, Overview of control measures. Permissible limits. Stress, Exposures to heat, Effects of heat stress, WBGT index measurement, Control Measures. Chemical agents, IS/UN classification, Flammables, Explosives, Water sensitive chemicals, Oxidants, Gases under pressure, Chemicals causing health hazards: irritants, asphyxiates, anaesthetics, systemic poisons and carcinogens, Chronic and acute exposure,

Unit - IV: Control of Chemical Hazards

6 Hours

Classification of dangerous materials with pictorial symbols, common hazard and common precautions for each class. Safety in transportation of dangerous materials by road, rail, ships and pipelines. Safety in bulk storage of hazardous substances. Safety in shelf storage of hazardous substances. Safety in handling of chemicals in the plant by pipelines. Hazards of chemical reactions, and possibilities of reactions going out of control. Safety considerations in process control instrumentation. Safe start up, shut down and emergency shut down procedures. Safety in sampling and gauging. Safety aspects of plant modifications. Preventive maintenance of vulnerable equipments. Safe entry into confined spaces.

Unit - V: Industrial Safety Legislations

6 Hours

Factories Act, 1948, Workman's Compensation Act, 1943, Employees State Insurance Act, 1948. Mines Act, Air (Prevention and control) Pollution Act, 1981, Water (Prevention and

Control) Pollution Act, 1974, Boiler Vessels Act. Child Labour and Women Employee Act. The factories rules,

References

1. R. K. Jain and Sunil S. Rao , *Industrial Safety, Health and Environment Management Systems*, Khanna publishers , New Delhi, 2006.
2. L.Slote, *Handbook of Occupational Safety and Health*, John Willey and Sons, NewYork , 1999.
3. Frank P. Lees, *Loss of prevention in Process Industries , Vol. 1 and 2*, Butterworth-Heinemann Ltd., London, 1991.
4. Industrial Safety -National Safety Council of India.
5. The Factories Act with amendments 1987, Govt. of India Publications DGFASLI, Mumbai
6. Grimaldi and Simonds , *Safety Management*, AITBS Publishers , New Delhi, 2001.
7. *Industrial Safety and pollution control handbook*: National Safety Council and Associate publishers Pvt. Ltd, Hyderabad, 1993.
8. Herman Koren and Michel Bisesi, *Handbook of Environmental Health and Safety*., Jaico Publishing House, Delhi, 1999.
9. Peter Calow, *Handbook of Environmental Risk Assessment and Management*., Blackwell Science Ltd. USA, 1998.
10. D. Kofi Asvite-Dualy, *Risk Assessment and Environmental Management*., John Willey & Sons, West Sussex, England, 1998.
11. Gilbert M. M, *Introduction to Environmental Engineering & Science*, Pearson Education, Singapore, 2004.

Department of Computer Science

UG PROGRAMME STRUCTURE

| Sem | Part | Code | Subject Title | Hrs. | Credit(s) |
|------------|------|------|--|-----------|-----------|
| I | I | | Tamil – I | 5 | 3 |
| | II | | English – I | 5 | 3 |
| | III | | Allied – I: Mathematics – I | 6 | 4 |
| | III | | Digital Computer Fundamentals | 4 | 4 |
| | III | | Web Design Concepts | 4 | 4 |
| | III | | Practical I: Web Design Concepts | 2 | 2 |
| | IV | | Personal Skills | 2 | 1 |
| | IV | | Christian Religion - I / Value Education - I | 2 | 1 |
| | IV | | Communicative English – I | - | 1 |
| | | | 30 | 23 | |
| II | I | | Tamil – II | 5 | 3 |
| | II | | English – II | 5 | 3 |
| | III | | Allied – I: Mathematics – II | 6 | 4 |
| | III | | Computer Organization and Architecture | 4 | 4 |
| | III | | Programming with C | 4 | 4 |
| | III | | Practical II: Programming with C | 2 | 2 |
| | IV | | Social Skills | 2 | 1 |
| | IV | | Christian Religion - II / Value Education - II | 2 | 1 |
| | IV | | Communicative English – II | - | 1 |
| | | | 30 | 23 | |
| III | I | | Tamil – III | 5 | 3 |
| | II | | English – III | 5 | 3 |
| | III | | Allied – II: Physics – I | 4 | 3 |
| | III | | Object Oriented Programming with C++ | 4 | 4 |
| | III | | Data Structures and Algorithms | 4 | 4 |
| | III | | Practical - III: Data Structures and Algorithms | 2 | 2 |
| | III | | Practical: Allied – II: Physics – I | 2 | 1 |
| | IV | | Employability Skills – I | 2 | 1 |
| | IV | | Environmental Science | 2 | 1 |
| | | | 30 | 22 | |
| IV | I | | Tamil – IV | 5 | 3 |
| | II | | English – IV | 5 | 3 |
| | III | | Allied – II: Physics – II | 4 | 3 |
| | III | | Computer Graphics | 4 | 4 |
| | III | | Relational Database Management Systems | 4 | 4 |
| | III | | Practical - IV: Relational Database Management Systems | 2 | 2 |
| | III | | Practical : Allied – II: Physics - II | 2 | 1 |
| | IV | | Employability Skills – II | 2 | 1 |
| | IV | | Human Rights | 2 | 1 |
| | V | | DEEDS | - | 2 |
| | V | | SHELTERS | - | 2 |
| | | | | 30 | 26 |

| Sem | Part | Code | Subject Title | Hrs. | Credit(s) |
|----------|------|------|-----------------------|------|-----------|
| V | III | | Programming with JAVA | 5 | 5 |

| | | | | |
|-----------|-----|---|------------|---------------------------|
| | III | Linux and Shell Programming | 5 | 5 |
| | III | Operating Systems | 5 | 5 |
| | III | Programming with PHP | 2 | 2 |
| | III | Elective - I Software Engineering | 4 | 3 |
| | III | Practical - V: Programming with JAVA | 2 | 2 |
| | III | Practical - VI: Linux and Shell Programming | 2 | 2 |
| | III | Practical - VII : Programming with PHP | 2 | 1 |
| | III | Project Work | 1 | - |
| | III | Non-Major Elective – I | 2 | 1 |
| | VI | SSP1: Industrial Plant Training | - | 1 [@] |
| | | | 30 | 26 + 1[@] |
| VI | III | Microprocessor and its Applications | 5 | 5 |
| | III | Web Development using XML | 5 | 5 |
| | III | Mobile Apps – Android Development | 5 | 5 |
| | III | Programming with R | 2 | 2 |
| | III | Elective – II Computer Networks | 4 | 3 |
| | III | Practical - VIII: Microprocessor and its Applications | 2 | 2 |
| | III | Practical - IX: Web Development using XML | 2 | 2 |
| | III | Practical - X: Programming with R | 2 | 1 |
| | III | Project Work | 1 | 2 |
| | III | Non-Major Elective – II | 2 | 1 |
| | VI | SSP2: Quantitative Aptitude | - | 1 [@] |
| | | | | 30 |
| | | Total | 180 | 148+2[@] |

Distribution of Credit(s) for B.Sc. (CS) Programme

| Part | Course | No. of Courses | Total No. of hours | Total No. of Credit(s) |
|--------------|--------------------------------------|----------------|--------------------|------------------------|
| I | Tamil | 04 | 20 | 12 |
| II | English | 04 | 20 | 12 |
| III (Allied) | Allied I – Mathematics | 02 | 12 | 08 |
| | Allied II – Physics | 02 | 08 | 06 |
| | Practical Allied – II: Physics | 02 | 04 | 02 |
| III (Core) | Theory | 16 | 66 | 66 |
| | Practical | 10 | 20 | 18 |
| | Theory – Elective | 02 | 08 | 06 |
| | Project work | 01 | 02 | 02 |
| | Non-Major Elective | 02 | 04 | 02 |
| | Christian Religion / Value Education | 02 | 04 | 02 |

| | | | | |
|---------------------------|-----------------------|-----------|------------|---|
| IV (Life Education) | Environmental Science | 01 | 02 | 01 |
| | Human Rights | 01 | 02 | 01 |
| | Life Skills | 04 | 08 | 04 |
| | Communicative English | 02 | - | 02 |
| V (Extension) | DEEDS | - | - | 02 |
| | SHELTERS | - | - | 02 |
| VI (Optional) | SSP | 02 | - | 02 [@] |
| | Certificate Courses | 04 | - | 08 [@] |
| Total | | 61 | 180 | 148 +(2[@]/8[@]) |

5. EXPLANATION OF THE CIPHER USED FOR THE COURSES

For each of the course, the specification of the cipher can be interpreted as follows:
[L-T-P-C:CA:SE], where L denotes the Lecture hours, T denotes the Tutorial hours, P denotes the Practical hours, C denotes the Credits, CA denotes the maximum Continuous Assessment mark and SE denotes the maximum Semester Examination mark respectively.

6. DETAILED SYLLABI [SEMESTER V]

[4-1-0-5:30:70]

PROGRAMMING WITH JAVA

1. Learning Objectives

- To acquire the programming skills in core java applications.
- To learn the art of GUI programming with Applet.
- To write interface with Applet Controls.
- To understand the Layouts of Applets.
- To establish database connectivity.
- To learn the Interaction between AWT control and Data Base.

2. Blue Print of the Question Paper

| Section | I-Unit | II-Unit | III-Unit | IV-Unit | V-Unit |
|---------|--------|---------|----------|---------|--------|
|---------|--------|---------|----------|---------|--------|

| | | | | | |
|------------------|---|-------------------------------------|---|--------------------------------------|--|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11 (a).Theory (OR) (b).Program | 12 (a).Theory (OR) (b).Theory | 13 (a).Program (OR) (b).Theory | 14 (a).Theory (OR) (b).Program | 15 (a).Theory (OR) (b).Theory |
| Section-C | 16. Theory | 17. Theory (or) Program | 18. Program | 19. Theory | 20. Theory |

3. Course Outline

Unit – I: BASICS, ESSENTIALS, CONTROL STATEMENT AND CLASSES & OBJECTS

Computer and its Languages – Stage, Origin and Features for Java - JDK–OOP;Java Essentials:Program – API - Variables& Literals - Data Types - String Class – Operators - Type conversion - Constants - Scope – Comments - Keyboard Input; Control Statements: Conditional Statements – Looping Statements - Break and Continue Statements;Classes and Objects:Modifiers - Arguments - Constructors - Packages and import - Static Class - Overloaded Methods and Constructors - Returning Objects – toString() - this reference – Enumeration - Garbage Collection.

Unit – II: ARRAYS, INHERITANCE, INTERFACES AND PACKAGES

Arrays - Three or More Dimensions; Inheritance: Basics - Calling the Superclass Constructor - Overriding Superclass Methods - Inheritance from Subclasses – Polymorphism -Abstract

Classes and Methods - Interfaces: Fields - Multiple inheritance - Interface inheritance;
Packages: Creating packages – Accessing package from other packages- Access Specifier.

Unit – III: STRING & EXCEPTION HANDLINGS AND MULTITHREADING

String Handling: Basics - Operations –String Methods - String Buffer class - String Builder –
to String method -String Tokenizer class. **Exception Basics:** try and catch block - Multiple
catch block - Nested try - throws keyword - Throw vs Throws - Final vs Finally vs Finalize -
Method Overriding - Custom Exception - Multithreading: Life Cycle - Methods in Thread -
thread application – Thread priority – Synchronization - Inter-thread communication -
Suspending, Resuming, and Stopping Threads.

Unit – IV: I/O & FILE HANDLING, APPLLET AND GUI -I

File Handling–Streams - Byte Streams - Filtered Byte Streams - RandomAccessFile Class -
The Character Streams. Applets: Basis - Lifecycle - Applet classes - Application – Graphics;
AWT-I: GUI Programming - AWT classes - Windows fundamentals- Creating Windows -
Dialog Boxes - Layout Managers - Radio Buttons and Check Boxes – Borders.

Unit – V: GUI - II AND JAVA DATABASE CONNECTIVITY

AWT-II: Event Handling - AWT Controls – Menus - Text Areas - Lists - Combo Boxes –
Graphics classes: Images – Font- Color. Other controls: File Choosers, Color Choosers,
Sliders. JDBC - Types of Drivers- Architecture- Classes and Interfaces - Developing JDBC
Application - New Database and Table with JDBC - Working with Database Metadata.

4. Teaching Resources

Text Book

1. S.Sagyaraj, R.Denis, P.Karthik & D.Gajalakshmi, “Java Programming“,
Universities Press, 2017

| | |
|-------------------|---|
| Unit - I | : Ch. 1.1 – 1.8, 2.1 – 2.12, 3.1- 3.16 & 4.1 - 4.15 |
| Unit - II | : Ch. 5.1 – 5.11, 7.1 – 7.7 & 8.1 – 8.8 |
| Unit - III | : Ch. 6.1 – 6.10, 9.1 – 9.10 & 10.1-10.11 |
| Unit - IV | : Ch. 11.1 – 11.6, 12.1-12.6 & 13.1-13.6 |
| Unit - V | : Ch. 14.1 – 14.4 & 16.1 – 16.6. |

References

1. Patrick Naughton and Herbert Schildt. “The Complete Reference JAVA 2”. 3rd
Edition. Tata McGraw-Hill Edition, 1999.
2. Muthu C. “Programming with JAVA”. 2nd Edition. Vijay Nicole Imprints,
2011.
3. Ken Arnold Gosling and Davis Holmen. “The Java Programming Language”.
3rd Edition. Addition Wesley Publication.

Web References

(i) Online tutorials

1. <http://www.roseindia.net/java/>
2. www.tutorialspoint.com/java

(ii) Online quiz

1. www.bullraider.com/quiz/core-java-quiz
2. www.javatpoint.com/examaccess.

5. Support Study

Log4Net

LINUX AND SHELL PROGRAMMING

1. Learning Objectives

- State the major components and describe the architecture of the Linux operating system.
- To learn and understand Linux commands.
- State how the shell functions at the user interface and command line interpreter.
- Create structured shell programming with flow control constructs.

2. Blue Print of the Question Paper

| Section | I-Unit | II-Unit | III-Unit | IV-Unit | V-Unit |
|-----------|--------------------------------------|--------------------------------------|--|--|--|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11. (a).Theory (OR) (b).Theory | 12. (a).Theory (OR) (b).Theory | 13. (a).Program (OR) (b) Program | 14. (a).Program (OR) (b).Program | 15. (a).Program (OR) (b).Program |
| Section-C | 16.Theory | 17.Theory | 18.Program | 19.Program | 20.Program |

3. Course Outline

Unit - I: Organization

Salient Features of Linux – Linux System Organization – Types of Shells – Linux Commands – The Linux File System – Creating Files – Listing Files and Directories. - The Boot Block – The Super Block – The Inode Table – Data Blocks – How Does Linux Access Files – Storage of Files – Disk Related Commands.

Unit - II: Linux Commands

Essential Linux commands: Password – Commands: cal, banner, touch – File Related Commands – Viewing Files – Taking Printouts – File Compression. I/O Redirection and Piping. vi editor – Modes of operation – The First Editing Session. Processes in Linux: Running the Process – Still More Processes – Background Processes – The nohup command – Killing a process – Changing Process Priorities – Scheduling of Processes, Communication – Linux write and wall command - Basis of Linux Communication.

Unit - III: SHELL Programming - I

Interactive Shell Scripts – Shell Variables – Shell Keywords – Assigning Values to Variables – Positional Parameters – Passing Command Line Arguments – Setting Values of Positional Parameters – Displaying Date in Desired Format – Using Shift on Positional Parameters – Arithmetic in Shell Script, Taking Decisions: if-then-fi Statement – if-then-else-fi Statement – The test Command – Nested if-else – Form of if – Use of Logical Operators – else - if Equals elif – The Case Control Structure.

Unit - IV: SHELL Programming - II

Loop Control Structure: Loops – The While Loop – Reading from a file – The Until and for Loop – Creating Nested Directories – Generating Values for a for Loop – The Break and Continue Statement- Shell script using Command Line Arguments.

Unit - V: System Calls

System calls: Operational mode – Kernel mode – User mode. File Handling calls: open(), create(), open(), read(), write(), lseek(),close(). Directory Handling calls: mkdir(), rmdir(), chdir(), getcwd(), opendir(), readdir(), telldir(), seekdir(), rewaddir(), closedir(). Process related calls - exec(), fork(), wait(), exit(). Interrupted system calls – Error Handling: strerror() – perror().

4. Teaching Resources

Text Books

1. Yashavant Kanetkar. “Unix Shell Programming”. New Delhi: BPB Publisher, 1996.

Unit – I : Ch. 1, 2, 3.

Unit – II : Ch. 4, 5, 6, 7, 8.

Unit – III : Ch. 9 - 10

Unit – IV : Ch. 11.

2. B. M. Harwani. “Unix and Shell programming”, OXFORD University Press, 2013

Unit – V : Ch. 7.1, 7.2.1- 7.2.6, 7.3, 7.4, 7.5, 7.8.

Reference

1. Kernighan. et al. “The UNIX Programming Environment”. 2nd Edition. New Delhi: Prentice Hall of the India, 1988.

Web References

(i) Online tutorials

1. <http://www.cgl.ucsf.edu/Outreach/bmi219/slides/shell.html>
2. <http://www.cs.utk.edu/~huangj/cs360/360/notes/Syscall-Intro/lecture.html>

(ii) Online quiz

1. www.tcyonline.com/tests/unix-and-shell-scripts

(iii) Online compiler

1. https://www.tutorialspoint.com/execute_bash_online.php

[SEMESTER V]

[5-0-0-5:30:70]

OPERATING SYSTEMS

1. Learning Objectives

- To acquire the principles of Operating System, Process, its Description, Uniprocessor and Multiprocessor and its Scheduling Techniques.
- To understand the concept of Mutual Exclusion, Deadlock and its detection, prevention & avoidance.
- To learn the various Main Memory and Virtual Memory Management techniques.
- To explore the Organization and Management of I/O, Disk and File Managements.

2. Course Outline

Unit – I: Operating System Overview and Process Description

Operating System Objectives and Functions - The Evolution of Operating Systems - Developments Leading to Modern Operating Systems - Process Description and Control: Concept of Process - Process States - Process Description - Process Control - Security Issues.

Unit – II: Uniprocessor, Multiprocessor and Real-Time Scheduling

Types of Processor Scheduling - Scheduling Algorithms - Multiprocessor Scheduling - Real-Time Scheduling.

Unit – III: Mutual Exclusion, Synchronization and Deadlock

Mutual Exclusion: Hardware Support – Semaphores : Message Passing – Readers / Writers Problem - Principles of Deadlock - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection.

Unit – IV: Memory Management and Virtual Memory

Memory Management Requirements - Memory Partitioning – Paging – Segmentation - Security Issues – Virtual Memory: Hardware and Control Structures - Operating System Software.

Unit – V: I/O Management, Disk Scheduling and File Management

I/O Devices - Organization of the I/O Function - I/O Buffering - Disk Scheduling – File Management: Overview - File Organization and Access - File Directories - File Sharing – Record Blocking – Secondary Storage Management - File System Security.

3. Teaching Resources

Text Book

1. William Stallings,” Operating Systems: Internals and Design Principles”, 7th Edition, Pearson Education Inc., Fourth Impression: 2016.

Reference

1. Madnick S. E and Donovan J. J. “Operating Systems”, New Delhi: McGraw hill International Book Co, 1987.

Web Reference

1. <http://lass.cs.umass.edu/~shenoy/courses/fall10/>
2. <http://people.csail.mit.edu/rinard/osnotes/>

[SEMESTER V]

[1-1-0-2:30:70]

PROGRAMMING WITH PHP

1. Learning Objectives

- To learn about PHP is a server scripting language, and a powerful tool for making dynamic and interactive Web pages
- To Understand File handling concepts
- Understanding PHP code to connect, access, and update a MySQL database
- Understanding PHP using XML

2. Blue Print of the Question Paper

| Section | I-Unit | II-Unit | III-Unit | IV-Unit | V-Unit |
|-----------|-----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (OR) b) Program | 12.a)Theory (OR) b) Program | 13.a)Theory (OR) b) Theory | 14.a)Theory (OR) b) Program | 15.a) Theory (OR) b) Theory |
| Section-C | 16.Theory (OR) Program | 17.Theory | 18.Theory | 19.Theory (OR) Program | 20.Theory |

3. Course Outline

Unit – I: Fundamentals of PHP

Web server – Apache - PHP Intro- PHP Install -PHP Syntax -PHP Variables-PHP Echo / Print -PHP Data Types- PHP Strings -PHP ConstantsPHP Operators- Control structures - PHP Functions - Directory Functions - File System Functions -PHP ArraysPHP Sorting ArraysPHP Super global - String Functions - Date and Time Functions-Mathematical Functions - Miscellaneous Functions.

Unit – II: PHP Forms

Basic Form Processing (GET and POST Method) - PHP Form Handling - PHP Form Validation- PHP Form Required– URL - E-mail- PHP Form Complete.

Unit - III: PHP Advanced

PHP Arrays Multi-PHP Date and Time- PHP Include-PHP File Handling-PHP File Open/Read- PHP File Create/Write- PHP File Upload-PHP Cookies- PHP Sessions-PHP Filters- PHP Filters Advanced- PHP Error Handling- PHP Exception-COM-DOM - CURL-SOAP.

Unit – IV: PHP with MySQL Database

PHP MySQL Functions -Connect- Create DB -Create Table- Insert Data- Get Last ID- Insert Multiple- Prepared-Select Data- Delete Data- Update Data- Limit Data -Table join - Database driven application.

Unit - V: PHP - XML

PHP XML Parsers - PHP Simple XML Parser- PHP Simple XML - GetPHP XML ExpatPHP XML DOM.

4. Teaching Resources

Text Book

1. Julie C. Meloni, Sams “Teach yourself PHP, MySQL and Apache”, Fourth edition, 2008 by Sams Publishing.

Unit - I : Ch. 3 – 8, 10

Unit - II : Ch. 11

Unit - III : Ch. 12-13

Unit - IV : Ch. 16

Unit - V : Ch. 28

References

1. Nowicki, et al. “Professional PHP”, Wrox Press, 2000.

Web References

(i) Online Tutorial

1. www.w3schools.com
2. www.php.net
3. www.phpclasses.org

[SEMESTER V]

[4-0-0-3:30:70]

ELECTIVE – I: SOFTWARE ENGINEERING

1. Learning Objectives

Upon completion of this course, students should be able to:

- Understand the principles of large scale software systems, and the processes that are used to build them.
- Acquire ability to the software-development process, including requirements analysis, design, programming, testing and maintenance.
- Understand the Communication issues in large, complex software projects.
- Understand purpose and importance of the project management from the perspective of planning, tracking and completion of project.

2. Course Outline

Unit - I: Software Process

The Software Engineering – Software Process – Process Model – Prescriptive Models – Specialized Models – Unified Process – Personal Software Process – Team Software Process – Agile Process – Extreme Programming.

Unit - II: Modeling I

Requirement Engineering – Establishing – Eliciting Requirements – Developing use cases – Building Requirements Model – Negotiating and Validating Requirements – Requirement Analysis- Scenario Based Modeling – UML Models – Data Modeling concept – Class Based

Modeling – Requirement Modeling – Flow oriented Modeling – Behavioral Model – Design Process – Design Models.

Unit - III: Modeling II

Software Architecture – Architecture Styles – Architectural Design – Architectural Mapping using Data Flow – Component – Designing class based component – Using traditional components – User Interface Design – The Golden Rules - User interface Analysis and Design – Interface Analysis – Design Steps.

Unit - IV: Quality Management

Software Quality – Achieving software Quality – Software Quality Assurance, Tasks, Goals and Metrics – Software Reliability – Software Testing Strategies: A Strategic Approach – Strategic Issues – Test Strategies for Conventional Software – System Testing- Validation Testing – The Art of Debugging – Software testing fundamentals –White box testing: Basis Path Testing – Control structure Testing – Black box testing – Model based testing.

Unit - V: Managing Software Projects

The Management Spectrum - People – The Product – Process – The Project – The W5HH Principle – Critical Practices – Basic Concepts – Project Scheduling – Defining a Task Network Scheduling – Software Risk – Risk Identification – Risk Projection – Risk Refinement – Risk Mitigation, Monitoring and Management – The RMMM Plan.

3. Teaching Resources

Text Book

1. Pressman, Roger S. “Software Engineering a Practitioner’s Approach”, 7th Edition, New York: McGraw Hill International Edition, 2010.

Unit-I : Ch. 1.1-1.6, 2.1-2.6, 3.1-3.4.

Unit-I : Ch 5, 6, 7, 8.2, 8.4.

Unit-III : Ch. 9, 10.1-10.3, 10.5-10.7, 11.1-11.4.

Unit-IV : Ch. 14, 16.1-16.3, 16.6, 17.1-17.3, 17.6-17.8, 18.1-18.7.

Unit-V : Ch. 24, 27, 28.

References

1. Rajib Mall. “Fundamentals of Software Engineering”, New Delhi, PHI Learning Pvt Ltd., 2009
2. James K. L. “Software Engineering”, New Delhi: PHI Learning Pvt Ltd., 2009.

Web References

(i) Online Tutorial

1. <http://www.scribd.com/doc/27252883/Software-Engineering-Notes>
2. <http://www.Engineeringppt.blogspot.in/2011/12/pressman-software-engineering-ppt-pdf.html>.

[SEMESTER V]

[0-0-2-2:40:60]

PRACTICAL - V: PROGRAMMING WITH JAVA

1. Classes and objects
2. Inheritances & Interfaces
3. Package
4. String Handling

5. Exception Handling
6. File handling
7. Multithreading
8. Menu and Dialogue Box
9. Applet and AWT Controls
10. GUI application with JDBC

[SEMESTER V]

[0-0-2-2:40:60]

PRACTICAL - VI: LINUX AND SHELL PROGRAMMING

Part – I: Programming With Shell Script

1. Shell Script – Sequential Structure
2. Shell Script – Iterative Control Structure
3. Shell Script – Strings
4. Shell Script – Files
5. Shell Script – Command Line Arguments

Part - II: System Calls

6. System Call – Printing the Command Line Arguments.
7. System Call – read(), write(),open(), creat()
8. System Call – execlp(), execvp() perror() system calls
9. System Call – Use of fork(), wait() & exit()
10. System Call – Child Process , generated interrupt & lseek()

[SEMESTER V]

[0-0-2-1:40:60]

PRACTICAL - VII: PROGRAMMING WITH PHP

1. Data Types and Operators
2. Control Statements and Looping
3. Functions
4. Arrays
5. Form Processing (GET & POST)
6. Validation
7. File Uploading and Downloading
8. Cookies
9. Forms and Databases
10. XMLs

[Semester- VI]

[4-1-0-5:30-70]

MICROPROCESSOR AND ITS APPLICATIONS

1. Learning Objectives

- To Understand the basic architecture of the Microprocessor
- To learn the instruction sets of the processor

- To write applications in assembly level language program
- To study the input/output interfaces of the processor
- To use interrupts in programming
- To understand the advanced Processors software models

2. Course Outline

UNIT - I: SOFTWARE ARCHITECTURE AND MACHINE CODING

Microcomputer : Architecture – Microprocessor Evolution – Micro architecture of the 8088/8086 - Software Model - Memory Address Space And Data Organization - Data Type - Segment Registers and Memory Segmentation - Dedicated and General Use of Memory - Instruction Pointer - Data Registers - Pointer And Index Registers - Status Register - Generating A Memory Address - Stack - I/O Address Space – Software: Micro computer program - Assembly language program development – Instruction set - The MOV instruction - Addressing Modes.

UNIT - II: MICROPROCESSOR PROGRAMMING - I

Converting Assembly Language Instructions to Machine Code - Encoding a Complete Program in Machine Code - The Instruction Set of 8086 - Data Transfer Instructions - Arithmetic Instructions - Logic Instructions - Shift Instructions - Rotate Instructions.

UNIT - III: MICROPROCESSOR PROGRAMMING - II

Flag Control Instructions - Compare Instructions - Control Flow and the Jump Instructions - Subroutines and Subroutine - Handling Instructions - The Loop and The Loop Handling Instructions - Strings And String - Handling Instructions.

UNIT - IV: I/O INTERFACE OF THE 8086 MICROPROCESSOR

8088 and 8086 Microprocessors – Minimum mode and Maximum mode systems – Minimum mode Interface Signals – Maximum mode Interface Signals - Types Of I/O- The Isolated Input/output Interface - Input/output Data Transfers - I/O Instructions - Input/output Bus Cycles - Core and Special Purpose I/O Interfaces – Byte Wide Output Ports Using Isolated I/O - Byte Wide Input Ports Using Isolated I/O – Input/output handshaking and a parallel printer interfaces - Memory Mapped Input/output Ports.

UNIT - V: INTERRUPT INTERFACE OF THE 8086

Interrupt Mechanism, Types, and Priority – Interrupt Vector Table - Interrupts Instructions - Enabling/Disabling Of Interrupts - External Hardware Interrupt Interface -External Hardware Interrupt Sequence - 8259A Programmable Interrupt Controller -Software Interrupt - Non-Maskable Interrupt – Reset - Internal Interrupt Functions – DMA – 80286 Microprocessor – Internal Architecture – Real Mode Software Model –80386 Microprocessor Family – Internal Architecture of the 80386DX – Real Address Mode Software Model - Pentium Processor Family.

3. Teaching Resources

Text Book

1. Triebel. et al. The 8088 And 8086 Microprocessors Programming, Interfacing Software, Hardware and Applications. 4th Edition. New Delhi: Prentice Hall of The India, 2011.

Unit - I: Ch. 1.1 – 1.2, 2.1-2.13 & 3.1-3.5

Unit - II: Ch. 4.1 – 4.2, 5.1-5.5

Unit - III: Ch. 6.1-6.6

Unit - IV: Ch. 8.1-8.4, 8.14-8.18 & 10.1-10.4 & 10.7

Unit - V: Ch. 11.1-11.5, 11.9-11.12, 12.1-12.3, 13.1 – 13.3 & 13.12

Reference

1. John Uffenbeck, The 8086/8088 Family, Design, Programming And Interfacing. 7th Edition. New Delhi: Prentice Hall of India, 2000.

Web Reference

1. https://www.vssut.ac.in/lecture_notes/lecture1423813120.pdf
2. https://www.vssut.ac.in/lecture_notes/lecture1428551326.pdf

[SEMESTER VI]

[4-1-0-5:30:70]

WEB DEVELOPMENT USING XML

1. Learning Objectives

- To know how to represent data over the Web using XML.
- Understanding of the XML Document Object Model.
- Understanding XML DTD and its uses.
- Understanding XML schema and its uses.
- Understanding JSON and its uses.

2. Blue Print of the Question Paper

| Section | I-Unit | II-Unit | III-Unit | IV-Unit | V-Unit |
|-----------|-----------------------------------|----------------------------------|--|--|--------------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | (a).Theory (OR) (b).Program | (a).Theory (OR) (b).Theory | 13. (a).Program (OR) (b). Theory | 14. (a).Theory (OR) (b). Program | 15. (a).Theory (OR) (b).Theory |
| Section-C | 16. Theory | 17. Theory (or) Program | 18. Program | 19. Theory | 20.Theory |

3. Course Outline

Unit - I: Fundamentals of XML

SGML - The Beginnings of XML – Benefits of XML - Advantages of XML over SGML, HTML, Databases and Flat Files - Drawbacks of XML. XML Syntax - Document Structure - Declaration - Markup and Content - Elements - Attributes - Entities - Comments - Processing Instructions - Rules of XML Structure – Well Formed and Valid Documents - Applying CSS Style to XML.

Unit - II: Validating XML with the DTD

Document Type Definitions -Some Simple DTD Examples - Structure of a Document - Type Definition - DTD Attributes - DTD Entities - DTD Directives - DTD Drawbacks and Alternatives

Unit – III: XML Schema

Schema Recommendation - Document - Schema for XML Document - Creating XML Schemas - Declaring Attributes - Declaring Elements - Declaring Complex Elements - Declaring Simple Types - Refining Simple Types Using Facets - Anonymous Type Declarations - Specifying Mixed Content for Elements - Annotating Schemas - Model Groups - Attribute Groups - Targeting Namespaces - "Inheriting" from Other Schemas.

Unit – IV: X-path, X-link and Xml for the Web

XPath - Operators and Special Characters - XPath Syntax – Axes – Predicate – XPath Function. XPointer - Points - Ranges - Abbreviating XPointer Notation - XLink - Simple Links - Extended Links. **JSON**: JSON Introduction - JSON Syntax - JSON Data types - JSON Objects - JSON Schemas - JSON Comparison with XML.

Unit - V: XML DOM

Concept of DOM – Features of DOM - Disadvantages of Using DOM - DOM Levels - DOM Core: Parents, Children, and Siblings - DOM Interfaces - Java Bindings - Walking Through an XML Document - Creating an XML Document - DOM Traversal and Range: Traversal - Range.

4. Teaching Resources

Text Book

1. Ron schmelzer. et al. “XML and Web Services Unleashed”. Sams Publishing, 2002.

Unit – I : Ch. 1 & 2

Unit – II : Ch. 3

Unit – III : Ch. 4

Unit – IV : Ch. 5

Unit – V : Ch. 7

Reference

1. David Chappell and Tyler Jewell. “Java Web Services”, 1st Edition, O’Reilly, 2002.

Web References

(i) Online Tutorial

1. <http://www.w3schools.com/xml/>
2. <http://www.scribd.com/doc/29110068/XML-and-Web-Services>
3. <http://msdn.microsoft.com/en-us/library/ms996507.aspx>

(ii) Online Quiz

1. <http://www.indiabix.com/online-test/>
2. <http://www.pskills.org/xml.jsp>

(iii) Online Compiler

1. http://www.tutorialspoint.com/online_xml_editor.htm

[SEMESTER VI]

[5-0-0-5:30:70]

MOBILE APPS – ANDROID DEVELOPMENT

1. Learning Objectives

Upon completion of this course, students should be able to:

- Develop a mobile application.
- Understand the concept of SQLite.

2. Course Outline

Unit - I: Introducing Android

Introduction – History – Versions – Features – Understanding the Android market - Android software stack – Life cycle of an Android – The layers of Android – The Intent of Android development – Four kinds of Android components – Understanding the AndroidManifest.xml file – Mapping applications to processes – **Android development environment** – Introducing the Android SDK – Exploring the development environment – Building an Android application in Eclipse - Creating an Android Hello World Application – Using the Android emulator – Debugging your application.

Unit - II: Building Basic User Interfaces and Using Controls

User Interfaces – Understanding Android’s Common Controls – Adapters and List Controls – Understanding Layout Managers – Working with Menus and Action Bars - Working with views – Intents and Services – Toast.

Unit - III: Android Applications

Telephony – Exploring telephony background and terms – Accessing telephony information – Interacting with the phone – Working with messaging: SMS – **Notifications and alarms** – Introducing Toast – Placing your Toast message – Making custom Toast view – Introducing notifications – Making a custom notification view – Introducing alarms – **Graphics and animation** – Drawing graphics in Android – Creating animations with Android’s Graphics API – **Multimedia** – Introducing to Multimedia and Stagefright – Playing audio – Playing video – Capturing media.

Unit - IV: The Maturing Platform

Location – Simulating your location within the emulator – Using LocationManager and LocationProvider – Working with Maps – Converting places and addresses with Geocoder – **Bluetooth and sensors** – Exploring Android’s Bluetooth capabilities – Interacting with the SensorManager – AppWidgets – **Drag and Drop** – The drag-and-drop classes – Drag-and-drop operations – The shadow builder – Drag events – Starting drag operations – Listening for drag-and-drop events – Responding to drag-start operations – Handling drop operations.

Unit - V: Database Operations

Storing and retrieving data – Creating a SQLite Database – Migrating a Database – SQLite DB: CRUD Operations. Publishing Android Application: Export android application – Google play store registration.

3.

Teaching Resources

Text Book

1. W. Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz, “**Android in Action**”, Third Edition 2012.
2. Dave Maclean, Satya Komatineni, Grant Allen, “**Pro Android 5**”, Apress Edition 2015.

Reference

1. Dave Smith and Jeff Friesen, “Android Recipes: A Problem – Solution Approach”, Rakmo Press (P) Ltd, New Delhi, 2011.

Web Reference

1. Android Developer’s Guides - available at <http://developer.android.com/>

[SEMESTER VI]

[2-0-0-2:30:70]

PROGRAMMING WITH R

1. Learning Objectives

Upon completion of this course, students should be able to:

- Understand the fundamentals of R and able to use Basic Programming Concepts.
- Understand the concepts of vectors and performing operations on Complex Data Types.
- Understand the various R functions and strings, concepts of data frame and reshaping in R Programming.

- Become more popular in charts and graphs and to understand the Mean, Median and Mode in R statistics.

2. Blue Print of the Question Paper

| Section | I-Unit | II-Unit | III-Unit | IV-Unit | V-Unit |
|-----------|-----------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.Theory (OR) Theory | 12.Theory (OR) Theory | 13.Theory (OR) Problem | 14.Theory (OR) Theory | 15.Theory (OR) Theory |
| Section-C | 16.Theory (OR) Theory | 17.Theory (OR) Theory | 18.Theory (OR) Problem | 19.Theory (OR) Problem | 20.Theory (OR) Problem |

3. Course Outline

Unit – I: Data types, Operators and Structures.

Overview – (Evolution of R, Features of R) – R Environment Setup – Basic Syntax of **Basic Data Types** (Vectors, Lists, Matrices, Arrays, Factors and Data Frames) – R Variables (Declaration, Data Type of a Variable, Finding and Deleting a Variable) – **Operators** (Types of Operators, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators) – **Decision Making** (if Statement, if...Else Statement, Switch Statement) - **loops** Repeat Loop , While Loop, For Loop, Control Statement, Break Statement, Next Statement).

Unit – II: Functions, Strings and Vectors

Function – Function Definition – Function Components – Built-in Function – User Defined Function – Calling a Function – Lazy Evaluation of Function – **Strings** – String construction – String Manipulation - **Vectors** –Vector Creation-Accessing Vector Elements – Vector Manipulation - Lists – Creating a List – Naming List Elements – Accessing List Elements – Manipulating List Elements – Merging Lists – Converting List to Vectors.

Unit – III: Matrices, Array, Factors and Data Frames

Matrices – Accessing Elements of a Matrix – Matrix Computations - Arrays – Accessing Array Elements – Manipulating Array Elements- Calculating Across Array Element - and **Factors** – Factors in Data Frame – Changing the order of Levels – Generating **Data Frames** – Packages – Data Reshaping – CSV Files – Excel File – Data Bases.

Unit – IV: Databases and Charts

Data Bases – Connecting R to MySQL – Querying the Table – Updating Rows in the Table – Inserting Data into Table – Creating Tables in MySQL – Dropping Tables - **Pie Charts** – Pie Chart Title and Colors, Slice Percentages and Chart Legend, 3D Pie Chart – Bar Charts – Bar Chart Label, Title Colors, Group Bar chart and Stacked Bar Chart – Boxplots – Creating the Boxplot – Histograms.

Unit – V: Graphs and Statistics

Graphs - Line Graphs – Line Chart Title, Color and Labels, Multiple Lines in a Line Chart– Scatterplots – Creating Scatter Plots – Scatter Plot Matrices - **Statistics** - Mean – Applying Trim and NA options – Median – Mode.

3.

Teaching Resources

Text Book

Unit I, II and III.

1. Norman Matloff. “Art of R Programming: Tour of Statistical Software Design”, Safari books online Publisher, No Starch Press. 2011

Unit IV and V.

2. Robert Gentleman and Ross Ihaka, “R Programming”, Tutorials Point (I) Pvt. Ltd, 2016.

References

1. OzgurErgul. “Guide to Programming and Algorithms using R”. Springer Verlag London 2013.
2. Mark Gardener. “Beginning R: The Statistical Programming Language”. Wrox Publication, 2012
3. Pierre Lafaye de Micheaux _ R’emy Drouilhet Benoit Liquet. “The R Software Fundamentals of Programming”, Springer New York Heidelberg Dordrecht London, 2013.
4. Andrie De Vries and Joris Meys. “R Programming for Dummies”, Wiley India Private Limited; 1st Edition, 2012

Web References

(i) Online Tutorial

1. www.r-tutor.com/
2. <https://www.rstudio.com/online-learning/>
3. <https://CRAN.R-project.org/>
4. <http://www.omegahat.net/>
5. <http://www.rseek.org>
6. <http://www.tutorialspoint.com/r/>

(ii) Online Quiz

1. www.sanfoundry.com/r-programming-quiz/

[SEMESTER VI]

[4-0-0-3:30:70]

ELECTIVE - II: COMPUTER NETWORKS

1. Learning Objectives

- To know the concepts of Networks, Communication Architectures and Physical Medium.
- To understand the concept of Error Detection & Correction Techniques and Flow and Error Control Mechanisms.
- To learn about the Internetworking & its protocols and Routing Principles.
- To explore the Organization of TCP & UDP, Data Traffic, Congestion and its Control Measures, DNS, Remote Logging and E-Mail.

2. Course Outline

Unit – I: Data Communications

Introduction: Data Communications – Networks – Network Models: Layers in the OSI Model – Addressing. Transmission Media: Guided Media – Unguided Media.

Unit – II: Data Link Layer

Error Detection and Correction: Introduction – Block Coding – Linear Block Codes – Cyclic Codes: Cyclic Redundancy check – Checksum. Data Link Control: Framing – Flow and Error Control – Protocols – Noiseless Channels – Noisy Channels.

Unit – III: Network Layer

Internet Protocol: Internetworking – IPv4 – IPv6 – Transition from IPv4 to IPv6 - Delivery, forwarding and Routing: Delivery- Forwarding.

Unit – IV: Transport Layer

Process-to-Process Delivery: User Datagram Protocol – TCP. Quality of service: Data Traffic – Congestion – Congestion Control – Quality of Service.

Unit – V: Application Layer

Domain Name System: Name Space – Domain Name Space – Distribution of Name Space – DNS in the Internet – Resolution – DNS Messages – Types of Records – Registrars – Dynamic Domain Name System – Encapsulation. Remote Logging – Electronic Mail – File Transfer.

3. Teaching Resources

Text Book

1. Behrouz A Forouzan, “Data Communication and Networking”, 4th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi: 2008.

Reference

- a. Andrew S Tanenbaum,” Computer Networks”, 4th Edition, Pearson Education, New Delhi: 2003.

Web Reference

1. http://seat.massey.ac.nz/159334/Lectures/Week6_3_1s.pdf
2. <http://www.technolamp.co.in/2010/08/computer-networks-tanenbaum-powerpoint.html>
3. <https://www.scribd.com/doc/179525183/CS-2363-COMPUTER-NETWORKS-pdf>
4. <http://www.cse.iitk.ac.in/users/dheeraj/cs425/>

[Semester- VI]

[0-0-2-2:40-60]

Practical - VIII: MICROPROCESSOR AND ITS APPLICATIONS

1. 8 and 16 Bit Arithmetic Operation and Logical Operations
2. Finding the Largest Element in an Array.
3. Sum of the numbers in an array
4. Computation of Factorial.
5. Sorting – Two methods
6. Searching - Two methods
7. Code Conversion from BCD to HEX, ASCII to BCD
8. String Manipulation
9. Illustration of loop instruction
10. Demonstration of procedures

[SEMESTER VI]

[0-0-2-2:40:60]

PRACTICAL - IX: WEB DEVELOPMENT USING XML

1. XML Document Structure
2. Rules of XML Structure

3. XML with XSLT/CSS
4. Namespaces in XML
5. Creating XML Schemas
6. XPath
7. XPointer
8. XLink
9. XHTML
10. XFORMS

[SEMESTER VI]

[0-0-2-1:40:60]

PRACTICAL - X: PROGRAMMING WITH R

1. Control Structures.
2. Functions
3. Strings.
4. Vectors
5. Matrices
6. Arrays
7. Data Frames and Factors
8. Charts and Graphs
9. Database
10. Statistical Functions

7. REGULATIONS FOR THEORY COURSES

(i) Evaluation Scheme for Continuous Assessment

| | |
|----------------------------------|----------|
| Two Written Tests | 15 Marks |
| Attendance | 05 Marks |
| Assignment / Moodle Test | 04 Marks |
| Open Book Test / Problem Solving | 02 Marks |
| Other Components | 04 Marks |

Other components may comprise seminars, quiz. At least two components must be considered for a course.

(ii) There is no passing minimum for CA.

8. REGULATIONS FOR PRACTICAL COURSES

Each practical course will have a maximum of 100 marks.

- (i) For a practical course, Continuous Assessment is 40 marks and Semester Examination is 60 marks.
- (ii) The features of every programming language are alone listed in the syllabus, however the students are expected to carry out several exercises in each feature of the programming language.
- (iii) **Continuous Assessment (CA)**
 - a. Attendance : 05 marks.

- b. Performance in the practical session : 10 marks.
- c. CA Test : 15 marks.
- d. Application Development : 10 marks.

b. Performance in the practical session

Every practical session will carry a maximum of 10 marks and it is divided as follows:

- (a) Initial Preparation & Observation : 5 marks.
- (b) Debugging & Execution of Program : 5 marks.

The students must prepare for the practical exercises by writing programs in the observation notebook. The observation notebook should be submitted for evaluation. Marks will be deducted for late as well as incomplete or incorrect submission.

Ten marks will be awarded for each exercise subject to the successful completion of the entire exercise as directed by the staff concerned.

c. CA Test

For each practical paper, only one CA test will be conducted for a maximum of 15 marks.

d. Developing an application

A student has to develop an application in the respective programming language. The student has to construct the application outside the class hours using his own resources. The student has to demonstrate the application in front of the class students at the time fixed by the Practical in-charge.

- a) Application Development - 5 Marks
- b) Presentation - 3 Marks
- c) Viva Voce - 2 Marks

(iv). There is no passing minimum for CA.

(v). Semester Examinations (SE)

The duration of practical examination is three hours. The student should submit a bonafide record of the experiments done at the time of the semester examination. The student shall not be allowed to appear for the semester examination without the bonafide record.

The bonafide record should contain a certificate, program list and source code listing of all the programs with outputs.

Semester Examinations will be conducted for 60 marks and the marks are divided as follows:

- (a) Programming : 50 Marks
- (b) Record : 10 Marks

If a student fails in a semester examinations he/she has to reappear for the next semester practical examination. However the student need to resubmit the record work for evaluation.

9. QUESTION PATTERN FOR THEORY EXAMINATIONS

(i) Question Paper Pattern for Continuous Assessment Tests

Time: 2 Hrs.

Max Marks: 75

The Question Paper shall consist of three sections

Part – A (6 x 3 =18) Answer all Questions.

Part – B (3 x 9 =27) 3 Questions with internal choice (either or type)

Part – C (2 x 15 =30) Answer any two questions out of 3 questions.

(ii) **Question Paper Pattern for External Theory Examinations**

Time: 3 Hrs.

Max Marks: 70

The Question Paper shall consist of three sections

Part - A (10 x 1.5 = 15) Answer all Questions. Two questions from each unit.

Part - B (5 x 5 = 25) 5 Questions with internal choice (either or type). One question from each unit.

Part - C (3 x 10 = 30) Answer any three questions out of 5 questions. One question from each unit.

(iii) **Blue Print of Theory Question Paper for External Theory Examinations**

| Section | Description Type and Choice | Marks | Number of Questions from | | | | | Total Questions in each Section |
|---------------------------|--|---------------------------------|--------------------------|---------|----------|---------|--------|---------------------------------|
| | | | Unit I | Unit II | Unit III | Unit IV | Unit V | |
| A | Short Answer Questions NO CHOICE | Each Question Carries 1.5 Marks | 2 | 2 | 2 | 2 | 2 | 10 |
| B | Medium Answer Questions EITHER OR TYPE | Each Question Carries 5 Marks | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 1 Pair | 5 Pairs |
| C | Long Answer Questions ANY THREE | Each Question Carries 10 Marks | 1 | 1 | 1 | 1 | 1 | 5 |
| Total Number of Questions | | | 4 | 4 | 4 | 4 | 4 | 20 |

10. QUESTION PATTERN FOR PRACTICAL EXAMINATIONS (BOTH FOR THE INTERNAL TEST AND FOR EXTERNAL EXAMINATIONS)

Time: 3 Hrs

Max. Marks: 50+10 (60 for Record)

Each student will get a single question to be answered. The question may have subdivisions. No more than three candidates should get the same question in a batch of 25 students. Hence a question paper in practical should have 9 questions.

Blue Print of Practical Paper (Both for the internal test and for External Examinations)

| Section | Description Type and Choice | Marks | Total Questions in each Section |
|---------------------------|--|--------------------------------|---------------------------------|
| A | Programming Questions EITHER OR TYPE | Each Question Carries 25 Marks | 1 Pair |
| B | Programming Questions EITHER OR TYPE | Each Question Carries 25 Marks | 1 Pair |
| Total Number of Questions | | | 2 Pair |

In section A the programming question will be related to the features mentioned in the list of

exercises from 1 to 5.

In section B the programming question will be related to the features mentioned in the list of exercises from 6 to 10.

PROJECT WORK

Learning Objective

To practice the Systems Development Life Cycle (SDLC) in an application or system domains

I. General Regulations

1. The project work report must be original. Photocopies are not accepted.
2. Plagiarism when detected will necessarily invite zero marks to the candidate.
3. In the course of project development each student must have regular consultation with guide and these consultations must be recorded. The consultation is meant to review the candidate's progress, besides advising the candidate on any project issues. During each consultation the candidate must submit, the intermediate deliverables to the project guide for review. The deliverable will be assessed and marks will be allocated during the final project presentation.
4. Each consultation report must reflect the detailed tasks completed for the period, the problems encountered in the course of the project, how the candidate resolved them and the plan for the next phase.
5. A minimum of five consultations throughout the project is essential to accept the project for the final evaluation.
6. Two copies of the project are to be submitted at the prescribed time announced by the department.
7. A student shall be declared to be passed in the project if s/he secures 40% or above in the semester examination and 40% or above in the aggregate of CA and the semester examination. If the candidate fails, he/she has to improve his/her project and s/he has to resubmit in the following even semester.
8. Viva-voce is compulsory for all candidates. If a candidate is absent for viva voce, his/her absence is treated as absence for the semester examinations.
9. The students who fail in the project work will have to redo the whole project again.
10. Combined projects are not allowed.

II. Evaluation

| | |
|-----------------------------|------------------|
| CA | 20 Marks |
| Semester Examination | 80 Marks |
| Total | 100 Marks |

| CA | | | 20 Marks |
|--------------|---|-----------------|-----------------|
| I | First Review a. Project Proposal 2 Marks b. System Study 2 Marks c. Vision Document 2 Marks d. Use case Specification 2 Marks e. Presentation 2 Marks | 10 Marks | |
| | Second Review a. Design Document 3 Marks b. Implementation 3 Marks c. Testing 2 Marks f. Presentation 2 Marks | 10 Marks | |
| Total | | 20 Marks | |

| Semester Examination | | | 80 Marks |
|-----------------------------|--|-----------------|-----------------|
| 1. | Evaluation of Project Work Report a. Analysis 15 Marks b. Design 15 Marks c. Coding 15 Marks d. Testing 10 Marks e. Organization of Report 05 Marks | 60 Marks | |
| 2. | Viva – Voce a. Presentation 12 Marks b. Question and Answering 08 Marks | 20 Marks | |
| | Total | 80 Marks | |

Scope of the First Review

The students need to submit the project work file to the project guide on the day of first review. The project work file should contain the following documents for first review:

- Project proposal (Aim, Objectives, Problem Statement, Proposed Solution, Technical Requirements)
- System Study (List of Modules and Activities, Module Description, ER diagram, DFD diagram)
- Vision Document (Features of the software project)
- Use case Specification (Use Cases)

The student should prepare a Power Point Presentation for 10 minutes and present it in the class.

Scope of the Second Review

The students need to submit the project work file to the project guide on the day of second review. The project work file should contain the following documents for second review:

- Project proposal (Aim, Objectives, Problem Statement, Proposed Solution, Technical Requirements)
- System Study (List of Modules and Activities, Module Description, ER diagram, DFD diagram)
- Vision Document (Features of the software project)
- Use case Specification (Use Cases)
- Design Documents
- Implementation Documents
- Testing Documents

The student should prepare a Power Point Presentation for 10 minutes and present it in the class.

Evaluation of the Project Work Report

| Analysis | 15 |
|---|-----------|
| Software requirements specification documents (SRS) Indicator: SRS with proper structure based on software engineering concepts | 6 |
| Entity Relationship diagram (ER Diagram) for Database related projects Indicators: Proper symbols of attributes, entities and relationships Relationship of ER diagram to SRS OR Class diagrams for projects which do not use any DBMS but developed in an Object Oriented Programming Language | |

| | |
|---|---|
| Indicator: Class diagrams indicating hierarchies OR For projects which neither use any DBMS nor any object oriented programming language but used a procedural language Indicators: System should be modular Each module should control the functions of appropriate number of subordinate modules at the next level Modules should be independent Each module should perform one function Each module should be of reasonable size | 6 |
| Data Flow Diagram (DFD) Requirements: All the flow should be leveled and should have proper input and output Relationship of data flow to dictionary | 3 |

| | |
|--|-----------|
| Design | 15 |
| Program Structure Requirement: It should have the proper modularization of software and the specification of each module | 5 |
| Procedural Design Requirement: Explain using Flowchart/ Pseudo code | 5 |
| User Interface Design Requirement: Consistency of interface and naming convention | 5 |

| | |
|--|-----------|
| Coding | 15 |
| Comments and description Requirement: Should have comments with functional description – input, output, total function calls to/from other functions | 5 |
| Standardization of coding Requirements: Naming convention of variables and functions Use of data structure and style | 5 |
| Error Handling Requirements: Explain the exceptions handling Explain the conditional checking | 5 |

| | |
|--|-----------|
| Testing | 10 |
| Test case design Requirements: Unit Testing Integration Testing System Testing | 5 |
| Test Reports Requirements: Unit Testing Integration Testing System Testing | 5 |

| | |
|--|----------|
| Organization of report | 5 |
| Contents page and page numbering | 2 |
| Organization of content, proper printout of text and images | 3 |

Project Plan

| Project area | Work products |
|----------------------|---|
| Project Management | Project Proposal |
| | Project Plan |
| | Project Review Record -1 |
| Requirement analysis | System Study (SSD) |
| | Vision Document (VSD) |
| | Use Case Specification |
| | Project Review Record – 2 |
| Design | Design Document |
| | Architectural Design |
| | Database Design |
| | Interface Design |
| | Procedural Design |
| | Test Case Design |
| | Project Review Record -3 |
| First Review | Draft Report (Combination of all the above work products) |
| | PPT for project presentation |
| | Project Presentation |
| Implementation | Overview of the Project |
| | Pseudo Code (Algorithms) |
| | Project Review Record – 4 |
| Test | Test Case Document |
| | Unit Testing |
| | Integration Testing |
| | System Testing |
| | Project Review Record – 5 |
| Second Review | Draft Copy of the Project Report |
| | PPT for Project Presentation |
| | Project Presentation |
| | Application Demo |

Signature: _____
 Guide Name:
 Date:

Signature: _____
 Proposer Name:
 Date:

12. DETAILED SYLLABI AND REGULATIONS FOR SELF-STUDY COURSES

A course designed to acquire a special or advanced knowledge, and a candidate studies such a course on his/her own with an advisory support of a teacher is called a self-study course. This is to promote them do additional learning and get additional credit for it. The department will offer self-study courses in the V and VI semesters.

| S.No | Semester | Subject Title | Credit |
|------|----------|---------------------------|--------|
| 1 | V | Industrial Plant Training | 1 |
| 2 | VI | Quantitative Aptitude | 1 |

A student can opt for a course if he/she would like to obtain additional credits other than the mandatory credits. There will not be any formal classes conducted for these courses. The

students have to study themselves and carry on with the learning process and attend the evaluation fixed by the department. When the student passes the course evaluation the name of the course and its credits will be forwarded to COE and hence will be recorded in the semester mark sheet.

The Faculty member approved by the Head of the Department shall be responsible for periodic monitoring and evaluation of the course.

[SEMESTER V]

[0-0-0-1:100:0]

INDUSTRIAL PLANT TRAINING (IPT)

Regulations

1. Students need to undergo an industrial training during the summer vacation after the completion of the second year.
2. The duration of the training programme can be four weeks, ie 30 working days, either continuously or in 2 spells of 15 working days.
3. Requisition for a bonafide certificate can be arranged through a coordinator designated by the department for the IPT course.
4. On applying for industrial training the student has to submit Review Forms along with industrial training Acceptance letter from the respective company to the dept industrial training Coordinator.
5. On completion of the training the student has to submit a report at the time fixed by the department.
6. The report will be evaluated by a Committee of two internal faculty members.
7. The student has to make an oral presentation for about 30 minutes including question and answer session.
8. There is no external examination.

Evaluation

| | | |
|------------------------------|---|-----------|
| Evaluation of the IPT Report | - | 80 Marks |
| Viva-Voce | - | 20 Marks |
| Total | - | 100 Marks |

[SEMESTER VI]

[0-0-0-1:100:0]

QUANTITATIVE APTITUDE

1. Course Outline

Unit - I:

Averages – Problems on numbers – Problems on Ages – Percentages – Profit and Loss.

Unit - II:

Ratio and Proportion – Partnership – Time and Work – Pipes and Distances – Time and distance

Unit - III:

Problems on Trains – Boats and Streams – Allegation – Simple Interest – Compound Interest

Unit - IV:

Calendar – Clocks – Permutation – Combination – Probability

Unit - V:

Direction sense test – Mathematical Operations – Logic – Problems on cubes – Problems on dice

2. Teaching Resources

Text Book

1. R. S. Aggarwal, "Quantitative Aptitude for Competitive Examinations", 7th Revised Edition, S.Chand and Co. Ltd, New Delhi, 2005
2. R. S. Aggarwal, "Verbal and Non Verbal Resanoning", S.Chand and Co. Ltd, New Delhi.

Reference

1. Barron's Guide for GMAT, Galgotia Publications, New Delhi, 2006

Web References

1. <http://www.careerbless.com/aptitude/qa/home.php>
2. <http://www.indiabix.com/aptitude/questions-and-answers/>
3. <http://www.careersvalley.com/solved-placement-papers/company/wipro>
4. <http://www.indiabix.com/placement-papers/tcs/2608>
5. <http://www.careersvalley.com/tcs-solved-papers-quantitative-aptitude-i>

Evaluation

| | |
|----------------------------------|------------------|
| Online Objective Type CA test 1 | 20 Marks |
| Online Objective Type CA test 2 | 20 Marks |
| Problem Solving | 20 Marks |
| Online Objective Type Final Test | 40 Marks |
| Total | 100 Marks |

13. DETAILED SYLLABI AND REGULATIONS FOR CERTIFICATE COURSES

Certificate courses are to be conducted either by faculty members or by external resource persons with 30 hours of class, outside working hours, with due payment collected from students for remuneration to teaching members. Lab fee, if any, has to be collected separately. Amount to be collected, depends on the strength of participants. The course fees will be decided by the department and published to the prospective students.

The department will offer certificate courses in I, II, III and IV semesters.

| S.NO. | Semester | Subject Title | Hrs. | Credits |
|-------|----------|--------------------------------|------|---------|
| 1 | I | Java Script | 30 | 2 |
| 2 | II | Windows Application using .NET | 30 | 2 |
| 3 | III | Python Programming | 30 | 2 |
| 4 | IV | Content Management System | 30 | 2 |

A student can opt for a course if he/she would like to obtain additional credits other than the mandatory credits. The student has to attend classes with 75% of minimum attendance and complete the requirements for the course as fixed by the respective course teacher. When a student completes the requirements of course with 75% of minimum attendance the name of the course and its credits will be forwarded to COE and hence will be recorded in the semester mark sheet of the student.

Students of Computer Science (UG) can opt for certificate courses offered by the department of Computer Applications (UG) and vice versa.

1. Learning Objectives

- Understanding of the basics of Javascript.
- Understanding java script arrays and objects.
- Understanding java script with HTML forms.
- Understanding of the basics of JQuery.
- Understanding of the basics of AJAX.

2. Course Outline**Unit - I: JavaScript and HTML Document**

JavaScript: A Language for All - The Right Tool for the Right Job - The Software Tools - Setting Up Your Authoring Environment - Validate, Validate, Validate - Creating Your First Script - Combining JavaScript with HTML - Designing for Compatibility -Language Essentials for Experienced Programmers - What Your First Script Will Do - Entering Your First Script - Connecting Scripts to Documents -JavaScript Statements -When Script Statements Execute -Viewing Script Errors -Scripting versus Programming .

Unit - II: Variable, Data type and control structure

Variables -Expressions and Evaluation -Data Type Conversions -Operators -Decisions and Loops -Control Structures Repeat Loops -Functions -Curly Braces -Arrays -Top-Level Objects -The window Object -window Properties and -Methods -The location Object -The navigator Object -The document Object.

Unit - III: Forms and Form Elements

The Form object -Form Controls as Objects -Passing Elements to Functions with this - Submitting and Pre validating Forms - Core Language Objects -String Objects -The Math Object - The Date Object - The Object Model Hierarchy -How Document Objects Are Born - Object Properties -Object Methods -Object Event Handlers -Object Model Smorgasbord - Basic Object Model -Basic Object Model Plus Images

Unit - IV: JQuery

Overview – Basics – selectors – attributes – traversing – CSS- DOM – event – effects.

Unit - V: AJAX

Basics – technologies – browser support – action – XML HTTP request – Database operation – security.

3. Teaching Resources**Text Book**

1. Danny Goodman, Michael Morrison, Paul Novitski, Tia Gustaff Rayl, “Java Script Bible”, Seventh Edition, 2010

Web References**(i) Online Tutorial**

1. www.w3schools.com/jquery
2. www.tutorialspoint.com/jquery/
3. www.w3schools.com/xml/ajax_intro.as
4. www.tutorialspoint.com/ajax/

1. Learning Objectives

- To understand the basics of C# language.
- To program using Object Oriented Concepts in C#.
- To create and use user controls in a Windows Forms application.
- To code in Windows Presentation Foundation.
- To bind Windows Forms applications to various data sources by using Microsoft ADO.NET.

2. Course Outline

Unit – I: Introduction to C#

Introduction to .NET – Features of C# - Data Types – Value Types – Reference Types Variables and Constants – Declaring – Assigning values – variables of nullable types – Operators Type Conversions – Implicit and Explicit Type Conversions – Arrays – Single Dimensional and Multidimensional – Control Flow Statements – Selection – Iteration and Jump.

Unit – II: Object- Oriented Programming

Classes and Objects –Access Modifiers – Defining a Class – Variables – Properties andMethods – Creating Objects –Constructor and Destructors – Partial Classes – Static Classes – ExtensionMethods Inheritance –Defining a Derived Class – Accessing Members of a BaseClass – Abstract Classes Sealed Classes –Interfaces – Defining Interfaces – Implementation –Inheritance Polymorphism Compile Time –Run Time.

Unit – III: Windows Forms

Form Class – Common Operations on Forms- Creating a Message Box - Handling Events Mouse Events – Keyboard Events – Common Controls in Windows Forms Label –Tex Box – Button – Combo Box – List Box – Check Box – Combo Box – Group Box – Panel – Picture Box – Timer - Progress Bar Timer.

Unit – IV: Menus, Controls and Events

Menus – FolderBrowserDialog Control – OpenFileDialog Control – SaveFileDialog Control- FontDialog Control – ColorDialog Control – PrintDocument Control – PrintDialog Control – TreeView Control - Mouse Events – Keyboard Events.

Unit – V: Accessing Data using ADO.NET

Basic SQL Statements – Working with ADO.NET – Overview of ADO.NET objects – DataGridView Control – Creating a New Data Connection – Accessing Data using Data Adapters and Datasets – Creating a Dataset – Displaying Data in DataGridView – Viewing Data from Data Adapters – Connecting to an MS Jet Database.

3. Teaching Resources

Text Book

1. Vikas Gupta, “Comdex .NET Programming”, Dream Tech Press, New Delhi, 2010.

Unit – I : Ch. 1

Unit – II : Ch. 2

Unit – III : Ch. 4-6

Unit – IV : Ch. 7-8

Unit – V : Ch. 9

References

1. Kongent Solutions, “C# 2008 Programming Black Book”, Dream Tech Press, New Delhi, 2009.
2. Microsoft, “ADO .Net Step by Step”, Prentice Hall of India Private Limited, New Delhi, 2005.

Web References

(i) Online Tutorial

1. <https://www.tutorialspoint.com/csharp/>
2. <http://csharp.net-tutorials.com/>

(ii) Online Quiz

1. http://www.tutorialspoint.com/csharp/csharp_online_quiz.htm
2. <http://www.withoutbook.com/OnlineTestStart.php?quizId=71>

(iii) Online Compiler

1. <http://rextester.com/>
2. <https://www.tutorialspoint.com>

PYTHON PROGRAMMING

1. Learning Objectives

To learn program and programming paradigms brought in by Python with a focus on File Handling and Regular Expressions.

2. Course Outline

Unit - I: Introduction and overview

Introduction, What is Python, Origin, Comparison, Comments, Operators, Variables and Assignment, Numbers, Strings, Lists and Tuples, Dictionaries, if Statement, while Loop, for Loop and the range() Built-in Function, Files and the open()-Built-in Function, Errors and Exceptions, Functions, Classes, Modules Syntax and Style Statements and Syntax, Variable Assignment, Identifiers, Basic Style Guidelines, Memory Management, Python Application Examples

Unit - II: Python Objects, Numbers and Strings

Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types. Numbers and Strings. Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions. Sequences: Strings, Lists, and Tuples, Sequences, Strings, Strings and Operators, String-only Operators, Built-in Functions, String Built-in Methods, Special Features of Strings

Unit - III: Lists and Conditional Loops

Operators, Built-in Functions, List Type Built-in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples. Dictionaries : Introduction to Dictionaries, Operators, Built-in Functions, Built-in Methods, Dictionary Keys, Conditionals and Loops: if statement, else Statement, elif Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement, else Statement

Unit - IV: Files and Input/Output

File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules Regular Expressions Introduction/Motivation, Special Symbols and Characters for REs, REs and Python.

Unit - V: Errors and Exceptions

What Are Exceptions? Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions. Programming Exercise: Check for data error in CSV files: Numeric Check, Alphanumeric Check, Email Check, and Date Check.

3. Teaching Resources

Text Book

1. Chun, J Wesley, “Core Python Programming”, Third Edition, Pearson, 2012

References

1. Barry, Paul, “Head First Python”, 2nd Edition, O Rielly, 2010
2. Lutz, Mark, “Learning Python”, 4th Edition, O Rielly, 2009

Web Reference

1. www.learnpython.org/
2. <https://www.codecademy.com/learn/python>
3. www.python.org

CONTENT MANAGEMENT SYSTEM

1. Learning Objectives

- To understand the page structure of WordPress.
- To work with templates in Joomla.
- To create static web pages in Drupal.

2. Course Outline

Unit – I: Basics of WordPress

Understanding and Using domain names - WordPress Hosting Options - Installing WordPress on a Dedicated Server - Understanding Directory Permissions - Understanding the WordPress Dashboard Pages, Tags, Media and Content Administration - Core WordPress Settings - Finding and Installing Plugins Quickly and Easily - Upgrading WordPress Plugins - Recommended WordPress Plugins.

Unit – II: Working with WordPress

Understanding the Structure of WordPress Themes - Finding Themes and Choosing the Right One - Installing and Configuring Themes - Editing and Customizing Themes - Understanding Posts Versus Pages - Organizing Posts with Categories - Managing Lists of Links - WordPress Editors - Image Editor - Adding Video and Audio Media to a WordPress Site - WordPress as a Blog vs. WordPress as a Website - Converting a Website to WordPress.

Unit – III: Introduction to Joomla

Introduction to Joomla - Installation of Joomla - Introduction to templates in Joomla - Installation of predefined Templates - Creation custom template from html - Introduction to Modules - Installation of predefined Modules - Creation of custom modules - Introduction to Components - Installation of predefined Components - Creation of custom components.

Unit – IV: Joomla Plugins

Introduction to Plugins - Installation of predefined plugins - Creation of custom plugins -Configuring the Joomla site in live environment - Explanation of Joomla constants - Explanation of Database commands in Joomla.

Unit – V:Drupal Basics

Drupal terminology: Modules - Themes - Nodes - Blocks - Drupal Workflow: Bootstrap - Hooks and Callbacks - Installing Drupal - The Admin Interface - Creating Content - Managing Content - Site Building - Site Configuration - User Management – Roles - Permissions - Creating User Accounts - Reports - Layouts in Drupal.

3. Teaching Resources

1. www.tutorialspoint.com/wordpress
2. www.tutorialspoint.com/joomla
3. www.tutorialspoint.com/drupal

14. SYLLABI FOR NON-MAJOR ELECTIVE COURSES

Non Major Elective Courses

| Sem | Part | Subject Title | Hrs. | Credits |
|-----|------|---|------|---------|
| V | III | Non Major Elective I: Internet Fundamentals | 2 | 1 |
| V | III | Non Major Elective II: Web Design | 2 | 1 |
| | | | 4 | 2 |

[SEMESTER V]

[2-0-0-1:30:70]

NON-MAJOR ELECTIVE - I: INTERNET FUNDAMENTALS

1. Learning Objectives

- To understand the fundamentals of Internet, its Services, Capabilities and Activities.
- To know the Methods of Internet Connectivity and its Internals.
- To learn about the working of Internet Protocols and Internet Addressing.
- To explore the basics and uses of E-Mail and various Search Engines.

2. Course Outline

Unit - I: Internet Fundamentals

Internet Concepts: Internet Services - Specialties about Internet - capabilities of Internet. Working style of Internet. TCP/IP - URLs and Domain Names - Internet Service Provider.

Unit - II: Getting Connected

Internet Access: Dial-up Connection - Direct Connection. Modems: Transfer speeds - External Modems Vs Internal Modems- Speed, Error Correction and Data Compression Standards.

Unit - III: Internet Internals

Internal Protocols: TCP/IP – FTP – HTTP - WAIS. Internet Addressing: IP Address - Domain Name - E-Mail Address - URL.

Unit - IV: E-Mail

E-mail basics: Use of Email - Privacy of E-Mail - Working of E-mail-Getting Started: Composing/Sending an Email Message - Address Book – Signature - File Attachment Facility - Setting Priority - Customizing your Mail Program – Replying and Forwarding E-Mail Messages. E-Mail Ethics: Netiquettes - E –Mail advantages and disadvantages.

Unit - V: Searching the Web

Web Search Basics: Web Index – Search Engines - Meta Search Engines-Making your Search. Choosing the right search tool and strategy: Simple and Advanced Searches - Search Functions - Tips and Techniques for web Searching - General Search tips.

3. Teaching Resources

Text Book

1. Alexis Leon and Mathews Leon. "Internet in a Nut Shell". New Delhi: UBS Publishers' Distributors Ltd., 1998

Unit - I : Ch.1, 2 & 3.

Unit - II : Ch.6, 7.

Unit - III : Ch.11& 14.

Unit - IV : Ch.15, 16 & 18.

Unit - V : Ch.33 & 34.

Reference

1. Christian Crumlish, "The Internet – No experience required", 1st Edition. BPB Publications, 1999.

Web References

(i) Online Tutorial

1. <http://www.c4learn.com/>
2. <http://www.gcflernfree.org/internet>.

[SEMESTER VI]

[2-0-0-1:30:70]

NON-MAJOR ELECTIVE - II: WEB DESIGN

1. Learning Objectives

- To understand the basics of HTML
- To understand the ways of formatting a HTML page.
- To understand usage of images, links and list in a HTML page.
- To understand the usage of tables and frames in a HTML page.
- To understand the usage of Forms in a HTML page.

2. Course Outline

Unit - I: HTML Basics

HTML Introduction – Web page: Static & Dynamic Page - Web Browsers - HTML Versions - HTML Tags – HTML Elements – HTML Attributes - HTML Editors - HTML Page Structure - HTML Basic tags: Head – Title – Body - Background - Heading tags – Paragraph tag – HR tag - Line break.

Unit - II: Formatting Tags

Presentational Element: Bold – Italic – Underline – Subscripted – Superscripted – Strike through - Emphasized – Strong – Inserted – Deleted – Phrase Elements: Abbreviation – Acronyms - Text Direction - Block quoted - Short quotation – citation – definition - Computer output tags: computer code – keyboard – variable – preformatted

Unit - III: Image, Links & List

HTML Images - Src Attribute - Dynsrc Attribute - Alt Attribute - Setting Height and Width of an Image – Map - Area - HTML Links – Hyperlinks – Hyperlinks Syntax - The target attribute – creating image as a link – HTML List: Ordered List – Unordered List – Definition List.

Unit - IV: Table and Frames

HTML Tables: Table attributes (Cell spacing, Cell Padding, Border, Width, Height) - Table Headers – Table Row – Define Table - Caption – Rows span – Cols span – Frames : The Frameset, No Frame Element - Creating Link between Frames -Nested Frameset.

Unit - V: Forms

HTML Form: Text Fields - Password Field - Radio Buttons – Checkboxes - Submit Button – Reset Button – Button – Select – option – text area.

3. Teaching Resources

Text Book

1. Jon Ducktt. “Web Programming with HTML, CSS & Java script”. Wiley Publishing, 2005.
Unit – I : Ch. 1.1, 1.3, 1.4
Unit – II : Ch. 1.5-1.7
Unit – III : Ch. 1.8, 2.1-2.3
Unit – IV : Ch. 6.1-6.3
Unit – V : Ch. 5.1-5.3

References

1. Joel Sklar, “Principles of Web Design”, Singapore: Thomson Asia Pvt Ltd, 2000.
2. Powell, Thomas A., “Web Design – The Complete Reference”, Tata McGraw Hill Edition, 2000.

Web References

(i) Online Tutorial

1. http://www.w3schools.com/html/html_basic.asp

(ii) Online Quiz

1. <http://www.pskills.org/html.jsp>

(iii) Online Compiler

1. www.onlinehtmleditor.net

15. SYLLABI OF ALLIED COURSES

Allied Courses for BBA

| Sem | Part | Subject Title | Hrs. | Credits |
|-----|------|---|------|---------|
| V | III | Allied I: Computer Applications for Management Studies | 4 | 3 |
| V | III | Allied I: Practical I: Computer Applications for Management Studies | 2 | 2 |
| VI | III | Allied II: E-commerce and its Applications | 4 | 3 |
| VI | III | Allied II: Practical II : E-commerce and its Applications | 2 | 2 |
| | | | 12 | 10 |

ALLIED I: COMPUTER APPLICATIONS FOR MANAGEMENT STUDIES

1. Learning Objectives

Upon completion of this course, students should be able to:

- Understand the basics of Office Software
- Understand the operations of Word Processor, Spreadsheet, Presentation, Outlook and Access.

2. Course Outline**Unit – I: Introducing Office Software & Word Processor**

Getting to know office: Starting – Introducing – Quick Access – Ribbon – Customize – Exit – Adding Data – Selecting Data – Editing Text – Deleting – Cut, Copy, Paste – Dragging – Undo – Redo – Sharing – Adding Pictures – Manipulating – Enhancing – Browsing Help – Searching – Making the Help window Easier to read – Typing Text in Word – Formatting Text – Designing your pages.

Unit – II: Spread Sheet

Understanding Spreadsheets – Sorting – Formatting – Navigating – Searching – Editing – Clearing Data – Printing – Creating a formula – Using functions – Editing – Conditional Formatting – Data Validation – Goal Seeking – Creating Multiple scenarios – Auditing your formulas – Checking errors – Understanding parts of chart – Creating – Editing – Chart Tools – Spark lines – Organizing Lists in Pivot Tables.

Unit – III: Presentation

Defining purpose – Creation – Working with Text – Applying a Theme – Changing Background – Adding Graphics – Adding Movies – Adding sound – Spell Checking – Organizing slides – Adding Visual Transitions – Adding Hyperlinks – Viewing a Presentation – Creating a Handouts.

Unit – IV: Getting Organized with Outlook

Managing E-mail with Outlook: Configuring E-mail Settings – Creating E-mail – Attaching Files – Reading and Organizing E-mail – Deleting – Setting Appointments – Storing Names and Addresses – Managing Tasks.

Unit – V: Storing Stuff in Access

Using a Database – Designing – Editing and Modifying – Typing Data – Closing and Saving – Searching– Sorting – Querying – Using the Report Wizard – Manipulating the Data in a Report – Editing – Making Reports – Deleting a Report.

3. Teaching Resources**Text Book**

1. Gurty Leete, Ellen Finkelstein Mary Leete, “openoffice.org for Dummies”, Wiley Publishing, Inc.

References

1. Wallace Wang, “Microsoft Office 2010 for Dummies”, Willey India Pvt Ltd, New Delhi, 2010.
2. Gorden Padwick, Sue Plumley, Debbie Walkowski, “Micro Office Quick Start”, Prentice Hall of India Private Ltd.
3. http://www.openoffice.org/documentation/conceptualguide/conceptual_guide_OOo_3_ebook.pdf.

Web References

(i) Online Tutorial

1. <https://www.openoffice.org/>
2. <https://en.wikipedia.org/wiki/OpenOffice.org>
3. www.tutorialsforopenoffice.org/

(ii) Online Quiz

1. www.eduzip.com/computer-science/ms-word-quiz.html
2. www.openoffice.blogs.com/openoffice/2008/05/template-for-je.html
3. www.openoffice.blogs.com/openoffice/2006/08/times_tables_qu.html

[SEMESTER V]

[0-0-2-2:40:60]

ALLIED I - PRACTICAL I: COMPUTER APPLICATIONS FOR MANAGEMENT STUDIES

1. Creating a word document with formatting features.
2. Designing the Document.
3. Creating a spread sheet with formatting features and Charts.
4. Working with Formulas.
5. Creating Slides.
6. Creation Slides with Multimedia Presentation.
7. Creating Email Setting using Outlook.
8. Managing tasks in Outlook.
9. Creating Tables and Queries.
10. Generating Report in Access.

[SEMESTER VI]

[3-1-0-3:30-70]

ALLIED II: E-COMMERCE AND ITS APPLICATIONS

1. Learning Objectives

Upon completion of this course, students should be able:

- To understand the complexity of E-commerce and its many facets.
- To explore how e-business and E-commerce fit together.
- To identify the impact of E-commerce and to recognize the benefits and limitations of E-commerce.
- To use classification frameworks for analyzing E-commerce.
- To understand the basics of HTML

2. Course Outline

Unit - I: History E –Business Models for E-Commerce

Introduction – Emergence of the Internet – World Wide Web – Advantages of E-Commerce – Disadvantages of E-Commerce – E-business Models Based on the Relationship of Transaction Parties – Business to Consumer – Business to Business – Consumer to Consumer – Consumer to Business – E-Business Models based on the Relationship of Transaction Types.

Unit - II: E-Marketing

Traditional Marketing – Identifying web presence goals – Achieving Web Presence Goals – The Uniqueness of the Web – Meeting the Needs of Website Visitors – E- Marketing Value Chain - The browsing behavior model – Online marketing – Online Payments by Buyers – Advantages of Online Marketing – E-Advertising Various Means of Advertising – E-branding One to one Marketing – Market Segmentation – Data Mining and Marketing Research – Measuring the Effectiveness of advertising. – Marketing strategies.

Unit - III: E-Security

Information System Security – Security on the internet – Network and Website Security – E-Business Risk management issues – The Firewall Concept – Components – Benefits – Enterprise - wide Security Frameworks– Information Security Environment in India – Security Environment in India.

Unit - IV: E-Payment Systems

Digital Payment Requirements – Digital Token based E-Payment Systems - Benefits to Buyers and Sellers – Credit Card as Payment Systems – The Mobile Payments – Classification of New Payment System – Smart Card and Micropayment Systems – Properties of Electronic Cash – Cheque Payment System – Electronic Cheque – Risk and E-Payment Systems – Data Protection – Managing Information privacy and Credit Risks – Designing E-Payment Systems – Cryptography – Encryption Techniques – A matter Of Keys – Search – Private and Public Key – Digital Signature.

Unit - V: Introducing HTML

Creating Structured Documents – Links and Navigation – Images – Basic Table Elements and Attributes – Forms – Form Controls – Frames.

3. Teaching Resources

Text Book

1. P. T. Joseph, “E-Commerce – An Indian Perspective”, Third Edition, PHI Learning Pvt Ltd, New Delhi, 2009.

Unit – I : **Ch. 1 & 2**

Unit – II : **Ch. 4**

Unit – III : **Ch. 5**

Unit - IV : **Ch. 6**

2. Jon Ducktt, “Web Programming with HTML, CSS & Java script”, Wiley Publishing, New Delhi 2013.

Unit - V : **Ch. 1, 2, 3, 4, 5, 6**

References

1. R. Kalakota and A. B. Whinston, “Readings in Electronic Commerce”, Addison Wesley, 1997.
2. David Kosiur, “Understanding Electronic Commerce”, Microsoft Press, 1997.
3. Joel Sklar, “Principles of Web Design”, Singapore: Thomson Asia Pvt. Ltd, 2000
Powell, Thomas A., “Web Design – The Complete Reference”, Tata McGraw Hill Edition, 2000.

Web References

(i) Online Tutorial

1. https://www.tutorialspoint.com/e_commerce
2. <https://ecommerceguide.com/guides/>
3. <https://ecommerceguide.com/guides/>
4. http://www.w3schools.com/html/html_intro.asp

(ii) Online Quiz

1. www.proprofs.com
2. <https://www.classmarker.com/online-test/>
3. <http://www.pskills.org/html.jsp>

(iii) Online Compiler

1. https://www.tutorialspoint.com/try_html_online.php
2. <https://html-online.com/editor/>

[SEMESTER VI]**[0-0-2-2:40:60]****ALLIED II - PRACTICAL: E-COMMERCE AND ITS APPLICATIONS**

1. Structure of HTML
2. Heading Tags.
3. To Change the Background of a Web Layout
4. Text Formatting and Marquee Tag
5. Images
6. List Tags
7. Hyperlinks
8. Tables
9. Forms
10. Frames

**Department of Biochemistry (UG)
(Effect from 2017-18 Onwards)**

| Sem | Code | Title of the Subject | Contact Hrs | Credit | E-Hrs | CA | SE | Total |
|-----------|--------------|-----------------------|-------------|--------------|-------|----|----|-------|
| | LT 1 | Tamil | 5 | 3 | - | - | - | - |
| I | LE 1 | General English | 5 | 3 | - | - | - | - |
| | CE | Communicative English | | 1* | | | | |
| | MC 1 | Cell Biology | 3 | 3 | 3 | 30 | 70 | 100 |
| | MC 2 | Biomolecules | 4 | 4 | 3 | 30 | 70 | 100 |
| | CP1 | Main Practical - I | 3 | 3 | 3 | 40 | 60 | 100 |
| | AR | Allied Chemistry - I | 6 | 4 | - | - | - | - |
| | FC | Personal Skill | 2 | 1 | - | - | - | - |
| | RE/ET | Religion / Ethics | 2 | 1 | - | - | - | - |
| | Total | | 30 | 22+1* | - | - | - | - |
| II | LT 2 | Tamil | 5 | 3 | 3 | 30 | 70 | 100 |
| | LE 2 | General English | 5 | 3 | 3 | 30 | 70 | 100 |
| | CE | Communicative English | | 1* | | | | |
| | MC 3 | Plant Physiology | 3 | 3 | 3 | 30 | 70 | 100 |
| | MC 4 | Human Physiology | 4 | 4 | 3 | 30 | 70 | 100 |
| | CP 2 | Main Practical - II | 3 | 3 | 3 | 40 | 60 | 100 |
| | AR | Allied Chemistry - II | 6 | 4 | - | - | - | - |
| | FC | Social Skill | 2 | 1 | - | - | - | - |
| | RE/ET | Religion / Ethics | 2 | 1 | - | - | - | - |
| | Total | | 30 | 22+1* | - | - | - | - |

| Sem | Code | Title of the Subject | Contact Hrs | Credit | E-Hrs | CA | SE | Total |
|-----|----------------------------|---|-------------|----------------|-------|----|----|-------|
| III | LT 3 | Tamil | 5 | 3 | 3 | 30 | 70 | 100 |
| | LE 3 | General English | 5 | 3 | 3 | 30 | 70 | 100 |
| | MC 5 | Microbiology | 3 | 3 | 3 | 30 | 70 | 100 |
| | MC 6 | Biophysical Chemistry | 4 | 4 | 3 | 30 | 70 | 100 |
| | CP 3 | Main Practical - III | 3 | 3 | 3 | 40 | 60 | 100 |
| | Allied | Biostatistics | 6 | 4 | - | - | - | - |
| | FC | Employability Skill - I | 2 | 1 | - | - | - | - |
| | | Human Rights | 2 | 1 | - | - | - | - |
| | | DEEDS | - | - | - | - | - | - |
| | SHELTERS | - | - | - | - | - | - | |
| | Total | | 30 | 22 | - | - | - | - |
| IV | LT 4 | Tamil | 5 | 3 | 3 | 30 | 70 | 100 |
| | LE 4 | General English | 5 | 3 | 3 | 30 | 70 | 100 |
| | MC 7 | Applied Microbiology | 3 | 3 | 3 | 30 | 70 | 100 |
| | MC 8 | Analytical Biochemistry | 4 | 4 | 3 | 30 | 70 | 100 |
| | CP 4 | Main Practical - IV | 3 | 3 | 3 | 40 | 60 | 100 |
| | Allied | Biostatistics | 6 | 4 | 3 | 30 | 70 | 100 |
| | FC | Employability Skill - II | 2 | 1 | - | - | - | - |
| | | EVS | 2 | 1 | 3 | 30 | 70 | 100 |
| | | DEEDS | - | 2 | - | - | - | - |
| | SHELTERS | - | 2 | - | - | - | - | |
| | Summer Lab Training | | | 2* | - | - | - | - |
| | Total | | 30 | 26+2* | | | | |
| V | MC 9 | Enzymology | 4 | 4 | 3 | 30 | 70 | 100 |
| | MC 10 | Intermediary metabolism | 5 | 5 | 3 | 30 | 70 | 100 |
| | MC 11 | Endocrinology | 4 | 4 | 3 | 40 | 60 | 100 |
| | MC 12 | Genetics | 4 | 4 | 3 | 30 | 70 | 100 |
| | CP 5 | Main Practical - V | 5 | 4 | 6 | 40 | 60 | 100 |
| | ME | 1. Biomedical Instrumentation 2. Medical laboratory technique 3. Pharmacology (one out of three) | 6 | 4 | 3 | 30 | 70 | 100 |
| | SSP | Health Management | - | 1* | - | - | - | - |
| | NME | NME –Energy Builders | 2 | 1 | 3 | 30 | 70 | 100 |
| | Total | | 30 | 26 + 1* | - | - | - | - |

| Sem | Code | Title of the Subject | Contact Hrs | Credit | E-Hrs | CA | SE | Total |
|-----|--------------|--|-------------|----------------|-------|----|----|-------|
| VI | MC 13 | Molecular Biology | 5 | 5 | 3 | 30 | 70 | 100 |
| | MC 14 | Immunology | 4 | 4 | 3 | 30 | 70 | 100 |
| | MC 15 | Medical Biochemistry | 4 | 4 | 3 | 30 | 70 | 100 |
| | CP 6 | Main practical VI | 5 | 4 | 6 | 40 | 60 | 100 |
| | SS 1 | Biotechnology | 5 | 5 | 3 | 30 | 70 | 100 |
| | SS2 | Bioethics | 5 | 5 | 3 | 30 | 70 | 100 |
| | SSP | Nutritional Biochemistry | - | 1* | - | - | - | - |
| | NME | NME – Health Care and Disease Management | 2 | 1 | 3 | 30 | 70 | 100 |
| | TOTAL | | 30 | 28 + 1* | - | - | - | - |

Total Hours = 180 Hours

Total Credits = 148 + 2* (SSP) + 2* (Lab training)+ 2* from other department certificate courses

Objective:

Semester – V
Enzymology

4 Hours / 4 Credits

Objective:

- To understand the role of enzymes in biochemical reactions and its applications

Unit – I: Define - Chemical nature - General characterization, Nomenclature and IUBMB system of enzyme classification and specificity, enzyme units (IU, Katal, turnover number and specific activity). Metalloenzymes and metal activated enzymes. Multi-enzyme systems – PDH and FAS. Non-protein enzymes, Cofactor, Coenzymes, prosthetic group, apoenzyme and holoenzyme.

Unit – II: Active site – General characteristics; Mechanism of action of enzyme – Lock and Key theory and induced fit theory. Structure and functions of coenzyme reaction involving nucleotides - NAD/NADP, FMN/FAD and Coenzyme-A. Isoenzymes (LDH and CK).

Unit – III: Enzyme Kinetics – reaction rate, energy of activation, enzyme catalysis and factors influencing velocity of enzyme reaction. Michaelis-Menton equation, Line-Weaver Burk plot, Eadie – Hofstee plot.

Unit – IV: Control of enzyme activity- feedback inhibition (aspartate transcarbamylase), reversible covalent modification - phosphorylation (glycogen phosphorylase). Proteolytic cleavage – zymogen activation. Enzyme inhibition – reversible -competitive, non-competitive and uncompetitive and irreversible inhibitions (kinetics and derivations not required) Allosteric enzymes and its regulation

Unit – V: Extraction and purification of enzymes: Chromatography and electrophoretic techniques. Criteria of purity of enzymes. Applications of enzymes - Enzyme immobilization.

Text Books:

1. Trevor Palmer (2004). Enzymes-Biochemistry, Biotechnology, Clinical Chemistry. First Edition, East West Press, New Delhi.
2. J.M. Bery, J.L. Tymoezko and L. Stryer (2008) Biochemistry, 6th Ed, W.H. Freeman and Company, New York.

References:

1. U. Sathyanarayanan (2002)., Essentials of Biochemistry Books and allied (p) Ltd.
2. D.L.Nelson, and M.M. Cox (2008) Lehninger Principles of Biochemistry, 5th Ed, W.H. Freeman and Company, New York
3. D. Voet, and G.Voet (2006), Biochemistry, John Wiley and Sons, New York.
4. G.L Zubay (1999) Biochemistry, 4th Ed, WCB, McGraw-Hill, New York.
5. R.K. Murray, D.K. Granner, P.A. Mayes, D.W. Rodwell (2006), Harper's Biochemistry, twenty fifth edition, Prentice Hall, New Jersey.
6. T.M. Devlin (2002), Textbook of Biochemistry with Clinical correlations, 5th edition, John Wiley & Sons Inc, Publications.
7. A.C. Deb(2001), Fundamentals of Biochemistry, New Central Book Agency Pvt., Ltd., Calcutta.
8. S.M. Bhatt (2011), Enzymology and Enzyme Technology. (2011), S. Chand Publishing, New Delhi.

Intermediary Metabolism

5 Hours
5 Credits

Objective

- To promote and understand chemical reactions, central metabolic pathways and kinetics of energy and homeostasis of metabolism

Unit – I: The basic metabolic (anabolic & catabolic) pathways and amphibolic pathways. Glycolysis – aerobic and anaerobic, energetics, action of pyruvate dehydrogenase complex enzyme, Citric acid cycle and energetics, Gluconeogenesis. Glycogenesis, Glycogenolysis and Pentose phosphate pathway

Unit – II: The electron transport chain – components and reactions of ETC. Role of ETC – oxidative phosphorylation – chemiosmotic hypothesis. Uncouplers of oxidative phosphorylation and high energy compounds (ATP and GTP).

Unit – III: Biosynthesis and oxidation of fatty acids, Biosynthesis of Triacyl glycerol and phospholipids and Cholesterol.

Unit – IV: Catabolism of aminoacids – Transamination, oxidative deamination and non-oxidative deamination, and urea cycle. Formation of creatine phosphate and Creatinine, methylation and decarboxylation

Unit – V: Nucleic acid metabolism – Biosynthesis and degradation of purine and pyrimidine nucleotides – Denovo synthesis and Salvage pathway.

Text Books:

1. Fundamentals of Biochemistry. (2005).,J.L Jain S. Chand Publishing, New Delhi.
2. R.K. Murray, D.K. Granner, P.A. Mayes, D.W. Rodwell (2012), Harper's Biochemistry, twenty eighth edition, Prentice Hall, New Jersey.

References

1. D.L.Nelson, and M.M. Cox (2008) Lehninger Principles of Biochemistry, 5th Ed, W.H. Freeman and Company, New York
2. J.M. Bery, J.L. Tymoezko and L. Stryer (2008), Biochemistry, 6th Ed, W.H. Freeman and Company, New York.
3. Trevor Palmer (2004). Enzymes-Biochemistry, Biotechnology, Clinical Chemistry. First Edition, East West Press, New Delhi.
4. A.C. Deb (2001), Fundamentals of Biochemistry, New Central Book Agency Pvt., Ltd., Calcutta.
5. D. Voet, and G.Voet (2006), Biochemistry, John Wiley and Sons, New York.
6. U. Sathya Narayanan and U. Chakrapani. (2007), Text book of Biochemistry – 3rd edition, Pvt Ltd.
7. Fundamentals of Biochemistry for Medical Students,(1998) Ambika Shanmugam.

Endocrinology

4 Hours
4 Credits

Objective:

- To understand the role of hormones in biochemical reactions and its applications

Unit - I: Hormones: Definition, Chemical nature and classification. General mechanism of action of Group I and Group II hormones, Signal transduction and Hormonal receptors.

Unit - II: Hypothalamus and hypothalamic releasing factor. Pituitary hormones- Chemistry, Secretion, Functions and Regulation of Anterior Pituitary hormones – GH, Pituitary tropic hormones (LH, FSH and ACTH) and Posterior Pituitary hormones – Vasopressin and Oxytocin.

Unit – III: Thyroid and Parathyroid Hormones–Chemistry, Synthesis, Secretion, Functions and Regulations. Pancreatic Hormones - Chemistry, Secretion, Functions and Regulations of Pancreatic hormones (Insulin and Glucagon)

Unit - IV: Adrenal gland hormones - Chemistry, Secretion, Functions and Regulations of Adrenal Cortex hormones (glucocorticoids and mineralocorticoids) and Adrenal Medullary hormones (Epinephrine and Nor-Epinephrine).

Unit -V: An introduction to Male and Female Reproductive system . Functions of Gonadal hormones - Testosterone, Estrogen and Progesterone. Ovarian cycle and its regulation.

Text Books:

1. R.K. Murray, D.K. Granner, P.A. Mayes, D.W. Rodwell (2006), Harper's Biochemistry, twenty fifth edition, Prentice Hall, New Jersey.
2. Guyton (1996) Human Physiology and Mechanisms of Disease. Saunders Publications; 6th edition.

References:

1. Williams Textbook of Endocrinology. (2011)., Shilomo Melmed., Elsevier, New Delhi.
2. K.V. Krishnadas (1996), Textbook of Medicine, Jaypee publication, New Delhi.

3. N.Chatterjee and Rana Shinde (2012) Textbook of Medical Biochemistry - eighth edition, Jaypee publication, New Delhi.
4. D.L.Nelson, and M.M. Cox (2008) Lehninger Principles of Biochemistry, 5th Ed, W.H. Freeman and Company, New York
5. D. Voet, and G.Voet (2006), Biochemistry, John Wiley and Sons, New York.
6. G.L Zubay (1999) Biochemistry, 4th Ed, WCB, McGraw-Hill, New York.

Genetics

4 Hours
4 Credits

Objective:

- To understand basic aspects of genetics and associated laws.

Unit - I: Genetics - Introduction; Premendelian concepts – Preformation, Epigenesis, Inheritance of acquired characters and Germplasm theory; Mendelian Inheritance and Mendelian laws; Genotype and Phenotype; Heredity; Gene, Genome, Trait, Genetic material and Genetic maps.

Unit - II: Principles of Inheritance; Chromosome theory of inheritance; Laws of Probability; Pedigree analysis; Incomplete and Co-dominance; Multiple alleles; Lethal alleles; Epistasis; Pleiotropy; Sex linked inheritance.

Unit - III: Linkage and Crossing over; Morgan's Law; Back and Test cross; Cytological basis of crossing over; Recombination frequency as a measure of linkage intensity - two factor and three factor crosses; Interference and Coincidence.

Unit - IV: Chromosomal Mutations: Deletion, Duplication, Inversion and Translocation; Ploidy – Euploidy, Aneuploidy and Polyploidy.

Unit - V: Population Genetics, Hardy Weinberg Law – Gene Frequency, Factors Affecting Gene Frequency, Eugenics, Euphenics and Euthenics, Bioethics.

Text Books:

1. A.V.S.S Sambamurty, (2007), Molecular Genetics, Narosa, Chennai.
2. P.J. Russell (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.

References:

1. E.J. Gardner, M.J.Simmons and D.P. Snustad (2008). VIII ed. Principles of Genetics. Wiley India.
2. D.P. Snustad M.J. Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
3. W.S. Klug, M.R. Cummings, C.A, Spencer, C.A. (2009). Concepts of Genetics. XI Edition. Benjamin Cummings.
4. B.R. Glick, J.J Pasternak (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
5. Gurbachan S Miglani (2006), Developmental Genetics, IK. International, New Delhi.

Main Practical – V

5 Hours
4 Credits

I. Colorimetric Estimation

- a. Estimation of Creatinine by Jaffe's Method.
- b. Estimation of Urea by Diacetyl Monoxime Method.

- c. Estimation of DNA by Di Phenyl Amine method.
- d. Estimation of RNA by Orcinol method.
- e. Estimation of glucose by Anthrone or O-Toluidine methods
- f. Estimation of Cholesterol by Zak's method.

II. Urinary Analysis

Qualitative analysis of Normal and pathological (abnormal) urine.

Major Elective - I Biomedical Instrumentation

**6 Hours
4 Credits**

Objective:

To focus on biomedical instrumentation in life sciences.

Unit - I: Classification of Biomedical Equipment: Diagnostic, therapeutic and clinical laboratory equipment. Therapeutic application of endoscope, laparoscope and cardio scope. Transducers for biomedical application: Types, properties and characteristics.

Unit - II: Bioelectric signals and their recording, Bioelectric signals (ECG, EMG, ECG, EOG and ERG) and their characteristics, Bioelectrodes, electrodes tissue interface, contact impedance, effects of high contact impedance, types of electrodes, electrodes for ECG, EEG and EMG.

Unit - III: Biosensor-mechanism and types. Autoanalyser- types and application. Automatic tissue processing and application of microtome. Pulse oximetry – Introduction, principle and clinical application of sphygmomanometer. Magnetic resonance imaging system, basic NMR components and its application in medicine.

Unit - IV: Heart rate measurement, pulse rate measurement, respiration rate measurement, blood pressure measurement, X- Ray Machine Basic X-Ray components, types of X-ray machines e.g. general purpose, dental image intensifier system, table shooting and maintenance of X- Ray machine.

Unit - V: Therapeutic instruments. Introduction, types, life time, classification, power source and electrodes of cardiac pacemaker. Computer application in medicine- computerized catheterization laboratory, computerized patient monitoring system.

Text Books

1. Arumugam, (2002) Biomedical Instrumentation, Anuratha Agencies Publishers, 2nd edition.
2. Mandeep Singh, (2014) Introduction to biomedical instrumentation, Paperback publishers.

Reference

1. Edward J. Bukstein, (2001) Introduction to Biomedical electronics, Sane and Co. Inc. USA.
2. Goddes and Baker, (2002) Principles of applied Biomedical instrumentation, John Wiley.
3. R.S. Khandpur, (2003) Hand book of Medical instruments, TMH, New Delhi, 644pp.
4. Cromwell, (2007) Biomedical instrumentation, Prentice Hall of India, New Delhi.
5. John G. Webster (2007) Medical instrumentation, John Wiley.
6. Carr and Brown (2009) Biomedical instrumentation and measurement, Pearson.
7. R.S Khandpur (2014) Handbooks biomedical instrumentation, 3rd edition McGraw Hill Education (India) Private Limited.

**Major Elective -
Medical Laboratory Technology**

**6 Hours
4 Credits**

Objective

- To give knowledge about laboratory practices, drugs and cancer chemotherapy.

Unit- I: Specimens: Collection and preservation of Blood, Urine, Feces, Sputum, Semen, Throat swab and CSF. Good laboratory practices.

Unit-II: Blood: Blood pressure (BP), Clotting time, Bleeding time, Hemoglobin Estimation, RBC count and WBC count, Differential count, Erythrocyte Sedimentation Rate (ESR), Hematocrit value (Packed cell volume) and platelet counting.

Unit-III: Urine: Composition, Preservation, Microscopic and Macroscopic Examination (Physical and Chemical examination)

Unit-IV: Feces: Composition, Macroscopic and Microscopic Examination, Chemical examination – occult blood and steatorrhea.

Unit-V: Culturing of organism from various specimens (Pus, Urine, Blood, Sputum, Throat Swab), Antibiotic sensitivity test and Gram staining (acid fast, base & neutral). Safety procedures in microbiological techniques.

Text Books

1. D.Sahu (1997), Critical approach to clinical medicine, Vikas Publishing, Noida.
2. Devlin, T.M. (2002), Textbook of Biochemistry with Clinical correlations, 5th edition, John Wiley & Sons Inc, Publications.

References

1. P.D.Mayne (1994), Clinical chemistry in diagnosis and treatment. A Hodder Arnold Publication; 6Rev Ed edition.
2. W.J. Marshall and S.K. Bangeit, (1995), Clinical biochemistry - Metabolic concepts and clinical aspects, Churchill Livingstone.
3. K.V. Krishna Das, Text Book of Medicine, (1996), Jaypee publication, New Delhi.
4. A.C. Guyton and J.E. Hall, (2000), Text Book of Medical PhysiologyHarcourt Asia.
5. Guyton (1996) Human Physiology and Mechanisms of Disease. Saunders Publications; 6th edition.
6. N.Chatterjee and Rana Shinde (2012) Textbook of Medical Biochemistry - eighth edition, Jaypee publication, New Delhi.
7. K. Sampath (1999), Hospital and Clinical Pharmacy, Vikas Publishing. Noida.

Major Elective - Pharmacology

6 Hours
4 Credits

Objective:

- To give focus on drug chemistry and its mechanism of actions

Unit - I: Drugs - History, Classification, routes of drug administration, absorption and distribution of drugs, factors influencing drug absorption and elimination of drugs.

Unit - II: Drug-Receptor interactions involvements of binding forces in drug receptor interaction, Receptor mediated and non-mediated interactions.

Unit - III: Drug metabolism - Phase I and II enzyme reactions and biochemical importance of xenobiotic metabolism.

Unit - IV: Cancer - principles of cancer chemotherapy, mode of action of anti cancer drugs, antimetabolites, antibiotics, alkylating agents and other agents.

Unit - V: Adverse drug reactions and drug induced side effects, biological effects of drug abuse and drug dependence, drug tolerance and intolerance.

Text Books

- Chatwal G R (1996) Pharmaceutical Chemistry – Inorganic., Himalaya, Bombay
- Bentley (1969) Bentley and Driver's Text Book of Pharmaceutical Chemistry Oxford and I B H, New Delhi.

References

- A. Burger, D. J. Abraham (2003) Oxford textbook, of Clinical pharmacology and drug therapy. D.G. Burger's medicinal Chemistry & Drug Discovery.
- K. D .Tripathi (2004) Essentials of Medical Pharmacology. 5th edition, Jaypee, NewDelhi.
- Richard A. Harvey, Pamela C. Champe, Richard Finkel, Luigi Cubeddu, Michelle A.Clarke (2008) Pharmacology (Lippincott Illustrated Reviews Series), 4th edition, Wolters kluwer.
- William, O. and Foge, B.I. (2008) Principles of medicinal chemistry, Waverks Pvt Ltd, New Delhi.
- Bhandarkar (2010) Pharmacology and Pharmacotherapeutics, 10th edition Elsevier.
- Satoskar (2015) Pharmacology and Pharmacotherapeutics, 24th edition, Elsevier.
- R.S.Satoskar. S.D. Bhandhakar and S.S. Anilapure (2015) Pharmacology and Pharmacotherapeutics, Elsevier.

SSP: Health Management

1 Credit

Objective

- To gain knowledge about first aid, basic health issues and handling emergencies.

Unit - I: Safe guards to health: Physical fitness and normal weight, normal diet, merits and demerits of taking foods

Unit - II: First Aid for Accidents - Wounds, Burns, Bites, Hiccup, Shock, Poisoning, Vomiting and Drowning

Unit - III: Handling Emergencies: Heart attack, blood pressure, Diabetic conditions unconsciousness, asthma and sprain

Unit - IV: General Disease –Causes, symptoms and preventions of headache, fever, common cold, cough, constipation, diarrhea, itching, and Obesity.

Unit- V: Specific Disease -Cataract, dandruff, hair fall, dental caries, cancer, AIDS, ulcer and appendicitis

Text Books:

1. DevendraVora. (1995), Health in Your Hands. Navneet Pub., Mumbai.
2. Harrison's principles of internal medicine - Vol-I & II (2015), McGraw Hill Education; 19 Edition.

References

1. H.K Bakhru. (1990), Herbs that Heal: Natural Remedies for Good Health, Orient, New Delhi.
2. K.V. Krishna Das, (2008), Text book of medicine, 5th edition.,
3. S.S. Purohit, H.N. Kakrani and A.K. Saluja (2003) Pharmaceutical Biotechnology, Student Edition Publications, Jodhapur.
4. M.J. Mycek, A.R.Harve and P.C.Champe (1997), Lipincott's Illustrated Reviews: Pharmacology, 2nd Edition, Lipincotts Williams and Wilkins publishers.
5. R.S. Satoskar, S.D.Bhandarkar and S.S. Annapure (1999), Pharmacology and Pharmocotherapeutics., Popular Prakashan, Mumbai.
6. Shashi Goyal (2012), Food, Nutrition and Health. S. Chand Publishing, New Delhi.

Non-Major Elective: Energy Builders

2 Hours
1 Credit

Objective:

- To understand about various biological macromolecules and its function (structures not required)

Unit - I: Carbohydrates – Introduction, source, classification, biological importance of carbohydrate and disease condition

Unit - II: Proteins – Introduction, source, classification, biological importance of proteins and disease condition

Unit - III: Fats – Introduction, source, classification, biological importance of fats and disease condition

Unit - IV: Vitamins– Introduction, source, classification, biological importance of vitamins and disease condition

Unit -V: Minerals – Introduction, source, classification, biological importance of minerals, and disease condition

Text Books:

1. J.L.Jain., Nitin Jain and Sunjay Jain (1979) Elementary Biochemistry, S. Chand Publishing. New Delhi.
2. Nitin Jain., Sunjay Jain and J.L.Jain, (2007) Fundamentals of Biochemistry, S. Chand Publishing. New Delhi.

References

1. R.K. Murray, D.K. Granner, P.A. Mayes, D.W. Rodwell (2006), Harper's Biochemistry, twenty fifth edition, Prentice Hall, New Jersey.
2. D.L.Nelson, and M.M. Cox (2008) Lehninger Principles of Biochemistry, 5th Ed, W.H. Freeman and Company, New York.
3. Sathyanarayanan.U (2002)., Essentials of Biochemistry Books and allied (p) Ltd.
4. D. Voet, and G.Voet (2006), Biochemistry, John Wiley and Sons, New York.
5. G.L Zubay (1999) Biochemistry, 4th Ed, WCB, McGraw-Hill, New York.
6. Ambika Shanmugam (1998)., Fundamentals of Biochemistry for Medical Students.

Semester -VI Molecular Biology

5 Hours
5 Credits

Objective:

- To give basic aspects of molecular theories and central dogma.

Unit – I: Organisation of genes, chromosome structure, types and functions. DNA as genetic material and central dogma, satellite DNA

Unit – II: Replication - types, evidence for semi conservative replication. Replication in prokaryotes and Eukaryotes. Inhibitors of replication.

Unit – III: Transcription: RNA polymerases, role of sigma factor, steps - initiation, elongation and termination [Rho-dependant and independent]. Inhibitors of transcription. Post transcriptional modifications and reverse transcription.

Unit – IV: Translation – Genetic code – codon dictionary and salient features of genetic code. Composition of prokaryotic and eukaryotic ribosomes, structure of RNA, role of signal peptide. Activation of amino acids, initiation, elongation and termination of protein synthesis in prokaryotes. Post translational modifications. Inhibitors of protein synthesis.

Unit - V: Gene mutation: types – point mutation (transition & transversion), frame shift mutation-insertion and deletion, suppressor mutation –nonsense and missense suppression. DNA damage – physical &vchemical mutagens. DNA repair mechanism – Base excision and UV repair. Gene regulation – operon concept (Lac operon).

Text Books:

1. P.S Verma and V.K.Agarval (2016) Cytology (Cell Biology, Biomolecules and Molecular Biology), S. Chand Publishing. New Delhi.
2. D.L.Nelson, and M.M. Cox (2008) Lehninger Principles of Biochemistry, 5th Ed, W.H. Freeman and Company, New York.

References

1. Rastogi, S.C. (2003), Cell and Molecular Biology, 2nd edition, New Age International Publishers.
2. Benjamin Lewin (2004) Genes VII, Pearson Education Limited, New York.
3. G.Karp.John (2002), Cell and Molecular biology – 3rd edition Wiley and Sons N.Y.
4. David Freifelder (1976).,Physical biochemistry, applications to biochemistry and molecular biology, second edition. W.H.Freeman & Co Ltd.

5. R.K. Murray, D.K. Granner, P.A. Mayes, D.W. Rodwell (2006), Harper's Biochemistry, twenty fifth edition, Prentice Hall, New Jersey.

Immunology

4 Hours
4 Credits

Objective

- To know about exact mechanism of action of Ag-Ab interaction.

Unit – I: History of Immunology - Edward Jenner and Louis Pastuer. Immunity - Innate & Acquired immunity. Immune Response - Antibody & Cell Mediated response. Cells of the immune system, Organs of the immune system – primary and secondary lymphoid organs.

Unit – II: Antigen - Properties, Cross reactivity, Antigenicity, Immunogenicity, antigen determinants, Haptens, Adjuvants, Self-antigen (MHC) an outline only. Antibodies - Properties and Structure of classes and subclasses of Immunoglobulins

Unit – III: Antigen – Antibody interaction – Precipitation and Agglutination, Complements and their activation pathway, Cytokines and their functions.

Unit – IV: Hypersensitivity – type I, II, III and IV and their clinical manifestations.

Transplantation - types, Mechanism of Allograft rejection, Immuno suppressor agents, Tissue and organ transplantation. Basic concepts of plastic surgery.

Unit – V: Immunization - Passive and Active, Vaccines - Recombinant vaccines, DNA vaccines, Benefits and adverse effects of vaccination. Principle and applications of RIA, ELISA, Immuno fluorescence, Immuno precipitation and Complement fixation test. Hybridoma technology for monoclonal Antibody production.

Text Books:

1. Annadurai. B (2008), A textbook of Immunology and Immunotechnology, 1st Edition., S.Chand & Co, Ltd, New York, USA.
2. J. Kuby, R.A.Goldsby, T.J. Kindt and B.A. Osborne, B.A. (2007), Immunology, 4th edition, W.H.Freeman and Company, New York, USA.

References

1. J. Kuby (2002), Immunology, 5th Edition, W.H.Freeman and Company, New York.
2. Ian R. Tizard (2000), Immunology: An Introduction., 4th Edition, W.B.Saunders Co., Philadelphia.
3. Murphy Kenneth (2008), Janeway's Immunobiology, Garland Science Publishers, New York.
4. Peter J.Delves, Ivan Maurice Roitt, Seamu J. Martin and Deninis Burton (2006), Roitt's Essential Immunology, 11th edition, Blackwell Scientific Publications, London.
5. Rajasekaran Pandian (2007), Immunology and Immunotechnology, Panima Publishers, Chennai.
6. I. Roitt, J. Brostoff and D Male (2002), Essential Immunology, 8th edition, English Language Book Society, London.

Medical Biochemistry

5 Hours
4 Credits

Objective

- To understand in details about diseases, associated symptoms and treatments

Unit – I: Blood sugar level, renal threshold, regulation of blood glucose - hormonal action, hypo, hyperglycemia, Diabetes Mellitus, GTT, Glycosuria, Ketoacidosis, Glycogen storage disease, Fructosuria & Galactosemia.

Unit – II: Disease related to amino acid - Clinical manifestation of Phenylketonuria, Cystinuria, Albinism, Fanconi syndrome, Tyrosinemia and alkaptonuria. Types of Lipoproteins –Hyper and Hypo lipoproteinemia, atherosclerosis, myocardial infarctions & obesity.

Unit - III: Liver function test - Metabolism of bilirubin - Jaundice, Classification, causes and differential diagnosis. Liver disorders - Acute and Chronic Hepatitis, Cirrhosis, Fatty Liver and Gall Stones.

Unit – IV: Renal function test: clearance test – urea, creatinine, inulin, PAH test, concentration and dilution test. Renal disorders - glomerulonephritis, Diabetes Insipidus, Nephrotic syndrome, renal failure and UTI.

Unit – V: Gastric function test- collection of gastric content, examination of gastric residue, FTM stimulation test, tubeless gastric analysis. Disorders - Peptic ulcer, gastric carcinoma, Zollinger-Ellison syndrome. Pancreatic function test - Composition of pancreatic juice. Disorders - acute and chronic pancreatitis.

Text Books:

1. Osborne Oliver T (1918), Handbook of Therapy., Osborne Oliver T., American Medical Association, Chicago.
2. Trevor Palmer (2004). Enzymes-Biochemistry, Biotechnology, Clinical Chemistry. First Edition, East West Press, New Delhi.

References:

1. N.Chatterjee and Rana Shinde (2012) Textbook of Medical Biochemistry - eighth edition, Jaypee publication, New Delhi.
2. T.M. Devlin (2002), Textbook of Biochemistry with Clinical correlations, 5th edition, John Wiley & Sons Inc, Publications.
3. P.D. Mayne, Clinical chemistry in Diagnosis and Treatment, ELBS / Arnold, New Delhi.
4. W.J. Marshall and S.K. Bangert, Clinical Chemistry [1995]
5. K.V. Krishnadas, Textbooks of Medicine [1996], Jaypee publication, New Delhi.
6. Harrison's principles of internal medicine – Vol-I &II (2015), 19 Edition. McGraw Hill Education Publishers.

Main Practical – VI

**5 Hours
4 Credits**

I. Experiments on Enzymes by Colorimetry

1. Effect of pH, temperature and substrate concentration on salivary amylase
2. Effect of pH, temperature and substrate concentration for urease
3. Assay of Serum Transaminases (SGOT) &(SGPT)
4. Preparation of alginate beads for Enzyme Immobilization (Demo)
5. Isolation of LDH from Goat Liver (Demo)

II. Haematology

1. Collection of Blood and Blood grouping,
2. Determination of BP

3. Enumeration of Total RBC count
4. Enumeration of Total WBC Count
5. Estimation of Haemoglobin content
6. Determination of ESR
7. Differential Counting

SS1: Biotechnology

**5 Hours
5 Credits**

Objective

- To give knowledge on applied field of life sciences like DNA technology, tissue culture techniques and Fermentation technology.

Unit – I: Recombinant DNA technology and its tools - Isolation of gene, Cloning vectors: plasmid, cosmid, phage, YAC, binary vector, shuttle vector and expression vectors, rDNA formation (DNA cloning). Ligation, Use of linkers and adapters.

Unit – II: Methods of gene transformation. Recombinant selection and screening methods- Insertional inactivation, Hybridisation and Immunological methods.

Unit –III: Techniques of cloning – Southern, Northern and Western blotting techniques. Gene amplification PCR. DNA sequencing

Unit – IV: Plant tissue culture – Media composition, nutrients, growth regulators, initiation and differentiation. Callus and suspension culture, Micro propagation, Somatic embryogenesis and somoclonal variation. Applications of Transgenic plants.

Unit – V: Animal tissue culture – substrate, culture media and culture procedures, Primary culture and cell lines, tissue culture- slide, flask and test tube culture. Transgenic Mice.

Text Books:

1. R.C.Dubey (1993) A textbook of Biotechnology, S. Chand Publishing, New Delhi.
2. A.K. Srivastava, R.K. Singh and M.P. Yadav (2005), Animal Biotechnology, Oxford and IBH.

References:

1. N Channarayappa, (2006),Molecular biotechnology University Press, Hyderabad
2. R.C.Dubey (2014) Advanced Biotechnology, S. Chand Publishing, New Delhi.
3. H.D. Kumar (1997), Molecular Biology & Biotechnology Vivas publishing house Pvt. Ltd.
4. Bernard, R. Glick Jack.J. Pasternak, (2003) Molecular biotechnology – Principle and application of recombinant DNA, 3rd edition Library of Congress.
5. S. B. Primrose (1994), Molecular Biotechnology, 2nd Ed. Blackwell Scientific publishers, Oxford.

SS 2 BIOETHICS

**5 Hours
5 Credits**

Objectives

- To understand the ethical aspects in Biology and Bio Containment.

Unit - I: Bioethics-Definition, Legal and socio-economic impacts. General Laboratory Practices. Bioethics committees. Handling and disposal of biomedical waste.

Unit - II: Ethical concerns of Biotechnology research and innovation, Biosafety levels-Genetically modified organisms and its release - Genetically modified foods, Biosafety guidelines in India–International guidelines.

Unit - III: Genetics and Genomics Research-Defining risks and benefits -principles governing research in human genetics– informed consent in genetic research, ethical issues in genetic testing.

Unit - IV: Rules and regulations in every country where ethical concerns were raised regarding human Genetics- International Laws on Stem Cell Research and Therapy.

Unit - V: Composition of (Human) institutional Ethical Committee (IEC).Ethics in animal experimentation. CPCSEA guidelines for Animal care in research.

Books

1. The Cambridge Textbook of Bioethics by Singer, Peter, A. and Viens A.M. Cambridge University Press, 2008.
2. Biotechnology by U. Sathyanarayana. Booksand Allied (p) Ltd., 2009.
3. Biotechnology by Singh, B.D. Kalyani Publishers, 2009.

References

1. Shaleesha A. Stanley, Bioethics, Wisdom educational service, 2008, Wisdom Educational Service.
2. Indian Council of Medical Research. Ethical guidelines for bio-medical research on human participants; Chapter VII. New Delhi (2006).
3. Designing Clinical Research: Stephen Hulley 4th Edition (2013).

SSP: Nutritional Biochemistry

1 Credit

Objective

- To know about importance of Nutrition and associated health risks.

Unit – I: Introduction and Definition of Food, Nutrition, and Diet. Classification of Food by Origin and Chemical Composition, Classes of Nutrients - Micro & Macro, Types of Nutrition. Food groups based on their functions - Energy yielding, Body building and Protective foods.

Unit - II: Units of energy measurement - Calorie, Joule & BTU, measurement of food stuffs by Bomb Calorimeter, Calorific value of Proteins, Carbohydrates and Lipids. RQ of foods and BMR.

Unit – III: Protein Energy Malnutrition - Kwashiorkor and Marasmus, their preventive and curative measures. Composition of balanced diet and RDA (for Indian) - for infant, children, adolescent and adult (male and female), pregnant & lactating women and old age.

Unit – IV: Vitamins: Fat and Water Soluble Vitamins (Vit-B complex & C)- Chemical name, Sources, Daily requirements and Deficiency syndrome.

Unit –V: Therapeutic Diets: Diet in peptic ulcer, High Blood Pressure, Renal and vesicle calculi, Diabetes Mellitus, Constipation, Diarrhoea (acute and chronic), jaundice, and Anaemias (iron, folic acid and vitamin B12 deficiency).

Text Books:

- B. Srilakshmi (2012), Nutrition Science, New Age, New Delhi, 2012.
- M. Swaminathan (1986) Hand book of food and nutrition, Bangalore Printing & Publishers.

References:

- R.K. Murray, D.K. Granner, P.A. Mayes, D.W. Rodwell (2006), Harper's Biochemistry, twenty fifth edition, Prentice Hall, New Jersey.
- D.L. Nelson, and M.M. Cox (2008) Lehninger Principles of Biochemistry, 5th Ed, W.H. Freeman and Company, New York.
- U. Sathyanarayanan (2002), Essentials of Biochemistry Books and allied (p) Ltd.
- D. Voet, and G. Voet (2006), Biochemistry, John Wiley and Sons, New York.
- G.L. Zubay (1999) Biochemistry, 4th Ed, WCB, McGraw-Hill, New York.

Non-Major Elective Healthcare and Disease Management

2 Hours
1 Credit

Objective

- To give awareness about first aid, basic health issues, handling emergencies.

Unit – I: Safe guards to health: Physical fitness and normal weight, normal diet, merits and demerits of taking foods

Unit – II: First Aid for Accident, Wounds, Burns, Bites (human, snake and dog), Poisoning, Vomiting, Drowning.

Unit - III: Handling Emergencies: Heart attack, blood pressure, diabetic condition, asthma and sprain

Unit – IV: General Diseases: Causes, symptoms and prevention of headache, fever, common cold, cough, constipation, diarrhea, itching and Obesity.

Unit – V: Specific Diseases: Cataract, dandruff, dental caries, cancer, AIDS, jaundice, ulcer and appendicitis

Text Books:

1. Shashi Goyal. (2012) Food, Nutrition and Health, S.Chand Publishing, New Delhi.
2. Devendra Vora.(1995) Health in Your Hands., Navneet Pub., Mumbai.

References:

1. H.K Bakhru, (1990). Herbs that Heal : Natural Remedies for Good Health., Orient, Delhi.
2. Harrison’s principles of internal medicine – Vol-I &II., (2015), McGraw Hill Education; 19 edition.
3. K.V. Krishna Das, (2008), Text book of medicine, 5th Edition., K.V. Krishna Das, Text book of medicine, 5th Edition.
4. Harold Shryock and Hubert O. Swartout, M.D., Dr.P.H (1970) You and Your health – (Vol-I, II & III), Pacific Press Publishing, California.
5. N. Ahamed (2016), Biomaterials and wound induced oxidative damage, Lambert Academic Publishing, Germany.

Regulation for Theory

Evaluation Scheme for Continuous Assessment

| | |
|------------------|----------|
| Written 2 tests | 20 Marks |
| Attendance | 5 Marks |
| Other Components | 5 Marks |
| Total | 30 Marks |

Other components may comprise assignments, seminars, open book test and on-line assignment. At least two components must be considered for a paper.

Question Paper Pattern for CA

The question paper shall have three sections with the maximum of 50 Marks with the following break-up:

Section - A

Section A shall contain 5 short answer questions without choice drawn from two units. Each question shall carry 3 marks. (5 x 3 = 15 Marks)

Section - B

Section B shall contain 3 either or questions drawn from two units.

Each question shall carry 5 marks. (3 x 5 = 15 Marks)

Section – C

Section C shall contain 3 questions from two units.

Two questions out of the three are to be answered each carrying 10 marks. (2 x 10 = 20 Marks)

Question Paper Pattern for Semester Examinations

The question paper shall have three sections with the maximum of 70 marks with the following break-up:

Section - A

Section A shall contain 10 short answer questions without choice drawn from all the units on the basis of minimum two from unit.

Each question shall carry 2 Marks. (10 x 2 = 20 Marks)

Section - B

Section B shall contain 5 either or questions drawn from all the five units.

Each question shall carry 4 marks. (5 x 4 = 20 Marks)

Section - C

Section C shall contain 5 questions drawn one each from the five units.

Three questions out of the five are to be answered each carrying 10 marks.

(3 x 10 = 30 Marks)

Regulation for Practicals**Total Marks 100****Internal Marks 40**

Observation of Regular Practical Classes 30 Marks

Record 10 Marks

External Marks 60

Model Practical - 1 30 Marks

Model Practical - 2 30 Marks

Evaluation Pattern for SSP (Health Management / Nutritional Biochemistry)

Submission of Assignment

One MCQ test covering the syllabus

Evaluation Pattern for Summer Lab Training

Submission of report with certificate of attending 15 days training at the end of IV Semester from the concerned lab – 2* Credits.

Department of Computer Applications (UG)
Programme Structure For Computer Applications (UG) 2017-2018 Onwards

| Semester | Part | Subject | L | P | CD |
|------------|------|---|-----------|----------|----------------|
| I | I | Tamil Paper – I | 5 | | 3 |
| | II | English Paper – I | 5 | | 3 |
| | II | Communicative English I | | | 1 |
| | III | Mathematical Foundations – I | 6 | | 4 |
| | III | Problem Solving Techniques Using C | 4 | | 4 |
| | III | Web Design Technology | 4 | | 4 |
| | III | Practical-I: Web Design Technology and C | | 2 | 2 |
| | IV | Personal Skills | 2 | | 1 |
| | IV | Ethics / Religion | 2 | | 1 |
| | | Total | 28 | 2 | 23 |
| II | I | Tamil Paper – II | 5 | | 3 |
| | II | English Paper – II | 5 | | 3 |
| | II | Communicative English II | | | 1 |
| | III | Mathematical Foundations – II | 6 | | 4 |
| | III | Computer Organization and Architecture | 4 | | 4 |
| | III | Object Oriented Programming Using C++ | 4 | | 4 |
| | III | Practical-II: Object Oriented Programming Using C++ | | 2 | 2 |
| | IV | Social Skills | 2 | | 1 |
| | IV | Ethics / Religion | 2 | | 1 |
| | | Total | 28 | 2 | 23 |
| III | III | Data Structures | 4 | | 4 |
| | III | Programming Using JAVA | 4 | | 3 |
| | III | Operating System | 4 | | 4 |
| | III | Financial Accounting I | 6 | | 4 |
| | III | Discipline Specific Elective I | 4 | | 3 |
| | III | Practical-III : Data Structures Using C++ | | 2 | 2 |
| | III | Practical-IV : Programming Using JAVA | | 2 | 2 |
| | IV | Employability Skills – I | 2 | | 1 |
| | IV | Human Rights | 2 | | 1 |
| | VI | Certificate Course - I | | | 2# |
| | | Total | 26 | 4 | 24 + 2# |

| Semester | Part | Subject | L | P | CD |
|-----------|------|---|---|---|----|
| IV | III | Software Engineering | 4 | | 4 |
| | III | Windows Application Using .NET | 4 | | 3 |
| | III | Relational Database Management System | 4 | | 4 |
| | III | Financial Accounting II | 6 | | 4 |
| | III | Computer Graphics | 4 | | 3 |
| | III | Practical-V: Windows Application using .NET | | 2 | 2 |

| | | | | | |
|----|-----|--|-----|----|------------|
| | III | Practical -VI: Relational Database Management System | | 2 | 2 |
| | IV | Employability Skills – II | 2 | | 1 |
| | IV | Environmental Science | 2 | | 1 |
| | V | DEEDS | | | 2 |
| | V | SHELTERS | | | 2 |
| | VI | Certificate Course - II | | | 2# |
| | | Total | 26 | 4 | 28 + 2# |
| V | III | Computer Networks | 5 | | 4 |
| | III | E –Commerce | 5 | | 4 |
| | III | Enterprise Java Programming | 5 | | 4 |
| | III | Web Programming Using PHP | 5 | | 4 |
| | III | Self-Study Paper I : Industry Interface | - | | 1* |
| | III | Practical-VII : Enterprise Java Programming | | 4 | 4 |
| | III | Practical-VIII : Web Programming Using PHP | | 4 | 4 |
| | IV | Non-Major Elective –I : Introduction to Information Technology | 2 | | 1 |
| | | Total | 22 | 8 | 25 + 1* |
| VI | III | Cloud Computing | 5 | | 4 |
| | III | Discipline Specific Elective II | 4 | | 3 |
| | III | Project Work | | 6 | 4 |
| | III | Web Application Using .NET | 5 | | 5 |
| | III | R Programming | 4 | | 4 |
| | III | Self-Study Paper II: Software Documentation | - | | 1* |
| | III | Practical-IX : Programming Using .NET and R | | 4 | 4 |
| | IV | Non-Major Elective – II : Multimedia | 2 | | 1 |
| | | Total | 20 | 10 | 25+1* |
| | | Grand Total | 180 | | 148 +2*+4# |

| | |
|-----------|--|
| L | Lecture |
| P | Practical |
| CD | Credits |
| * | Communicative English and Self-Study Paper |
| # | Certificate Courses |

DISCIPLINE SPECIFIC ELECTIVES (DSE)

The student has to choose one elective from the list provided for Semester III and Semester VI.

| | |
|---------------------|--|
| Semester III | Object Oriented Analysis and Design System Analysis and Design Management and Information System |
| Semester VI | Unix and Shell Programming Mobile Applications Client Side Scripting Technologies |

SELF STUDY PAPER (SSP)

| | |
|--------------------|------------------------|
| Semester V | Industry Interface |
| Semester VI | Software Documentation |

The main objective of the self-study paper is to support the advanced learners. This is to promote them to do additional learning and get additional credits for it. The department will offer self-study courses in the V and VI semesters. A student can opt for a course if they would like to obtain additional credits other than the mandatory credits. There will not be any classes conducted for these courses. The student themselves have to carry on with the learning process and attend the evaluation fixed by the department. A faculty member appointed by the head of the department will be responsible for monitoring and evaluation of the course. If a student doesn't pass the evaluation of the course then the course name and the additional credits will not be recorded into the semester mark sheet. When the student passes the course, the name of the course and its credits will be recorded in the semester mark sheet. If a student fails the course then the student can pay the required fees and re-do the course along with the next batch if he/she likes to do so.

CERTIFICATE COURSE (CC)

| | |
|---------------------|----------------|
| Semester III | GO Programming |
| Semester IV | GraphQL |

The department will offer certificate courses in the III and IV semesters. A student can opt for a course if they would like to obtain additional credits other than the mandatory credits. These courses will be for 30 hours duration. The student has to obtain minimum of 75% of attendance. If a student doesn't have 75% of attendance then the course name and the additional credits will not be recorded into the semester mark sheet. Students of Computer Applications (UG) can take certificate courses offered by Computer Science department and it can be also vice versa. The course fees will be decided by the department and published to the prospective students.

II DISTRIBUTION OF CREDITS

| Part | Course | Number of courses | Total number of hours | Total number of credits |
|--------------|-------------------------------|-------------------|-----------------------|-------------------------|
| I | Tamil | 2 | 10 | 6 |
| II | English | 2 | 10 | 6 |
| III – ALLIED | Mathematical Foundations - I | 4 | 24 | 16 |
| | Mathematical Foundations - II | | | |
| | Financial Accounting - I | | | |
| | Financial Accounting - II | | | |
| III – CORE | Core Theory | 10 | 43 | 39 |
| | Core Practical | 2 | 4 | 4 |
| | DSE Theory | 2 | 8 | 6 |
| | SEC Theory | 8 | 35 | 31 |
| | SEC Practical | 8 | 26 | 24 |
| | SSP | 2 | | 2* |
| IV | Religion/Ethics | 2 | 4 | 2 |
| | EVS | 1 | 2 | 1 |
| | Human Rights | 1 | 2 | 1 |
| | Foundation Course (4) | 4 | 8 | 4 |

| | | | | |
|-----------------|---------------------------|-----------|------------|----------------------|
| | Non-Major Elective (2) | 2 | 4 | 2 |
| | Communicative English (2) | 2 | | 2 |
| V | DEEDS | 2 | | 4 |
| | SHELTERS | | | |
| VI – ADDITIONAL | Certificate Course | 2 | | 4# |
| TOTAL | | 56 | 180 | 148 + 2* + 4# |

NON MAJOR ELECTIVES

| Sem | Part | Subject title | Hours | Credits |
|-----|------|--|-------|---------|
| V | IV | Introduction to Information Technology | 2 | 1 |
| VI | IV | Multimedia | 2 | 1 |

III REGULATIONS FOR THEORY COURSES

1. Evaluation Scheme for Continuous Assessment

| | | |
|-------|-------------------|-----------------|
| 1 | Two Written Tests | 15 Marks |
| 2 | Attendance | 05 Marks |
| 3 | Other Components | 10 Marks |
| Total | | 30 Marks |

Note: Other components may comprise of assignments, seminars, quiz, snap test, open book test and Group Discussion etc. The components considered for a paper should have prior approval from the Head of the Department and should be published in the course plan.

2. There is no passing minimum for CA.
3. Question paper pattern is as follows:

(i) Continuous assessment Tests

| | |
|---|--------------|
| Time: 2 Hours | Max Mark :50 |
| The Question paper shall consist of Three Sections | |
| Section - A (5 x 3 = 15) | |
| Answer all Questions | |
| Section - B (3 x 5 = 15) | |
| Three Questions with internal Choice (either or type) | |
| Section - C (2 x 10 = 20) | |
| Answer any Two out of Three questions. | |

(ii) Question paper pattern for Semester Theory Examinations

| | |
|--|--------------|
| Time : 3 Hours | Max Mark :70 |
| The question paper should consist of three sections | |
| Section - A (10 x 2 = 20) | |
| Answer all Questions. | |
| Two questions from each unit should be asked. | |
| Section - B (5 x 4 = 20) | |
| Five Questions with internal Choice (either or type). | |
| One question from each unit should be asked. | |
| Section - C (3 x 10 = 30) | |
| Answer any Three out of Five questions. | |
| One question from each unit should be asked. | |

IV. REGULATIONS FOR PRACTICAL COURSES

1. Each practical paper will have maximum of 100 marks.
2. For a practical paper, CA is 40 marks and Semester Examination is 60 marks.
3. The features of every programming language are listed in the syllabus; however the students are expected to carry out at least 2 exercises in each feature of the programming language.
4. Continuous Assessment is as follows.

| | | |
|--------------|--------------------------------------|-----------------|
| 1 | Attendance | 05 Marks |
| 2 | Performance in the practical session | 15 Marks |
| 3 | CA Test | 10 Marks |
| 4 | Application Development | 10 Marks |
| Total | | 40 Marks |

a) Performance in the practical session

- (i) Every practical session will carry a maximum of 10 marks and it is divided as follows:
 - Initial Preparation & Observation : 5 Marks.
 - Debugging & Execution of Program : 5 Marks.
- (ii) The Students must submit the observation note book with the written preparation of the current practical exercise, before the practical session at the time fixed by the staff concerned. Marks will be deducted for late as well as incomplete or incorrect submission.
- (iii) 10 marks will be awarded for each exercise, subject to the successful completion of the entire exercise as directed by the staff concerned.

b) CA Test

- (i) For each practical paper, only one CA test will be conducted for a maximum of 50 marks and it will be computed for 10 marks.
- (ii) There is no minimum passing marks for CA.

c) Application Development

- (i) For each practical paper, students have to group among themselves into a group of three. They have to find a problem and provide solution for it using the technology they learnt in that semester. Each student should have an individual

module and they should provide solution to it. All these tasks should be done outside the class hours. Finally the application has to be presented to the course teacher for evaluation along with the group members. The mark distribution is as follows,

| | | |
|--------------|-------------------------|-----------------|
| 1 | Application Development | 06 Marks |
| 2 | Presentation | 02 Marks |
| 3 | Viva Voce | 02 Marks |
| Total | | 10 Marks |

5. Semester Examinations

- (i) The duration of practical examination is three hours. The candidate should submit their record of the experiments done during the semester at the time of the semester examination. The student shall not be allowed to appear for the semester examination without record.
- (ii) Semester Examinations will be conducted for 60 marks and the marks are divided as follows:
 - Programming : 50 Marks
 - Record : 10 Marks
- (iii) If a student fails in a semester examinations he has to reappear for the next semester practical examination.
- (iv) Question Paper Pattern Practical Examinations
Time: 3 Hours Max Marks :50+10 (10 for Record)

Note: Each student will get a single question to be answered. The question may have subdivisions. No more than five candidates should get the same question in a batch.

1. Learning Objectives

- To understand the organization of computer networks.
- To test and implement the different network connections.
- To understand the performance of network layers like IPv4 and Ipv6 addresses.
- To understand the way protocols currently in use in the Internetwork and the requirements for designing network protocols.
- To understand the concepts of WWW and electronic mail.

2. Blue Print of the Question Paper

| Section | Unit – I | Unit – II | Unit – III | Unit – IV | Unit – V |
|------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (or) b) Theory | 12.a)Theory (or) b) Theory | 13.a)Theory (or) b) Theory | 14.a)Theory (or) b) Theory | 15.a) Theory (or) b) Theory |
| Section-C | 16. Theory | 17.Theory | 18.Theory | 19.Theory | 20.Theory |

3. Course Outline

UNIT – I: INTRODUCTION TO COMPUTER NETWORKS

A Brief History of Computer Networking and the Internet – Data Communications – Networks – Network Types – Standards and Administration – The OSI Model – Multiplexing – Transmission Media – Guided Media and Unguided Media.

UNIT – II: DATA LINK LAYER

Introduction to Data Link Layer – Error Detection and Correction – Block Coding – Cyclic Codes – Checksum. Data Link Control – DLC Services – Data Link Layer Protocols – HDLC – PPP.

UNIT – III: NETWORK LAYER

Network Layer Services – Network Layer Performance – IPV4 Addresses – Internet Protocol – IPV6 addressing – Packet Format – Extension Header – Mobile IP.

UNIT – IV: TRANSPORT LAYER

Introduction to Transport Layer – Transport Layer Protocols – Go-Back-N Protocol – Selective Repeat Protocol and Piggybacking – UDP – TCP – SCTP.

UNIT – V: APPLICATION LAYER

Introduction – Client Server Programming – WWW and HTTP – FTP – Electronic Mail – Telnet – DNS – SNMP.

4. Teaching Resources

i. Text

1. Behrouz A Forouzan, “Data Communication and Networking”, 5th Edition, McGraw Hill Education, 2013.

Unit – I : Ch. 1.1 – 1.5, 2.3, 6.1, 7.1 – 7.3

Unit – II : Ch.9.1 – 9.2, 10.1 – 10.4, 11.1 – 11.4

Unit – III : Ch. 18.1, 18.3 – 18.4, 19.1, 22.1 – 22.2, 19.3

Unit – IV : Ch. 23.1 – 23.2, 24.1 – 24.4

Unit – V : Ch. 25.1 – 25.2, 26.1 – 26.4, 26.6, 27.2

ii. References

1. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, 3rd Edition, Pearson Education, 2006.
2. Larry L. Peterson and Bruce S. Davie, “Computer Networks: A System Approach”, Elsevier, 4th Edition, 2007.
3. Andrew S. Tanenbaum, “Computer Networks”, 4th Edition, Prentice-Hall of India, 2003

iii. Web References

Online Tutorial

1. <http://www.isoc.org/internet/history/brief.shtml>
2. <http://www.ist-brain.org/>
3. <http://wireless-world-research.org/>

4. <http://mhhe.com/forouzan>

Online Quiz

1. <http://www.withoutbook.com/OnlineTest.php>
2. http://www.kevinsworkbench.com/networking_quiz/

Online Compiler

1. <http://ideone.com/fork/Ki9zrt>
2. http://tutorindia.net/Personal_Tutor-online-Compiler

5. Supplement Learning

- Periodic Analog Signals
- SONET
- IEEE 802.11 Project
- Connecting Devices and Virtual LANS
- Cryptography and Network Security

Semester -V

5-0-4:30-70

E-COMMERCE

1. Learning Objectives

- To learn the history of E-Commerce in Indian Business Context.
- To learn the basic E-Business models.
- To know the E-marketing strategies.
- To understand the principles in E-Security systems.
- To know the types of E-Payment Systems.

2. Blue Print of the Question Paper

| Section | Unit – I | Unit – II | Unit – III | Unit – IV | Unit – V |
|-----------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (or) b) Theory | 12.a)Theory (or) b) Theory | 13.a)Theory (or) b) Theory | 14.a)Theory (or) b) Theory | 15.a) Theory (or) b) Theory |
| Section-C | 16.Theory | 17.Theory | 18.Theory | 19.Theory | 20.Theory |

3. Course Outline

UNIT – I: HISTORY OF E-COMMERCE AND INDIAN BUSINESS CONTEXT

Introduction – Emergence of the Internet – World wide web – Advantages-Disadvantages – Transition to India – The Internet and India – E-Transition Challenges for Indian Corporate – The Information Technology Act 2000- IT Bill 2006.

UNIT - II: E –BUSINESS MODELS FOR E-COMMERCE

E-business Models Based on the Relationship of Transaction Parties – Business to Consumer – Business to Business – Consumer to Consumer – Consumer to Business – E-Business Models based on the Relationship of Transaction Types.

UNIT - III: E-MARKETING

Traditional Marketing – Identifying web presence goals – The browsing behavior model – Online marketing – E-Advertising – E-branding – Marketing strategies.

UNIT - IV: E-SECURITY

Information System Security – Security on the internet – E-Business Risk management issues – Information Security Environment in India.

UNIT - V: E-PAYMENT SYSTEMS

Digital Payment Requirements – Digital Token based E-Payment Systems – Classification of New Payment System – Properties of Electronic Cash – Cheque Payment System – Risk and E-Payment Systems – Designing E-Payment Systems – Digital Signature.

4. Teaching Resources

i. Text

1.P.T. Joseph, “E-Commerce – An Indian Perspective”, Third Edition, PHI Learning Pvt Ltd, New Delhi, 2009.

Unit – I : Ch. 1

Unit – II : Ch. 2

Unit – III : Ch. 4

Unit – IV : Ch. 5

Unit- V : Ch .6

ii. References

1. R.Kalakota and A.B.Whinston, “Readings in Electronic Commerce”, Addison Wesley, 1997.
2. David Kosiur, “Understanding Electronic Commerce”, Microsoft Press, 1997.
3. Soka, “From EDI to Electronic Commerce”, McGraw Hill, 1995.

iii. Web References

Online Tutorial

1. https://www.tutorialspoint.com/e_commerce
2. <https://ecommerceguide.com/guides/>

Online Quiz

1. www.proprofs.com > Home > Create > Quizzes > Business > Ecommerce
2. <https://www.classmarker.com/online-test/>

5. Supplement Learning

- Retail Management
- Marketing Management
- Human Resource Online Recruitment
- International E-Business
- Shipping and Taxation

Semester- V

5-0-4:30-70

ENTERPRISE JAVA PROGRAMMING

1. Learning Objectives

- To acquire the basic knowledge required for building enterprise applications using JAVA.
- To understand the role of servlet in creating web based applications.
- To have the basic knowledge in Java Server Pages and its role in distributed system.
- To understand the advantages of Java Server Faces over Java Server Pages.
- To program in Java Server Faces framework.

2. Blue Print of the Question Paper

| Section | Unit – I | Unit – II | Unit – III | Unit – IV | Unit – V |
|-----------|----------------------------------|-----------------------------------|-----------------------------------|----------------------------------|------------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (or) b) Theory | 12.a)Theory (or) b) Program | 13.a)Theory (or) b) Program | 14.a)Theory (or) b) Theory | 15.a) Theory (or) b) Program |
| Section-C | 16.Theory | 17.Theory | 18.Theory (or) Program | 19.Theory | 20.Theory (or) Program |

3. Course Outline

UNIT – I: OVERVIEW OF J2EE AND RMI

Distributed Multi-tiered Applications - J2EE Components-J2EEClients – Web Components – Business Components - EIS Tier J2EE Containers - Container Services, Servlets and Dynamic web pages - RMI – java.rmi.server package, Naming Class, RMI Security Manager Class, RMI Exceptions, Steps involved in creating RMI Client and Server Classes.

UNIT – II: SERVLETS

Life cycle of a Servlet – A Simple Servlet, Constituents of javax.servlet Package, Retrieving the values of Parameters, Procedure for execution, Retrieving the values of initialization parameters, javax.servlet - HTTP Package, Constituents of javax.servlet. HTTP Package, Cookies, Creating a Cookie and sending it to the client, Retrieving the stored Cookies, Session Tracking.

UNIT – III: JAVA SERVER PAGES (JSP)

JSP Technology – JSP Page, Life Cycle, Creating Static Content, Dynamic Content, Expression Language, Java Beans Components, Using Custom Tags, Reusing the Contents, Transferring Control to another web component, Including an Applet, Setting Properties, Java Server Pages Documents –Creating JSP Document.

UNIT –IV: JAVA SERVER FACES (JSF)

JSP Benefits, Framework roles, Simple JSF application, User Interface Component Model, Navigational Model, Life Cycle of JSF page, Using JSF in JSP Pages – Setting up a page, using core tags, using HTML tags, using localized messages, Using converters.

UNIT –V: DEVELOPING WITH JAVASERVER FACES TECHNOLOGY

Registering listeners on components, validators, binding component values to external data sources, referencing a backing Bean method, using custom objects writing component properties, performing localization, creating custom converter, implementing event listener, creating custom validator, writing backing Bean methods.

4. Teaching Resources

i. Text

- Stephanie Bodoffetl., “ The J2EETM Tutorial”, Pearson Education, 2005.

Unit – I : Ch. 1
 Unit – III : Ch. 12,13
 Unit – IV : Ch. 17
 Unit – V : Ch.18-19.

- C.Muthu, “Programming in JAVA”, Thomson Learning, 2004.

Unit – I : Ch. 20
 Unit – II : Ch. 19

ii. References

1. Lame Pekowsky, “Java Server Pages”, Pearson Education, 2004.
2. Marty Hall, Larry Brown, “Servlets and Java Server Pages”, Pearson Education, 2005.
3. James McGovern etl., “Java Web Services Architecture”, Elsevier, 2005.

iii. Web References

Online Tutorial

1. <http://www.tutorialspoint.com/servlets/>
2. <http://www.jsptut.com/>

Online Quiz

1. <http://career.guru99.com/j2ee-quiz>
2. <http://www.bullraider.com/quiz/servlet-and-jsp-quiz>

Online Compiler

1. www.browzy.com
2. www.tutorialspoint.com/execute_jsp_online.php

5. Supplement Learning

- JSTL
- JAVA Mail API
- JMS – Building Message Applications
- Web Services
- JNDI and Directory Transactions

Semester-V

5-0-4:30-70

WEB PROGRAMMING USING PHP

1. Learning Objectives

- To understand the basic fundamental syntax and functions.
- To understand form processing and validation methods.
- To know file handling concepts.
- To understand basic MySQL functions.
- To implement PHP using XML functions.

2. Blue Print of the Question Paper

| Section | Unit – I | Unit – II | Unit – III | Unit – IV | Unit – V |
|------------------|-----------------------------------|-----------------------------------|----------------------------------|----------------------------------|------------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (or) b) Program | 12.a)Theory (or) b) Program | 13.a)Theory (or) b) Theory | 14.a)Theory (or) b) Theory | 15.a) Theory (or) b) Program |
| Section-C | 16.Theory | 17.Theory (or) Program | 18.Theory | 19.Theory (or) Program | 20.Theory |

3. Course Outline

UNIT – I: FUNDAMENTALS OF PHP

Web server-Apache-PHP Intro-PHP Install- PHP Syntax- PHP Variables- PHP Echo / Print- PHP Data Types-PHP Strings- PHP Constants PHP Operators- Control structures-PHP Functions- Directory Functions-File System Functions- PHP Arrays PHP Sorting Arrays PHP Super global-String Functions-Date and Time Functions-Mathematical Functions-Miscellaneous Functions.

UNIT – II: PHP FORMS

Basic Form Processing (GET and POST Method) - PHP Form Handling - PHP Form Validation- PHP Form Required – URL- E-mail-PHP Form Complete.

UNIT-III: PHP ADVANCE

PHP Arrays Multi-PHP Date and Time-PHP Include-PHP File Handling- PHP File Open/Read-PHP File Create/Write-PHP File Upload-PHP Cookies-PHP Sessions-PHP Filters-PHP Filters Advanced-PHP Error Handling-PHP Exception-COM-DOM-CURL-SOAP.

UNIT – IV: PHP WITH MYSQL DATABASE

PHP MySQL Functions -Connect -Create DB- Create Table- Insert Data-Get Last ID-Insert Multiple-Prepared-Select Data-Delete Data-Update Data-Limit Data-Table join-Database driven application.

UNIT-V: PHP - XML

PHP XML Parsers-PHP Simple XML Parser-PHP Simple XML - Get PHP XML Expat PHP XML DOM.

4. Teaching Resources

i. Text

1. Julie C.Meloni, Sams, “Teach Yourself PHP, MySQL and Apache”, Fourth Edition, Sams Publishing, New Delhi, 2008.

Unit – I : Ch. 3 – 8, 10

Unit – II : Ch. 11

Unit – III : Ch. 12 – 6

Unit – IV : Ch. 16

Unit – V : Ch. 28

ii. References

1. Luke Welling, Laura Thomson, “PHP and MySQL Web Development” Third Edition, Dorling Kinderly Pvt Ltd., New Delhi, 2006.
2. Julie Meloni, Matt Tellus, “PHP 6”, Cengage Learning Inida Pvt Ltd, New Delhi, 2008.

iii. Web References

Online Tutorial

1. www.w3schools.com
2. www.php.net
3. www.phpclasses.org

Online Quiz

1. <http://www.w3schools.com/quiztest/quiztest.asp?qtest=PHP>
2. <http://www.pskills.org/php.jsp>

Online Compiler

1. <http://compileonline.com>
2. http://www.compileonline.com/execute_php_online.

5. Supplement Learning

- Processing Buffered and Un buffered Queries
- SQL Injection Cheat Sheet

- Comparison Operators
- Security Concepts
- Memory Management in PHP

Semester-V

0-4-4:40-60

PRACTICAL-VII: ENTERPRISE JAVA PROGRAMMING

1. Client/ Server application using RMI
2. Handling HTTP Servlet
3. Working with Cookies
4. Working with Sessions
5. Reading Servlet Parameters using Java Beans
6. Reading JSP Parameters using Java Beans Components
7. Simple JSP Application
8. JSF in JSP Pages
9. Using all HTML render kit
10. Using all Core render kit

Semester - V

0-4-4:40-60

PRACTICAL-VIII: WEB PROGRAMMING USING PHP

1. Control Structures and Arrays
2. Use of Date and time Functions and Mathematical Functions
3. Use of GET and POST Method
4. Form Validation Techniques
5. File operations Read, Write, upload
6. Creation of session and cookies
7. Creation of tables, Insertion, Updation and Deletion of rows in MYSQL tables
8. Database connectivity in PHP with MySQL
9. Basic PHP operations using XML
10. Creation of Simple web pages

Semester – V

2-0-1:30-70

NON MAJOR ELECTIVE- I: INTRODUCTION TO INFORMATION TECHNOLOGY

1. Learning Objectives

- To understand the basic of computer, Evaluation of computers, Generation and basic computer organization.
- To understand the basic of number system and converting from one number system to another.
- To understand the basic of processor, memory and secondary storage device.
- To understand the basic of computer languages and characteristics of a good programming languages.
- To understands the basic concepts of input and output organization.

2. Blue Print of the Question Paper

| Section | Unit-I | Unit-II | Unit-III | Unit-IV | Unit-V |
|-----------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (or) b)Theory | 12.a)Theory (or) b)Theory | 13.a)Theory (or) b)Theory | 14.a)Theory (or) b)Theory | 15.a)Theory (or) b)Theory |
| Section-C | 16.Theory | 17.Theory | 18.Theory | 18.Theory | 20.Theory |

3. Course Outline

UNIT – I: INTRODUCTION TO COMPUTER

Introduction: Characteristics of Computer – Evaluation of Computers – Computer Generation.
Basic Computer Organization: Input and Output Unit – Storage Unit – ALU – CU – CPU – The System Concept.

UNIT – II: NUMBER SYSTEMS

Data types: Non-Positional Number Systems – Positional Number Systems, Binary, Octal and Hexadecimal Numbers – Converting from one Number system to another.

UNIT – III: PROCESSOR AND MEMORY

Processor: Central Processing Unit Memory: Main memory – Secondary Storage: Magnetic Tape, Magnetic Disks, Optical Disks, Memory storage Devices.

UNIT – IV: COMPUTER LANGUAGE

Computer Languages: Analogy with Natural Languages – Machine Languages – Assembly Languages – High Level Language – Object Orient Language – Some High Level Languages – Characteristics of a Good Programming Languages.

UNIT – V: INPUT / OUTPUT ORGANIZATION

Peripheral Devices – I/O interface – Asynchronous Data Transfer – Modes of Transfer – Direct Memory Access – Input Output Processor.

4. Teaching Resources

i. Text

1. Pradeep K.Sinha, Priti Sinha, “Computer Fundamentals”, Sixth Edition BPB Publications.
Unit – I : **Ch. 1 - 2**
Unit - II : **Ch. 3**
Unit - III : **Ch. 7 - 8**
Unit – IV : **Ch. 12**
2. Moris Mano M., Computer System Architecture, 3rd Edition, New Delhi: Pearson Prentice Hall, India, 2008.
Unit – V : **Ch. 11.1 – 11.4, 11.6 – 11.7**

ii. References

1. William Stallings – “Computer Organization and Architecture” Eight edition, Pearson publication – 2010.
2. Morris Mano, “Digital Logic and Computer Design”, Prentice Hall of India Private Limited, New Delhi:2001.

iii. Web References

Online Tutorial

1. http://www.tutorialspoint.com/computer_logical_organization/

Online Quiz

1. <http://www.sanfoundry.com/computer-organization-mcqs-direct-memory-access/>

5. Supplement Learning

- Computer Ports
- Networking
- Internet and Intranet
- Logical Conversion
- Mother Board

1. Learning Objectives

- To learn basic concepts in cloud computing.
- To understand various features of virtualization.
- To learn the basic architecture of cloud.
- To understand Aneka cloud application platform.
- To understand cloud platforms and its applications.

2. Blue Print of the Question Paper

| Section | Unit – I | Unit – II | Unit – III | Unit – IV | Unit – V |
|-----------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (or) b) Theory | 12.a)Theory (or) b) Theory | 13.a)Theory (or) b) Theory | 14.a)Theory (or) b) Theory | 15.a) Theory (or) b) Theory |
| Section-C | 16.Theory | 17.Theory | 18.Theory | 19.Theory | 20.Theory |

3. Course Outline

UNIT – I: INTRODUCTION TO CLOUD COMPUTING

Cloud computing at a Glance – Historical Developments – Building cloud computing environments – Computing Platforms and Technologies.

UNIT – II: VIRTUALIZATION

Introduction – Characteristics of Virtualized Environments – Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing – Pros and cons of Virtualization – Technology examples.

UNIT – III: CLOUD COMPUTING ARCHITECTURE

Introduction – Cloud Reference Model- Types of Clouds – Economics of Cloud – Open Challenges.

UNIT – IV: ANEKA-CLOUD APPLICATION PLATFORM AND THREAD PROGRAMMING

Framework overview – Anatomy of the Aneka Container – Building Aneka Clouds – Clouds – Cloud Programming and Management. – Programming applications with Threads – Multithreading with Aneka.

UNIT – V: CLOUD PLATFORMS IN INDUSTRY AND APPLICATIONS

Amazon Web Services – Google AppEngine – Microsoft Azure – Scientific Applications – Business and Consumer Applications.

4. Teaching Resources

i. Text

1. Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi, “ Mastering Cloud Computing”, McGraw Hill Education (India) Private Limited, 2013.

Unit – I : Ch. 1
Unit – II : Ch. 3

| | | |
|-------------------|----------|-----------------|
| Unit – III | : | Ch. 4 |
| Unit – IV | : | Ch. 5, 6 |
| Unit- V | : | Ch.9, 10 |

ii. References

1. Rajkumar Buyya, James Broberg, Andrzej Goschinski, “Cloud Computing-Principles and Paradigms”, John Wiley and Sons, Inc, New Jersey.
2. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012

iii. Web References

Online Tutorial

1. https://www.tutorialspoint.com/cloud_computing/
2. www.guru99.com/cloud-computing-for-beginners.html

Online Quiz

1. www.javatpoint.com/cloud-computing-quiz
2. www.propofs.com › ... › [Quizzes](#) › [Computer](#) › [Networking](#) › [Cloud Computing](#)

5. Supplement Learning

- Data Security in Cloud Computing
- Big Data Analytics
- Multitenant Technology
- Virtualization Technology
- Service Technology

Semester- VI

4-0-3:30-70

DSE- II: UNIX AND SHELL PROGRAMMING

1. Learning Objectives

- To learn to add and remove users.
- To understand basic UNIX commands.
- To use controls structures.
- To understand loop structures.
- To understand System calls.

2. Blue Print of the Question Paper

| Section | Unit – I | Unit – II | Unit – III | Unit – IV | Unit – V |
|------------------|----------------------------------|----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (or) b) Theory | 12.a)Theory (or) b) Theory | 13.a)Theory (or) b) Program | 14.a)Theory (or) b) Program | 15.a) Theory (or) b) Program |
| Section-C | 16.Theory | 17.Theory | 18.Theory | 19.Theory (or) Program | 20.Theory (or) Program |

3. Course Outline

UNIT – I: FILE ORGANIZATION

Salient Features of Unix – Unix System Organization – Types of Shells – Unix Commands – The Unix File System – Creating Files – Listing Files and Directories. - The Boot Block –

The Super Block – The Inode Table – Data Blocks – How Does Unix Access Files – Storage of Files – Disk Related Commands. System Administration: Adding and Removing Users – Daily Administration – Disk Management – Using a Raw Disk – Monitoring System Usage – Ensuring System Security – Providing Assistance to Users.

UNIT - II: UNIX COMMANDS

Password – Commands: cal, banner, touch – File Related Commands – Viewing Files – Taking Printouts – File Compression – I/O Redirection and Piping. vi Editor – Modes of operation – The First Editing Session. Processes in Unix: What’s Running Right Now – Still More Processes – Background Processes – The nohup command – Killing a process – Changing Process Priorities – Scheduling of Processes, Communication – Unix write and wall command - Basis of Unix Communication.

UNIT - III: SHELL PROGRAMMING - I

Interactive Shell Scripts – Shell Variables – Shell Keywords –Assigning Values to Variables – Positional Parameters – Passing Command Line Arguments – Setting Values of Positional Parameters – Displaying Date in Desired Format – Using Shift on Positional Parameters – Arithmetic in Shell Script- Taking Decisions.

UNIT - IV SHELL PROGRAMMING - II

Loop Control Structure: Loops – The While Loop – Reading from a file – The Until and for Loop – Creating Nested Directories – Generating Values for a for Loop – The Break and Continue Statement- Shell script using Command Line Arguments.

UNIT - V: SYSTEM CALLS

System calls: File Structure related calls - create(), open(), close(), read(), write(), lseek(), process related calls- exec(), fork(), wait(), exit(), getpid(), getppid(), signal(), kill(), alarm() – Inter process communication calls– pipe().

4. Teaching Resources

i. Text

1. Yashavant Kanetkar, “Unix Shell Programming”, BPB Publishers, New Delhi, 1996.

| | | |
|-------------------|----------|---|
| Unit – I | : | Ch. 1, 2, 3, 15 |
| Unit – II | : | Ch. 4, 5, 6, 7, 8 |
| Unit – III | : | Ch. 9 - 10 |
| Unit – IV | : | Ch. 11 |
| Unit-V | : | <u>http://www.cs.utk.edu/~huangj/cs360/360/notes/SyscallIntro/lecture.html</u> |

ii. References

1. Kernighan. et al. “The UNIX Programming Environment”, Second Edition, New Delhi: Prentice Hall of the India, 1988.
2. Stephen G. Kochan, Patrick Wood, “Unix Shell Programming”, Third Edition, Dorling Kindersley Pvt Ltd, Delhi, 2008.

iii. Web References

Online Tutorial

1. <http://www.cgl.ucsf.edu/Outreach/bmi219/slides/shell.html>
2. <http://www.cs.utk.edu/~huangj/cs360/360/notes/SyscallIntro/lecture.html>

Online Quiz

1. www.tcyonline.com/tests/unix-and-shell-scripts
Online Compiler
1. www.compileonline.com/execute_bash_online.php

5. Supplement Learning

- Controlling Terminal
- Job Control
- Orphaned Process Group
- Pipes and Filters
- Signals and Traps

Semester-VI

4-0-3:30-70

DSE-II: MOBILE APPLICATIONS

1. Learning Objectives

- To impart the basis of mobile application and development environment.
- To learn HTML5.
- To use CSS & JavaScript in Mobile.
- To develop simple and professional application.
- To prepare for the job opportunity in mobile application development.

2. Blue Print of the Question Paper

| Section | Unit – I | Unit – II | Unit – III | Unit – IV | Unit – V |
|------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (or) b) Theory | 12.a)Theory (or) b) Theory | 13.a)Theory (or) b) Theory | 14.a)Theory (or) b) Theory | 15.a) Theory (or) b) Theory |
| Section-C | 16.Theory | 17.Theory | 18.Theory | 19.Theory | 20.Theory |

3. Course Outline

UNIT - I: INTRODUCTION

Mobile EcoSystem – Brands – Models – Platforms – Understating the Mobile Web – Myths – Native – Browsers – ERA – WAP – Browsing Experience – Fragmentation – Market Statistics – Web Platforms – HTML5 Web Apps – Pseudo-Browsers – Mobile Browsers Types.

UNIT – II: ARCHITECTURE AND TOOLS

Working with code – Testing – Emulators and Simulators – Real Device Testing – Remote Labs – Production Environment – Web Hosting – Domain – Error Management – Statistics – Mobile Strategy – Context – Server-Side Adaptation – Progressive Enhancement – Responsive Web Design – RESS – Navigation – Design and User Experience – Touch Design Patterns – Tablet Patterns – Official UI Guidelines

UNIT - III: MARKUPS, STANDARDS AND HTML5 BASICS

WML – Current Standards – Politics of the Mobile Web – Delivering Markup – XHTML Mobile Profile and Basic – Mobile HTML5 – Create Template – Syntax Rules – New Elements – CSS – WCSS – CSS3 – HTML5 Compatibility Levels – Testing Your Browser – Basics of Mobile HTML5 – Document Head – Document Body – Boilerplate – Content – Block Elements – Lists – Tables – Frames – Links – Accessibility

UNIT - IV: HTML5 FORMS

Form Design – Elements – Select Lists – Radio Buttons and Checkboxes – Buttons – Hidden Fields – Text Input Fields – Range Slider Fields – Date Input Fields – File Selection Fields – Non interactive Form Elements – Form Control Attributes – Placeholder – Autofocus – Form Validation – Possible Problems – Informational Web Sites – Client-Side Detection – Server-Detection – Images – Dealing with Multiple Screen Densities – Video – Audio.

UNIT - V: CSS AND J-SCRIPT MOBILE

Insert the CSS – Media Queries – Selectors – CSS Techniques – Common Patterns – CSS Sprites – CSS3 Modules – J-Script Coding – Execution – Cloud-Based Browsers – Debugging and Profiling – Battery Consumption – Background Execution – Supported Technologies – Standard J-Script Behavior – J-Script Libraries – UI frameworks – Offline Web Apps – Client-Side Storage – Network Communications

4. Teaching Resources

i. Text

1. Maximiliano Firtman, “Programming the Mobile Web”, O’Reilly, USA, 2nd Edition, 2013.

| | | |
|-------------------|----------|------------------|
| Unit – I | : | Ch. 3 |
| Unit – II | : | Ch. 4-5 |
| Unit – III | : | Ch. 6-7 |
| Unit – IV | : | Ch. 8-10 |
| Unit – V | : | Ch. 11-13 |

ii. References

1. Android application Development for Java Programmers: James C. Sheusi. Cengage Learning, 2013.
2. Programming Android: Zigurd Mednicks, Laird Dornin, G.Blake Mike, Masumi Nakamura, Second Edition, O’Reilly Media, 2012.

iii. Web References

Online Tutorial

1. <https://developer.android.com/training/basics/firstapp/index.html>
2. <https://www.tutorialspoint.com/android/>
3. <https://www.diygenius.com/how-to-learn-android-app-development-online>

Online Quiz

1. https://www.tutorialspoint.com/android/android_online_quiz.htm
2. www.javatpoint.com/android-quiz

5. Supplement Learning

- Thread Concepts
- Memory Leakage
- Mobile Security Mechanism
- REST and JSON in Android Application Development
- Strict Mode in Android

Semester - VI

4-0-3:30-70

DSE- II: CLIENT SIDE SCRIPTING TECHNOLOGIES

1. Learning Objectives

- To learn about the technical complexities, and implementations that allows one to make the most of XML and its related technologies.
- To define the legal building blocks of an XML document and define the document structure with a list of legal elements and attributes.

- To apply an HTML document that can provide dynamic interactivity on websites using JavaScript.
- To learn things like HTML document traversal and manipulation.
- To parse in client-server applications and to implement understand JSON.

2. Blue Print of the Question Paper

| Section | Unit – I | Unit – II | Unit – III | Unit – IV | Unit – V |
|------------------|-----------------------------------|-----------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (or) b) Program | 12.a)Theory (or) b) Program | 13.a)Theory (or) b) Theory | 14.a)Theory (or) b) Theory | 15.a) Theory (or) b) Theory |
| Section-C | 16.Theory | 17.Theory (or) Program | 18.Theory (or) Program | 19.Theory | 20.Theory |

3. Course Outline

UNIT - I: FUNDAMENTALS OF XML

SGML - HTML - Electronic Data Interchange - XML – Promise of XML - E-Business - Content Management - Web Services and Distributed Computing - Networking and Instant Messaging - Semantic Web. Syntax - Document - Document Structure - Content Models – Whitespace - Rules of XML Structure - Well-Formed Documents - Valid Documents - Namespaces - Applying Style - Reading and Processing - International Language Support.

UNIT - II: XML DTD AND XML SCHEMAS

Document Type Definitions - Some Simple DTD Examples - Structure of a Document Type Definition - DTD Drawbacks and Alternatives.

UNIT – III: JAVASCRIPT BASICS

JavaScript- Client-Side JavaScript- Advantages Of JavaScript- Limitations Of JavaScript- JavaScript Development Tools- Syntax-Placement-Variables-Operators-Control Statements- Loop Control-Functions-Events-Cookies.

UNIT-IV: JQUERY

Overview of JQuery-Basics- Selector- Query Attribute-Dom Traversing-CSS Selector Method.

UNIT-V: JSON

JSON introduction- JSON syntax- JSON usage- JSON using XMLHttpRequest- JSON files- JSON SQL

4. Teaching Resources

i. Text

1. XML and Web Services, Ron Schmelzer Pearson Education 2008 Edition, Pearson Education.

Unit - I : **Part I: Ch. 1-2**

Unit - II : **Ch. 3**

Unit - III : **Part I: Ch:1-2-3-4-5-6-7-8-9-10-11-12**

- Unit - IV** : http://www.tutorialspoint.com/javascript/javascript_tutorial.pdf
Ch: 1-2-3-4-5-6
- Unit - V** : http://www.tutorialspoint.com/jquery/jquery_tutorial.pdf
Unit V: Ch: 1-2-3-4-5
http://www.w3schools.com/js/js_json_intro.asp

ii. Web References

Online Tutorial

1. <https://www.youtube.com/watch?v=n-y-YHVZSwk>
2. <https://www.youtube.com/watch?v=aMqHYsGKscE>
3. <https://www.youtube.com/watch?v=jkTzHEtHd54&list=PL41lfR-6DnOrwYi5d824q9-Y6z3JdSgQa>

Online Quiz

1. <http://www.w3schools.com/quiztest/quiztest.asp?qtest=JavaScript>
2. <http://www.w3schools.com/quiztest/quiztest.asp?qtest=jQuery>

Online Compiler

1. <https://js.do/>
2. http://www.w3schools.com/jquery/tryit.asp?filename=tryjquery_hi_de
3. http://www.w3schools.com/js/tryit.asp?filename=tryjs_myfirst

5. Supplement Learning

- AJAX XML File
- XQuery
- XSD Data
- JavaScript Functions
- JSON PHP

1. Learning Objectives

- To configure an asp.net application.
- To create ASP.Net applications using standard .net controls.
- To develop a data driven web application.
- To connect the data sources and managing them.
- To maintain the session and controls related information for user used in multi-user web applications.

2. Blue Print of the Question Paper

| Section | Unit – I | Unit – II | Unit – III | Unit – IV | Unit – V |
|------------------|-----------------------------------|-----------------------------------|----------------------------------|----------------------------------|------------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (or) b) Program | 12.a)Theory (or) b) Program | 13.a)Theory (or) b) Theory | 14.a)Theory (or) b) Theory | 15.a) Theory (or) b) Program |
| Section-C | 16.Theory | 17.Theory (or) Program | 18.Theory | 19.Theory (or) Program | 20.Theory |

3. Course Outline**UNIT – I: INTRODUCTION**

Setting up ASP.NET and IIS -IIS manager-Creating a Virtual Directory-Virtual Directories and Applications-Folder Settings-ASP.NET Applications – File Types – The bin Directory Application Updates – A Simple Application – Code Behind – Web Form Inheritance Compiled Code – Compiling Multiple Files into One Assembly – Importing Namespaces – Assessing Code Behind - The Global.asax code behind-Application events-ASP.NET configuration-The Web.config file –Configuration file section.

UNIT –II: WEB FORMS

Web Form Fundamentals - A Simple Page Applet - The Problem with Response. Write – Server Controls - HTML Server Controls - View State - The HTML Control Classes - Events – Event Handling Changes - The Currency Converter application-Adding Support for Multiple Currencies -Adding Linked Images - Setting Styles – A Deeper Look at HTML control classesHTML control events-The HtmlControl Base Class-The HtmlContainerControl Class-The HtmlInputControl Class - The Page class-The Controls collection-The HttpRequest Class-The HttpResponse Class-The ServerUtility Class-Assessing HTML Server controls.

UNIT III: WEB CONTROLS

Stepping Up to web Controls - Basic Web Control Classes - The web Control Tags The WebControl Base Class- AutoPostBack and Web Control Events - How Postback Events Work – ThePage Lifecycle.

UNIT –IV: VALIDATION AND RICH CONTROLS

Validation and Rich Controls – The Calendar Control – Formatting the Calendar – Restricting Dates – The AdRotator – Validation Controls – Validation Process Validation Classes –

Server Side Validation – Manual Validation – Understanding Regular Expressions – Literals and Metacharacters – Finding a Regular Expression.

UNIT-V: DATA ACCESS

About ADO.NET-Data objects-Simple Data access – Simple Data Updates – Creating a Connection – Defining a Select Command – Using a Command with a DataReader – Updating Data – Accessing Disconnected Data – Selecting Multiple Tables – Modifying Disconnected Data – Updating Disconnected Data.

4. Teaching Resources

i. Text

1. Mathew MacDonald, “ASP.NET: The Complete Reference”, Tata McGraw Hill Publishing Company Ltd., New Delhi 2002.

Unit - I : **Ch. 2.1, 2.7, 3.2, 3.5, 3.11, 3.14.**

Unit - II : **Ch. 5.1, 5.2, 5.3, 5.4.**

Unit - III : **Ch. 7.1, 7.2, 7.3**

Unit - IV : **Ch. 9.1, 9.2, 9.3, 9.4**

Unit - V : **Ch. 9.1, 11.1, 11.2, 11.3.**

ii. References

1. Dino Eesposito, “Introducing Microsoft ASP .NET 2.0”, Prentice Hall of India, New Delhi, 2006.
2. Stephen Walther, “ASP.NET 2.0 Unleashed”, Second Edition, Pearson Education, 2005.

iii. Web References

Online Tutorial

1. <http://ebookily.net/doc/hearn-d-baker-p-computer-graphics>
2. <http://www.cs.brandeis.edu/~cs155>

Online Quiz

1. <http://www.careerride.com/test.aspx?type=ASP.NET>
2. <http://www.withoutbook.com/OnlineTestStart.php?quizId=70>

Online Compiler

1. <https://dotnetfiddle.net/CsMvc>
2. <http://compileonline.com/>

5. Supplement Learning

- ASP.NET Administrative Tasks
- AJAX extensions
- Working with XML data
- WCF
- SQL Basics

1. Learning Objectives

- To understand the concepts of vectors and data types.
- To understand the various R functions and strings in R Programming.

- To understand the concepts of data frame and reshaping.
- To become more popular in charts and graphs.
- To understand the mean, median and mode in R statistics.

2. Blue Print of the Question Paper

| Section | Unit – I | Unit – II | Unit – III | Unit – IV | Unit – V |
|-----------|-----------------------------------|--------------------------------|----------------------------------|-------------------------------|---------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (or) b) Program | 12.a)Theory (or) b) Program | 13.a)Theory (or) b) Theory | 14.a)Theory (or) b) Theory | 15.a) Theory (or) b) Program |
| Section-C | 16.Theory | 17.Theory (or) Program | 18.Theory | 19.Theory (or) Program | 20.Theory |

3. Course Outline

UNIT – I: INTRODUCTION TO R PROGRAMMING

Overview – Evaluation – Features – Environment Setup – Basic Syntax – Data Types – Vectors, Lists, Matrices, Arrays, Factors and Data Frames – Variables – Operators – Decision Making and loops.

UNIT – II: FUNCTION

Function – Function Definition – Function Components – Built-in Function – User Defined Function – Calling a Function – Lazy Evaluation of Function – Strings – Vectors – Lists – Matrices – Arrays and Factors.

UNIT – III: DATA FRAMES

Data Frames – Packages – Data Reshaping – CSV Files – Excel File – Binary Files – XML Files – Data Bases.

UNIT – IV: CHARTS AND GRAPHS

Pie Charts – Pie Chart Title and Colors, Slice Percentages and Chart Legend, 3D Pie Chart – Bar Charts – Bar Chart Label, Title Colors, Group Bar chart and Stacked Bar Chart – Boxplots – Creating the Boxplot and Boxplot with Notch – Histograms – Line Graphs – Line Chart Title, Color and Labels, Multiple Lines in a Line Chart.

UNIT – V: STATISTICS

Mean, Median and Mode – Linear Regression – Multiple Regression – Logistics Regression – Normal Distribution – Binomial Distribution – Poisson Regression – Analysis of Covariance – Time Series Analysis.

4. Teaching Resources

i. Text

1. Robert Gentleman and Ross Ihaka, “R Programming”, Tutorials Point (I) Pvt. Ltd, 2016.

| | | |
|------------|---|-----------------|
| Unit – I | : | Ch. 1 – 8 |
| Unit – II | : | Ch. 9 – 15 |
| Unit – III | : | Ch. 16 – 22, 25 |
| Unit – IV | : | Ch. 26 – 30 |
| Unit – V | : | Ch. 32 – 40 |

ii. References

1. W. N. Venables and D. M. Smith, “An Introduction to R: A Programming Environment for Data Analysis and Graphics”, 2016.

2. Norman Matloff, “The Art of R Programming”, A Tour of statistical software design 2009.
3. Robert J Knell, “Introductory R: A beginner’s guide to data visualization, statistical analysis and Programming in R”, Walton on Thames United Kingdom 2014.

iii. Web References

Online Tutorial

1. <https://CRAN.R-project.org/>
2. <http://www.omegahat.net/>
3. <http://www.rseek.org>
4. <http://www.tutorialspoint.com/r/>

Online Quiz

1. <http://www.sanfoundry.com/r-programming-quiz-online/>
2. <http://dni-institute.in/blogs/r-quiz-1/>

Online Compiler

1. https://www.tutorialspoint.com/execute_r_online.php
2. <https://www.codechef.com/ide>
3. <http://www.r-fiddle.org/#/>

5. Supplement Learning

- R-JSON file
- R – Web Date
- R-Non Linear Least Square
- R- Decision Tree
- R – Random Forest

Semester – VI

0-4-4:40-60

PRACTICAL-IX: PROGRAMMING USING .NET AND R

.NET

1. Sample Application and Programming using Web Config File
2. HTML Control Classes and HTML Control Events
3. Web Control Classes and Web Control Tags
4. Validation Controls and Rich Controls
5. Data Access and XML Classes

R

1. R Data Types, R Operators, R Decision Making and R Loops
2. R Functions, R String, R Vectors and R List
3. R Arrays and Matrices
4. R Data Frames and Reshaping
5. R Charts and Graphs

Semester – VI

2-0-1:30-70

NON MAJOR ELECTIVE- II: MULTIMEDIA

1. Learning Objectives

- To understand the basic of Multimedia, Delivering Multimedia, Using Text and Fonts in Multimedia.
- To understand the basic of making still images, Understanding natural lights and color and various image file formats.
- To understand the basic of sounds, digital and MIDI audio, multimedia sound systems and sounds to your multimedia project.

- To understand the basic of animation, principles of animation and making animations.
- To understand the basic of working, displaying, shooting and editing of video.

2. Blue Print of the Question Paper

| Section | I-Unit | II-Unit | III-Unit | IV-Unit | V-Unit |
|------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Section-A | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Section-B | 11.a)Theory (or) b)Theory | 12.a)Theory (or) b)Theory | 13.a)Theory (or) b)Theory | 14.a)Theory (or) b)Theory | 15.a)Theory (or) b)Theory |
| Section-C | 16.Theory | 17.Theory | 18.Theory | 18.Theory | 20.Theory |

3. Course Outline

UNIT - I: INTRODUCTION TO MULTIMEDIA

Introduction to Multimedia, Where to use Multimedia, Delivering Multimedia, Text the Power of Meaning, About Font and Faces, Using Text in Multimedia, Computers and Text, Font Editing and Designing Tools.

UNIT – II: IMAGES

Making still images – Bitmap, Vector Drawing, 3-D Drawing and Rendering Color – Understanding Natural light and Color, Computerized Color, Color Palettes, Image File Format – Macintosh Format, Windows Formats, Cross – Platform Formats.

UNIT – III: SOUND

Sound: The power of Sound, Digital Audio, MIDI Audio, MIDI vs. Digital Audio, Multimedia System Sounds, Audio File Formats, Vaughan’s Law of Multimedia Minimums, Adding sound to Your Multimedia Project.

UNIT – IV: ANIMATION

Animation: The Power of Motion, Principles of Animation, Animation by Computer, Making Animations

UNIT – V: VIDEO

Video: Using Video, How Video Works and Is Displayed, Digital Video Containers, Obtaining Video Clips, Shooting and Editing Video.

4. Teaching Resources

i. Text

1. Tay Vaughan, “Multimedia: Making it work”, 8th edition, Tata McGraw Hills.

| | |
|-------------------|------------------|
| Unit - I: | Ch. 1 - 2 |
| Unit - II | : Ch. 3 |
| Unit - III | : Ch. 4 |
| Unit – IV | : Ch. 5 |
| Unit – V | : Ch. 6 |

ii. References

1. James E Shuman, “Multimedia in action”, Vikas Publishing House.
2. Andreas hoi zinger, “Multimedia basics volume / technology”, firewall media New Delhi.

iii. Web References

Online Tutorial

1. <https://multimedia.journalism.berkeley.edu/tutorials/starttofinish/>
2. http://www.w3schools.com/html/html_media.asp

Online Quiz

1. http://highereducation.com/sites/0072367555/student_view0/cha-pter13/multiple-choice-quiz.html
2. <http://treeknox.com/computer/languages/computer-multimedia-questions/index.php>

5. Supplement Learning

- Basic Multimedia Software Tools
- Making Instant Multimedia
- Multimedia Authoring Tools
- Font Editing and Designing Tools
- Multimedia and the Internet

Semester - VI

0-6-4:20-80

PROJECT WORK

Objective

- To practice the Systems Development Life Cycle (SDLC) in an application or system domain.

i. General Regulations

11. The project work report must be original. Photocopies are not accepted.
12. Plagiarism when detected result in being given zero marks to the candidate.
13. In the course of project development each student must have regular consultation with guides and these consultations must be recorded. The consultation is meant to review the candidate progress, besides the advising the candidate on any project issues. During each consultation the candidate must submit, the intermediate deliverables to the project guide for review. The deliverable will be assessed and marks will be allocated during the final project presentation.
14. Each consultation report must reflect the detailed tasks completed for the period, the problems encountered in the course of the project, how the candidate resolved them and the plan for the next phase.
15. A minimum of five consultations throughout the project is essential to accept the project for the final evaluation.
16. Two copies of the project are to be submitted at the prescribed time announced by the department.
17. A student shall be declared to be successful in the project if s/he secures 40% or above in the semester examination and 40% or above in the aggregate of CA and the semester examination. If the candidate fails, he/she has to improve his/her project and s/he has to resubmit in the following even semester.
18. Viva-voce is compulsory for all candidates who have submitted the project work. If a candidate is absent for viva voce, and then his absence is treated as absence for the semester examinations.
19. The students who fail in the project work will have to redo the whole project again.
20. Combined projects are not allowed.

ii. Evaluation

| | | | |
|-----------------|----------------------------|-----------------|------------------|
| CA | | | 20 Marks |
| | First Review | 10 Marks | |
| | Second Review | 10 Marks | |
| | Total | 20 Marks | |
| Semester | | | 80 Marks |
| | Evaluation of Project Work | 40 Marks | |
| | Demo | 20 Marks | |
| | Presentation | 10 Marks | |
| | Viva Voce | 10 Marks | |
| | Total | 80 Marks | 100 Marks |

Two examiners will evaluate the project report separately and average is calculated for the final semester mark.

Semester -V

0-0-1*:100

SELF STUDY PAPER- I: INDUSTRY INTERFACE

Learning Objectives:

- This course provides an opportunity for the students to approach an industry, study the business processes and propose a solution. The study must be done by interacting with at least 5 key persons of the organization at different levels of management and operation.
- During the vacation between fourth and fifth semesters, each student will approach an industry/service sector to do a system study and propose a solution.
- The student is expected to make at least 5 technical visits to the organization during the industry visit and prepare a system study report. The report should consist of various policies, procedures, templates, guidelines and interview logs associated with the industry. The report of each visit should be acknowledged by a designated authority of the organization.
- Each visit should also include some kind of service to the organization such as training for the employees in basic computing skills, survey, resource gathering, data processing or monitoring.
- Each student maintains a Performance Card in which all his/her activities during the visits are recorded.

1. Submission of the Profile of the Organization

- Students are expected to submit the profile of the perspective organization in which the fieldwork will be done. Students may take an introduction letter from the department to introduce the objective of Industry Interface.

- Preferred organization must be a registered one as a Company, Trust, Service sector or Government sector, having at least 50 employee and three years of market existence. There should be a well-defined existing business process, which needs to be computerized or improved upon.

2. Approval of the Selection of the Organization

- Based on the submitted profile, the department shall approve the Industry Interface Site.

3. Sign-Off from the Organization

- Students must explain to the selected Organization what they are going to do during the course of their visits and should get the sign-off from the company based on the terms and conditions of the visit and deliverables.

4. Technical Visits

- Students should study the following aspects during their each visit and submit the report to the Department.

Visit 1 – Organizational System and Core Business

Visit 2 – Business Process (in IEEE Format)

Visit 3 – Subsystem I

Visit 4 – Subsystem II

Visit 5 – Subsystem III

- Each visit should take place on a different day. Recording the details of each visit is a must for the students and the students should get the required acknowledgement from the Industry Interface Representatives and submit the same to the department coordinator.

5. Final Report

- To make this visit really successful, students should make sure that they are proposing a software solution to the existing problem in the organization they visit. Based on this, final report should be prepared by the students.

6. Presentation of the Final Report

- Each student shall make a presentation (for 10 minutes) based on their reports given and explain the proposed solution. Clarifications shall be held for each presentation for at least 2 minutes.

7. Evaluation Scheme

| Reports | | 50 Marks |
|-----------------------------------|----------|------------------|
| | Report 1 | 10 Marks |
| | Report 2 | 10 Marks |
| | Report 3 | 10 Marks |
| | Report 4 | 10 Marks |
| | Report 5 | 10 Marks |
| Final Report | | 30 Marks |
| Presentation of the Report | | 20 Marks |
| Total | | 100 Marks |

Semester -VI

0-0-1*:100

SELF STUDY PAPER- II: SOFTWARE DOCUMENTATION

1. Objectives

- To make the student to study basic principles of software documentation.

- To introduce students to different forms of software documentation.
- To make the student to be aware of the process of software documentation.
- To know the tools for software documentation.
- To make the student to prepare software document.

2. Course outline

UNIT – I: INTRODUCTION TO SOFTWARE DOCUMENTATION

Understanding Task Orientation - Principles of Software Documentation – Theory Behind Task Orientation – Forms of Software Documentation – Processes of Software Documentation.

UNIT – II: FORMS OF SOFTWARE DOCUMENTATION

Writing To Teach-Tutorials – Writing to Guide -Procedures– Writing to Support -Reference.

UNIT – III: PROCESS OF SOFTWARE DOCUMENTATION

Analyzing Your Users –Planning and Writing your Documents – Getting Useful Reviews – Conducting Usability Tests – Editing and Fine Tuning.

UNIT – IV: TOOLS FOR SOFTWARE DOCUMENTATION

Designing for Task Orientation – Laying out pages and Screens – Getting the Language Right – Using Graphics Effectively – Designing Indexes.

UNIT V: CASE STUDY

3. Teaching Resources

i. Text

1. Thomas T. Barker, "Writing Software Documentation -A Task-Oriented Approach", 2nd Edition, Pearson Education, 2004.

| | | |
|-------------------|----------|--------------------|
| Unit – I | : | Ch. 1 |
| Unit – II | : | Ch. 2 – 4 |
| Unit – III | : | Ch. 5 – 9 |
| Unit – IV | : | Ch. 10 – 14 |

ii. References

1. William A.Florac, “Measuring the Software Process”, Pearson Education, Dorling Kinderley Pvt Ltd, Delhi, 2008.
2. Bob Hughes, Mike Cotterell, Rajib Mall, “Software Project Management” Fifth Edition, Tata McGraw Hill Education Pvt Ltd, New Delhi, 2011.

iii. Web References

Online Tutorial

1. <http://www.webassist.com/support/free-tools>
2. https://www.tutorialspoint.com/software_engineering/software_implementation.htm

Online Quiz

1. <http://www.sanfoundry.com/software-engineering-questions-answers/>
2. https://www.tutorialspoint.com/software_engineering/software_engineering_interview_questions.htm

Online Compiler

1. <https://gcc.gnu.org/onlinedocs/>

4. Evaluation Regulations:

| | | |
|-------------------------------------|--------------------------------------|------------------|
| Test | | 30 Marks |
| | Test 1 | 10 Marks |
| | Test 2 | 10 Marks |
| | Test 3 | 10 Marks |
| Report | | 40 Marks |
| | Topic Selection & Problem Definition | 05 Marks |
| | Paper Work Schema | 10 Marks |
| | Survey of Literature | 10 Marks |
| | Technical Exposition | 05 Marks |
| | Summary of Discourse | 05 Marks |
| | Bibliography & References | 05 Marks |
| Evaluation by the Supervisor | | 30 Marks |
| | Content presentation | 20 Marks |
| | Viva Voce | 10 Marks |
| Total | | 100 Marks |

B.Sc Microbiology - Programme Structure (2017-18 Batch onwards)

| Sem | Part | Code | Subject Title | Hrs | Credit (s) | E - Hrs | CA | SE | Total |
|--------------|------|--------|--|-----------|----------------|---------|----|----|-------|
| I | I | | Tamil – I | 5 | 3 | 3 | 30 | 70 | 100 |
| | II | | English – I | 5 | 3 | 3 | 30 | 70 | 100 |
| | III | | Allied Biochemistry – I | 4 | 3 | 3 | 30 | 70 | 100 |
| | III | | Allied Practical – I | 2 | 1 | 6 | 40 | 60 | 100 |
| | III | MB101 | Fundamentals of Microbiology | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | MB102 | Microbial Diversity and Classification | 3 | 3 | 3 | 30 | 70 | 100 |
| | III | MB103P | Main Practical - I | 3 | 3 | 6 | 40 | 60 | 100 |
| | IV | SK 103 | Personal Skills | 2 | 1 | - | - | - | - |
| | IV | | Christian Religion – I/Value Education - I | 2 | 1 | 3 | 30 | 70 | 100 |
| | IV | | Communicative English – I | - | 1* | - | - | - | - |
| Total | | | | 30 | 22 + 1* | - | - | - | - |
| II | I | | Tamil – II | 5 | 3 | 3 | 30 | 70 | 100 |
| | II | | English – II | 5 | 3 | 3 | 30 | 70 | 100 |
| | III | | Allied Biochemistry – II | 4 | 3 | 3 | 30 | 70 | 100 |
| | III | | Allied Practical – II | 2 | 1 | 6 | 40 | 60 | 100 |
| | III | | Microbial Physiology and Metabolism | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | | Bioinstrumentation | 3 | 3 | 3 | 30 | 70 | 100 |
| | III | | Main Practical - II | 3 | 3 | 6 | 40 | 60 | 100 |
| | IV | | Social Skills | 2 | 1 | - | - | - | - |
| | IV | | Christian Religion – II/Value Education - II | 2 | 1 | 3 | 30 | 70 | 100 |
| | IV | | Communicative English – II | - | 1* | - | - | - | - |
| Total | | | | 30 | 22 + 1* | - | - | - | - |
| III | I | | Tamil – III | 5 | 3 | 3 | 30 | 70 | 100 |
| | II | | English – III | 5 | 3 | 3 | 30 | 70 | 100 |
| | III | | Allied Biostatistics – I | 6 | 4 | 3 | 30 | 70 | 100 |
| | III | | Immunology | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | | Mushroom Technology | 3 | 3 | 3 | 30 | 70 | 100 |
| | III | | Main Practical - III | 3 | 3 | 6 | 40 | 60 | 100 |
| | IV | | Employment Skills – I | 2 | 1 | - | - | - | - |
| | IV | | Environmental Science | 2 | 1 | 3 | 30 | 70 | 100 |
| Total | | | | 30 | 22 | - | - | - | - |
| IV | I | | Tamil – IV | 5 | 3 | 3 | 30 | 70 | 100 |
| | II | | English – IV | 5 | 3 | 3 | 30 | 70 | 100 |
| | III | | Allied Biostatistics – II | 6 | 4 | 3 | 30 | 70 | 100 |
| | III | | Bioinoculant Technology | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | | Microbial Genetics | 3 | 3 | 3 | 30 | 70 | 100 |
| | III | | Main Practical - IV | 3 | 3 | 6 | 40 | 60 | 100 |
| | IV | | Employment Skills – II | 2 | 1 | - | - | - | - |
| | IV | | Human Rights | 2 | 1 | 3 | 30 | 70 | 100 |
| | V | | DEEDS | - | 2 | - | - | - | - |
| | V | | SHELTERS | - | 2 | - | - | - | - |
| | V | | Summer Lab/Industrial Training | - | 2* | - | - | - | - |
| Total | | | | 30 | 26 + 2* | - | - | - | - |

| Sem | Part | Code | Subject Title | Hrs. | Credit (s) | E – Hrs | CA | SE | Total |
|--------------|--------------|--------|---|-----------|----------------|----------------|----|----|-------|
| V | III | | Molecular Biology and Genetic Engineering | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | | Medical Bacteriology | 5 | 5 | 3 | 30 | 70 | 100 |
| | III | | Virology | 5 | 5 | 3 | 30 | 70 | 100 |
| | III | | Medical Mycology and Parasitology | 5 | 4 | 3 | 30 | 70 | 100 |
| | III | | Main Practical – V | 5 | 4 | 6 | 40 | 60 | 100 |
| | III | | Major Elective – I a) Health Care & Hygienic Practices b) Computational Biology c) Pharmaceutical Microbiology (One out of three) | 4 | 3 | 3 | 30 | 70 | 100 |
| | III | | Non – Major Elective – I | 2 | 1 | 3 | 30 | 70 | 100 |
| | III | | SSP – 1: Nutrition and Dietics | - | 1* | - | - | - | - |
| | Total | | | | 30 | 26 + 1* | - | - | - |
| VI | III | | Microbial Biotechnology | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | | Environmental Microbiology | 5 | 5 | 3 | 30 | 70 | 100 |
| | III | | Vermitechnology | 4 | 4 | 3 | 30 | 70 | 100 |
| | III | SS - 1 | Food Microbiology | 5 | 5 | 3 | 30 | 70 | 100 |
| | III | SS – 2 | Industrial Microbiology | 5 | 5 | 3 | 30 | 70 | 100 |
| | III | | Main Practical – VI | 5 | 4 | 6 | 40 | 60 | 100 |
| | III | | Non – Major Elective – II | 2 | 1 | 3 | 30 | 70 | 100 |
| | III | | SSP – 2: Dairy Technology | - | 1* | - | - | - | - |
| Total | | | | 30 | 28 + 1* | - | - | - | - |

Total Hours = 180 Hrs

Total Credits = 148 + 2 *(SSP) + 2 *(Lab/Industrial training) + 2* from other department Certificate course.

Semester – V Molecular Biology and Genetic Engineering

4 Hours / 4 Credits

Objectives

To study the pathogenicity, clinical symptoms and treatment for disease causing bacteria.

To provide the ability to characterize, isolate and identify different Medically important bacteria.

Learning Outcomes

To introduce the knowledge of the medically important bacteria, bacterial morphology with the main focuses being the pathogenicity, clinical symptoms, identification and treatment for different bacteria.

Unit - I: Clinical Specimens - Collection, Transport and Storage; Laboratory diagnosis of Bacteria – Staining techniques, Culture medium, Biochemical tests and Serological tests; Antibiotics – Microorganisms involved in Antibiotics production, Classification, Antibiotic Sensitivity Test and Antimicrobial Resistance.

Unit–II: Morphology, Cultural characteristics, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Gram Positive Cocci - *Staphylococcus aureus*, *Streptococcus pyogenes*, *Streptococcus agalactiae*, Viridans *Streptococci* – *Streptococcus pneumoniae* and Gram Negative Cocci – *Neisseria meningitidis* and *Neisseria gonorrhoeae*.

Unit–III: Morphology, Cultural characteristics, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Gram Positive Bacilli - *Bacillus anthracis*, *Bacillus cereus*, *Clostridium* sp., *Listeria monocytogenes*, *Corynebacterium diphtheriae*, *Mycobacterium leprae* and *Mycobacterium tuberculosis*).

Unit–IV: Morphology, Cultural characteristics, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Enterobacteriaceae (*Escherichia coli*, *Klebsiella pneumoniae*, *Proteus* sp., *Salmonella* sp. and *Shigella* sp.), *Pseudomonas aeruginosa*, *Vibrio cholerae*, *Campylobacter jejuni* and *Helicobacter pylori*.

Unit–V: Morphology, Cultural characteristics, Pathogenicity, Laboratory diagnosis, Treatment and Preventive measures for *Haemophilus influenzae*, *Brucella* sp., *Bordetella* sp. Spirochaetes (*Treponema pallidum*, *Borrelia* sp. and *Leptospira* sp.), *Mycoplasma* sp. and *Rickettsia* sp.

Text Books

- Jawetz, E., J. L. Melnic and E. A. Adelberg. 2013. Review of Medical Microbiology, 26th Edition, Lange Medical Publishers, New York.
- Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. Medical Microbiology, 8th Edition, Elsevier Publications, United States.

References

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- Chakraborty, P. 2013. A Text book of Microbiology, Published by New Central Book Agency (P) Ltd., Kolkata, India.
- Baron, E. J and S. M. Finegold. 1990. Bailey and Scott's Diagnostic Microbiology, 8th Edition, The C.V. Mosby Company. St. Louis, Missouri.

Objectives

- To make the students to understand the role of viruses in major diseases.
- To study general aspects of Structure, Classification, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Viruses.
- To understand the structure and replication of Bacteriophages.

Learning Outcomes

Virologist are highly demanded in the Medical research companies, Pharmaceutical companies, Governmental agencies, Laboratory testing companies or Cancer treatment or Research companies depending upon the specialization. This paper will provide the wide knowledge on Structure, Classification, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Viruses.

Unit – I: General properties and Structure of viruses; Classification of Virus; Replication of Viruses; Cultivation of Viruses; Diagnosis of Viral infections; Viral diseases – transmission, prevention and treatment; Antiviral agents; Viral Vaccines and its Immunization Schedule.

Unit – II: Structure, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for DNA Viruses – Poxviridae (Pox Virus); Herpesviridae (Herpes Simplex Virus, Varicella Zoster Virus and Epstein-Barr Virus); Adenoviridae (Adenovirus); Hepadnaviridae (Hepatitis – B Virus); Papillomaviridae (Papilloma Virus); Polymaviridae (BK & JC Virus) and Parvoviridae (B19 Parvo Virus).

Unit – III: Structure, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for RNA Viruses – Picornaviridae (Poliovirus & Rhinovirus); Rhabdoviridae (Rabies Virus); Calciviridae (Norwalk Virus); Togaviridae (Rubella virus) and Filoviridae (Ebola virus); Arboviruses (Flavivirus & Alphavirus).

Unit – IV: Structure, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for RNA Viruses – Orthomyxoviridae (Influenza virus); Paramyxoviridae (Parainfluenza virus, Measles virus & Mumps virus); Coronaviridae (Coronavirus – SARS); Retroviridae (HIV); Reoviridae (Rotavirus); Bunyaviridae (Bunyavirus) and Arenaviridae (Arenavirus).

Unit – V: Bacteriophages - General characteristics, Structure, Replication of Double stranded DNA Bacteriophages - Lytic cycle and Lysogenic cycle; Replication of Single stranded DNA Bacteriophage (M13 phage); Typing of Bacteriophage.

Text Books

- Jawetz, E., J. L. Melnic and E. A. Adelberg. 2013. Review of Medical Microbiology, 26th Edition, Lange Medical Publishers, New York.
- Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. Medical Microbiology, 8th Edition, Elsevier Publications, United States.

References

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.

- Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- Chakraborty, P. 2013. A Text book of Microbiology, Published by New Central Book Agency (P) Ltd., Kolkata, India.
- Baron, E. J and S. M. Finegold. 1990. Bailey and Scott's Diagnostic Microbiology, 8th Edition, The C.V. Mosby Company. St. Louis, Missouri.

Semester – V

Medical Mycology and Parasitology

5 Hours / 5 Credits

Objectives

- To make the students to understand the role of Fungi, Protozoa and Helminths in Human diseases.
- To study general aspects of Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Fungal and Parasitic diseases.
- To establish basic theoretical knowledge in the fields of Mycology and Parasitology.

Learning Outcomes

Students will be familiar with current developments and advances in the field of Mycology and Parasitology. They also will gain more knowledge on Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Fungal and Parasitic diseases.

Unit – I: General Properties of Fungi (Mold and Yeast); Classification of Human Mycoses – Superficial Mycoses, Cutaneous Mycoses, Subcutaneous Mycoses, Endemic Mycoses and Opportunistic Mycoses; Laboratory diagnosis of fungi from clinical specimens; Antifungal agents; Antifungal activity testing methods.

Unit–II: General Characteristics, Pathogenesis, Clinical Manifestations, Laboratory Diagnosis and Treatment for Opportunistic Mycoses (Candidiasis, Cryptococcosis & Aspergillosis), Endemic Mycoses (Blastomycosis, Histoplasmosis & Coccidioidomycosis).

Unit–III: General Characteristics, Pathogenesis, Clinical Manifestations, Laboratory Diagnosis and Treatment for Superficial Mycoses (Black piedra, White piedra, Tinea nigra & Pityriasis versicolor), Cutaneous Mycoses (Dermatophytoses) and Subcutaneous Mycoses (Sporotrichosis); Mycotoxins and Mycotoxicoses.

Unit–IV: Protozoa - Morphology, Life cycle, Clinical Manifestations, Lab diagnosis and Treatment for Intestinal Protozoa (*Entamoeba histolytica*, *Giardia lamblia* & *Balantidium coli*), Urogenital Protozoa (*Trichomonas vaginalis*) and Blood & Tissue Protozoa (*Plasmodium* sp., *Leishmania* sp. & *Trypanosoma* sp.); Antiprotozoan drugs.

Unit–V: Helminths - Morphology, Life cycle, Clinical Manifestations, Lab diagnosis and Treatment for Nematodes (*Ascaris lumbricoides* & *Wuchereria bancrofti*), Trematodes (*Fasciola hepatica* & *Schistosoma* sp.) and Cestodes (*Taenia* sp. and *Echinococcus* sp.); Antihelminthic drugs.

Text Books

- Subhash Chandra Parija. 2013. Textbook of Medical Parasitology, 4th Edition, All India Publishers and Distributors, India.

Jagdish Chander. 2017. Textbook of Medical Mycology, 4th Edition, Jaypee Brothers Medical Publishers, India.

Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. Medical Microbiology, 8th Edition, Elsevier Publications, United States.

References

Jawetz, E., J. L. Melnic and E. A. Adelberg. 2013. Review of Medical Microbiology, 26th Edition, Lange Medical Publishers, New York.

Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.

Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.

Semester – V Elective - Health Care And Hygienic Practices

3 Hours / 3 Credits

Objectives

To strengthen the knowledge of personal health care and hygienic to students.

To provide a detailed study on vaccine and its schedule throughout the life time for all age group.

To understand the various type of pollution and its preventive measures.

Learning Outcomes

Introducing the basics about the Health care and Hygienic practices to study various types of Vaccines to control the life time infectious disease.

Unit–I: Hygiene – Personal hygiene and Grooming routines; Importance of Personal hygiene; Factors for Good health; Importance of Hand washing; Health status in India; Future challenges in Public health.

Unit–II: Vaccines – History, Types of Vaccines, Conventional and Modern vaccines, Route of administrations, Mechanisms of inducing immunity; Diseases prevented by Vaccination; Microbial synthesis of Vaccines; Vaccine risks and safety.

Unit – III: Child health management – General child health and Types of infection in Child; Vaccination schedule in Children – New born, Child below 5 years and Child below 10 years; Vaccination schedule for Adults - Hepatitis B vaccines, MMR vaccines, Tetanus vaccines and Varicella vaccines; Vaccines for Travelers; Universal Immunization Programme.

Unit – IV

Common diseases caused by Microorganisms – Air borne and Water borne diseases; Water pollution; Water quality and analysis of Drinking water quality; Sanitary surveys; World Health Organization (WHO) and Centre for Disease Control and Prevention (CDC).

Unit–V: Industrial Pollution and Toxic pollutants from industries; Hygienic practices in Industries; Hygienic practices in Hospitals; Nosocomial Infections and its preventive measures; Vaccines for Healthcare workers; Biomedical wastes and its management.

Text Books

Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
Prasada Rao, J. V. R. 1999. Manual for Control of Hospital Associated Infections
National AIDS Control Organization. Ministry of Health and Family Welfare,
Government of India. New Delhi.

References

Judith A. Owen, Jenni Punt, Sharon A. Stanford and Patricia P. Jones. 2009. Kuby's Immunology, 4th Edition, W. H. Freeman and Company, New York.
Reed, G. 2004. Prescott and Dunn's Industrial Microbiology, 4th Edition, CBS Publishers and Distributors, New Delhi, India.
Chaudhri, A. K. 1998. Tripathy, G. C. and D. Sharma - Common sense rules for wellbeing, Naval Printing Press, New Delhi.
Dunne, J. 1997. Webb, M., R. Scott and P. Beale - First Aid Manual, 7th Edition, Dorling Kindersley Ltd., London.

Semester – V

Elective - Computational Biology

4 Hours / 3 Credits

Objectives

To detail the importance of Computer in the field of Life sciences.
To obtain good understanding about the interpretation of Biological database.
To uptake knowledge in latest tools and technology.

Learning Outcomes

The paper Computational Biology adds information about the search engines and various software tools involved in Bioinformatics and Chemoinformatics.

Unit–I: Introduction to Computers – History of Computers; Generation of Computers; Operating Systems – Windows, Unix – Hardware, Software and Disc operating systems; Office applications–MS-Office, MS-Word, MS-Excel and MS PowerPoint.

Unit–II: Bioinformatics – Definition, History and Development, Role of Bioinformatics in Biology; Introduction to Internet - Local area and wide area network, Types of files – HTML, TXT and PDF; Search Engines - Types and applications.

Unit–III: Biological sequence database – Primary databases (NCBI, EMBL and DDBJ), Secondary databases – Nucleic acid secondary databases and Protein secondary databases; Phylogenetic analysis and Sequence submission tools; Sequence Annotation.

Unit – IV: Applied Genomics – Prokaryotic and Eukaryotic Genomes, DNA Microarray, Microarray Database, Tools for analysis of Human Genome and Human Genome Project; Functional Proteomics – Protein – protein interaction and Yeast two hybrid system.

Unit–V: Chemoinformatics - Definition, History and Development, Applications of Chemoinformatics; Drugs – Physical and Chemical properties, Mode of action and Drug designing; Docking studies; Future perspectives in Chemoinformatics.

Text Books

Jin Xiong. 2006. Essential Bioinformatics, 1st Edition, Cambridge University Press, New York, United States.

Hooman Rashidi and Lukas K. Buehler. 2005. *Bioinformatics Basics: Applications in Biological Science and Medicine*, CRC Press, Taylor & Francis Group, United Kingdom.

References

Stephen A. Krawetz, David D. Womble. Stephen A. Krawetz and David D. Womble. 2003. *Introduction to Bioinformatics: A theoretical and Practical approach*, Humana Press, USA.

Bryan Bergeron. 2002. *Bioinformatics Computing*, Prentice Hall.

Claverie, J. M and C. Notredame. 2003. *Bioinformatics for Dummies*, Wiley Publishing, Inc., United Kingdom.

Semester – V

Elective - Pharmaceutical Microbiology

4 Hours / 3 Credits

Objectives

To explain the concept, principles on control and management of manufacturing and quality control testing of Biopharmaceutical products.

To understand a view on regulatory issues involving the trends in biopharmaceutical industry and changing regulatory needs related to products.

Learning Outcomes

The paper *Pharmaceutical Microbiology* provides an overview of the concepts of manufacture Biopharmaceutical products in today's regulatory environment.

Unit-I: Pharmaceutically useful and problematic microorganisms; Identification and characterization of pharmaceutically important microbes; Pharmaceutical products and its Sterilization; Testing of pharmaceutical products; Applications of microorganisms in Pharmaceutical science.

Unit - II: History of Chemotherapy; Drugs - Definition, Sources, Classification, Routes of drug administration, Dosage forms, Drug receptors, Mechanism of action of drugs, Combined effect of drugs, Factors modifying drug action and Selective toxicity.

Unit-III: Chemical Disinfectants, Antiseptics and Preservatives – Acids and Esters, Alcohols, Aldehydes, Biguanides, Halogens, Heavy metals, Hydrogen peroxide & peroxygen compounds, Phenols, Surface active agents and Dyes; Antimicrobial combination and systems; Disinfection policy.

Unit – IV:Antibiotics – Cell wall inhibitors, Cell membrane inhibitors, Protein synthesis inhibitors, Nucleic acid inhibitors and Antimetabolites; Antimicrobial drug resistance; Antibiotic sensitivity tests.

Unit – V: Antiviral drugs; Antifungal drugs; Antiprotozoan drugs; Anthelmintic drugs; Natural products as Antimicrobial agents – Medicinal plants, Mushrooms, Kitchen spices, Algae, Actinobacteria and Lactic acid bacteria.

Text Books

Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. *Medical Microbiology*, 8th Edition, Elsevier Publications, United States.

Luis Jimenez. 2004. Microbial Contamination Control in the Pharmaceutical Industry, Marcel Dekker Inc., New York.

References

- Stephen P Denyer, Norman A Hodges and Sean P Gorman. 2011. Hugo and Russell's Pharmaceutical Microbiology, 8th Edition, Blackwell Publishing Company, New York, United States.
- Thomas N. Tozer, Malcolm Rowland. Introduction to Pharmacokinetics and Pharmacodynamics: The Quantitative Basis of Drug Therapy. 2006. Lippincott Williams & Wilkins publishers.
- Nita K. Pandit. 2007. Introduction to the Pharmaceutical Sciences. Lippincott Williams & Wilkins publishers.
- Hugo and Russell, 2011. Pharmaceutical Microbiology. 8th Edition. Wiley Blackwell Publications.

Semester – V

SSP – 1: Nutrition and Dietics

0 Hour / 1 Credit

Objectives

- To know about importance of food, nutrition and nutrients.
- To understand the nutrients associated health risks.
- To learn about the various diets used for various disease conditions.

Learning Outcomes

Nutrition is the study of nutrients in food, how the body uses nutrients, and the relationship between diet, health and disease. In this Self study paper Nutrition and Dietics, students will gain knowledge about the Importance of nutrients and various diets used for various disease conditions.

Unit – I: Introduction and definition of food and nutrition; Basic food groups; Physiological role and Nutritional significance of Carbohydrates, Lipids and Proteins.

Unit - II: Unit of Energy measurement; Measurement of food stuffs by Bomb calorimeter; RQ of foods – BMR and its measurements; SDA of foods.

Unit -III: Single cell protein (SCP); Essential aminoacids; Biological value of Proteins (Animal & Plant proteins); Protein - Energy Malnutrition: Kwashiorkar and Marasmus.

Unit - IV: Food Allergy - Causes, Symptoms, Diagnosis and Treatment; Therapeutic Diets for Peptic ulcer, High Blood Pressure, Renal and Vesicle calculi, GOUT and Diabetes Mellitus; Balanced Diet for Pregnant & lactating women, Infants, Children, Adults and Old age.

Unit –V: Diet for Intestinal disorders – Diarrhoea; Diets in liver disorders in human being – Jaundice and Viral hepatitis; Diet for Kidney and Urinary tract – Nephritis and Renal failure; Treatment of Anemias (Iron, Folic acid and Vitamin B12 deficiency).

Text Books

Srilakshmi, B. 2012. Nutrition Science, New Age, New Delhi, India.

Swaminathan, S. 1986. Hand book of Food and Nutrition, Bangalore Printing and Publishers, India.

References

- Chatterjee, N and Rana Shinde. 2012. Textbook of Medical Biochemistry, 8th Edition, Jaypee publication, New Delhi, India.
- Murray, R. K., D. K. Granner, P. A. Mayes and D. W. Rodwell. 2006. Harper's Biochemistry, 25th Edition, Prentice Hall, New Jersey.
- Nelson, D. L and M. M. Cox. 2008. Lehninger Principles of Biochemistry, 5th Edition, W. H. Freeman and Company, New York.
- Sathyanarayanan, U. 2002. Essentials of Biochemistry, Books and Allied (p) Ltd, India.
- Voet, D and G. Voet. 2006. Biochemistry, John Wiley and Sons, New York.

Semester – V Non Major Elective – Applied Microbiology

2 Hours / 1 Credit

Objectives

- To make students to understand the fundamentals of microbiology and its applications.
- To encode the importance of the role of microorganisms in food industries and agricultural sciences both in beneficial and harmful ways.
- To study about the water borne disease and microbial standards of water quality.

Learning Outcomes

Microbiology has played a central role in all aspects of Biological sciences. This course Applied Microbiology will familiarize the students from various Arts and Science Departments with fundamental knowledge on microbiology and its applications.

Unit-I: Microbiology – History, Various branches and Scope; Cell - Prokaryotes and Eukaryotes; Bacteria – Characteristics (Gram positive and Gram negative); Culture medium; Economic importance of Bacteria.

Unit-II: Fungi and Algae – Characteristics and Economic importance. Water pollution; Bacteriological analysis of water; Water borne diseases; Purification of water.

Unit-III: Food Preservation; Lactic acid bacteria; Fermented dairy products – Cheese, Yogurt and Fermented milk; Spoilage and defects of fermented dairy products; Testing of Milk.

Unit - IV: Microbial fermentation and its types; Fermentation products - Baker's yeast, Bread and Alcoholic beverages (Beer & Wine); Cultivation and Health benefits of *Spirulina* and Mushroom.

Unit – V: Bioinoculants – Definition, Types, Importance and Advantages; Nitrogen fixing microorganisms; Phosphate solubilizing microorganisms; Biopesticides; Organic farming - Composting and Vermicomposting.

Text Books

- Gerard J. Tortora, Berdell R. Funke and Christine L. Case. 2015. Microbiology – An Introduction, 12th Edition, Peareson Publishers, San Francisco.

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.

References

- Dubey, R.C. and D. K. Maheswari. 2010. A Text book of Microbiology. 3rd Edition, S. Chand and Company, New Delhi.
- Chakraborty. 2003. A Text book of Microbiology. 2nd Edition, Published by New Central Book Agency (P) Ltd., Kolkata.
- Pelczar Jr. M. J., Chan, E. C. S and Kreig, N. R. 2006. Microbiology. 5th Edition Mc Graw Hill Inc. New York.
- Powar, C. B and H. F. Daginawala. 2008. General Microbiology. Volume – II, Himalaya Publishing House, Mumbai.

Semester – V

Main Practical – V

5 Hours / 5 Credits

- Collection and transport of clinical samples.
- Identification of bacteria from clinical samples – *Staphylococcus aureus*, *Escherichia coli*, *Salmonella typhi*, *Shigella* sp., *Proteus vulgaris*, *Klebsiella pneumoniae*, *Vibrio cholerae* and *Pseudomonas aeruginosa*.
- Slide Culture Technique for fungal identification.
- Examination of *Candida albicans* by Germ tube test and Sugar assimilation test.
- Antibiotic sensitivity test.

Semester – VI

Microbial Biotechnology

5 Hours / 5 Credits

Objectives

- To learn the basic tools in Microbial Biotechnology.
- To understand the various concepts of Recombinant DNA Technology and Microbial products.
- To emphasize on IPR issues and need for knowledge in patents in Biotechnology.

Learning Outcomes

The paper Microbial Biotechnology helps the student to study theoretical concepts of Biotechnology and their applications in Genetic engineering and Microbiology. It also creates an awareness on the Intellectual property rights and patenting of Biotechnological processes.

Unit – I: Biotechnology – Definition, Various branches and Scope; Impact of Microbial Biotechnology; Metabolites from Microorganisms – Primary and Secondary metabolites; Microbial production of industrial enzymes; Enzyme immobilization; Industrial application of Enzymes.

Unit – II: Recombinant DNA technology – Principles and applications; Cutting and joining enzymes in rDNA technology; Recombinant Vaccines; Microbial synthesis of Pharmaceutical products – Insulin, Interferon, Hormones and Monoclonal antibodies.

Unit–III: Production of Microbial biotechnology products – Xanthan, Dextran, Biosurfactants, Steroids transformation and Polyhydroxyalkanoates (PHA & PHB); Biofuels – Bioethanol, Biodiesel and Biogas.

Unit–IV: SCP (Algae & Yeast) – List of organisms, Cultivation Techniques, Advantages and Disadvantages; SCP from wastes; Genetically modified foods; Gene therapy; Stem cell therapy.

Unit–V: Animals used for laboratory experiments; Care and Maintenance for laboratory animals; Ethics in animal experimentation; Ethical issues in Human Gene Therapy; Protection of Biotechnological inventions – Patent protection, Trade secrets and Plant Breeder’s Rights; Biowarfare and Bioterrorism.

Text Books

Dubey, R. C. 2014. A Text Book of Biotechnology, 5th Edition, S. Chand Publishing, India.

Satyanarayana, U. 2005. Biotechnology, 1st Edition, Books and Allied (P) Ltd., Kolkata, India.

References

Old, R. S and S. B. Primrose. 2006. Principles of Gene Manipulation, 7th Edition, Blackwell Scientific Publications, London.

Jogdand, S. N. 2005. Gene Biotechnology, Himalaya Publishing House, Mumbai, India.

Singh, B. D. 2012. Biotechnology, 5th Edition, Kalyani Publishers, Chennai, Tamil Nadu, India.

Kumarasan, V. 2001. Biotechnology, Published by Saras Publication, Nagercoil, Tamil Nadu, India.

Semester – VI

Environmental Microbiology

5 Hours / 5 Credits

Objectives

To creating the awareness about environmental problems among people.

To provides a comprehensive overview of Biogeochemical processes relevant to environmental scientists and engineers mediated by microorganisms.

To study about the water borne pathogens, water borne disease, microbial standards of water quality, biogenic pollution, air borne microbes and waste water management.

Learning Outcomes

The paper Environmental Microbiology will create awareness about Microbes and environment, distribution, diversity and ecological importance, characteristics of microorganisms in different environment and its Biogeochemical cycle. This paper will also provides a detailed knowledge on Waste water treatment technologies.

Unit – I: Relationship between Microorganisms and Atmosphere; Sampling of Air; Air borne disease caused by Bacteria, Fungi and Viruses; Air pollution and Green house effect; Air Sanitation.

Unit – II: Soil characteristics (Physical & Chemical); Soil Microbiology – Major group of Soil microorganisms; Qualitative microflora of soil (Bacteria, Actinobacteria, Fungi, Viruses, Algae & Protozoa); Soil types and their microflora; Quantification of Soil microflora; Role of microorganisms in soil fertility.

Unit – III: Ecosystems - Fresh water ecosystem, Marine ecosystem, Estuarine ecosystem and Mangrove ecosystem; Water zonations; Eutrophication; Water pollution; Bacteriological analysis of water; Water borne diseases; Purification of water; Recycling of water.

Unit – IV: Organic matter decomposition; Biogeochemical cycles – Carbon cycle, Nitrogen cycle, Phosphorous cycle, Sulphur cycle and Iron cycle; Microbe – Microbe Interactions; Plant – Microbe Interactions.

Unit – V: Solid waste management - Incineration, Composting & Sanitary landfill; Sewage treatment – Small scale sewage treatment (Cesspools, Septic tank & Imhoff's tank) and Large scale sewage treatments (Primary treatment - Physical, Secondary treatment - Biological & Tertiary treatment - Chemical); Xenobiotics; Bioremediation, Bioremediation and Biodeterioration.

Text Books

- Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
Subba Rao N.S. 1999. Soil Microbiology, 4th Edition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.

References

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.
Madigan, M. T., J. M. Martinko and J. Parker. 2009. Brock's Biology of Microorganisms, 12th Edition, Pearson/Benjamin Cummings, New York.
Maier, R. M., I. L. Pepper and C. P. Gerba. 2009. Environmental Microbiology, 2nd Edition, Academic Press, United States.

Semester – VI

Vermitechnology

4 Hours / 4 Credits

Objectives

- To study about the properties of soil and microbial composting.
- To understand the biology of Earthworms and its role in Vermicomposting.
- To learn the ability of Earthworms in Organic farming and Solid waste reclamation.

Learning Outcomes

The course Vermitechnology has been designed to provide the knowledge to the students about Organic farming through Composting and Vermicomposting. This paper also provides the details of Earthworms and its role in Solid waste reclamation.

Unit–I: Vermitechnology – History, Scope and Future; Soil – Structure and Types; Influence of soil microorganisms in Vermitechnology; Development and future of Vermitechnology in India and other countries; Earthworms – Diversity, Geographical distribution, Morphology, Life cycle and Behaviour patterns.

Unit–II: Ecological categories of Earthworms – Epigeics, Anecics and Endogeics; Burrowing activity of Earthworms; Physical, chemical and biological changes caused by Earthworms in soil Drilospheres and Vermicasts; Effect of Earthworm is Soil structure – Carbon, Nitrogen and Phosphorous Transformation.

Unit – III: Composting – Difference between Microbial Composting and Vermicomposting; Factors affecting Composting process; Analysis of Physico-chemical characteristics and microbial quality of Compost materials; Microbial Composting - Aerobic and Anaerobic Composting.

Unit – IV: Vermicompost - Earthworm species used in vermicompost production; Materials used for Vermicomposting; Vermicomposting methods – Small scale and Large scale; Packaging, marketing and Cost benefit analysis of Vermicompost; Pests, parasites and pathogens affecting Earthworms; Applications of Vermicomposting in Agriculture and Horticulture practices; Advantages of Vermicompost over Chemical inputs.

Unit - V: Vermiculture; Vermiculture unit – Materials required and maintenance; Vermiwash and its applications; Feeding habits and food for Composting worms; Importance of microorganisms as food for Earthworms; Problems in Vermiculture units and remedial suggestions; Earthworms in recycling of various solid wastes; Benefits of Earthworms other than Vermicomposting.

Text Books

- Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
Subba Rao N.S. 1999. Soil Microbiology, 4th Edition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.

References

- Satyanarayana, U. 2005. Biotechnology, 1st Edition, Books and Allied (P) Ltd., Kolkata, India.
Edwards, C. A and Bohlen, P. J. 1996. Biology and Ecology of Earthworms, Chapman and Hall, London.
Ismail, S. A. 1997. Vermiculture: The Biology Earth worm, Orient Longman, United Kingdom.
Kale Radha, D. 1998. Earthworm: Cinderella of organic farming. Prism Books Pvt. Ltd., Bangalore, India.
Satchell, J. E. 1983. Earthworm Ecology: From Darwin to Agriculture. Chapman and Hall, London
Stephenson J., 1923. The fauna of British India - Oligo.

Semester – VI

SS - 1: Food Microbiology

5 Hours / 5 Credits

Objectives

- To encode the importance of the role of microorganisms in food industries both in beneficial and harmful ways.
- To obtain a good understanding of food microbiology and become qualified as microbiologist in food industries.
- To know the role of microbes in the spoilage of food products.

Learning Outcomes

The Food Microbiology paper adds information about the role of microorganisms in many food, beverage and various industries both in production and spoilage processes.

Unit – I: History and Development of Food Microbiology; Importance of microorganisms in Food microbiology – Mold, Yeast and Bacteria; Intrinsic and Extrinsic parameters of foods that affect microbial growth; Contamination of foods; Principles of Food preservation – High & Low temperature, High pressure, Drying and Radiation; Food preservatives – Natural & Chemical.

Unit – II: Contamination, preservation and spoilage of Cereals and its products, Sugars and its products, Vegetables, Fruits, Milk products, Egg, Meat products, Seafoods and Poultry products.

Unit – III: Fermentation and its types; Traditional Indian fermented foods; Production of Baker's Yeast; Bread production from yeast and its spoilage; Fermented vegetables – Olives, Pickles & Sauerkraut; Fermented Meat & Fish; Mold fermentations – Tempeh, Soy sauce & Rice wine and Mycoprotein.

Unit – IV: Lactic acid bacteria; Diseases caused by Lactic acid bacteria; Concept of Probiotics & Prebiotics; Lactic starter cultures; Fermented dairy products – Cheese, Yogurt and Fermented milk; Spoilage and defects of fermented dairy products; Testing of Milk and its products.

Unit – V: Food borne illness caused by Bacteria, Fungi, Viruses, Rickettsias and Parasites; Microbiology of food products; Hazard analysis and critical control points (HACCP); Enforcement and control agencies; Microbiological criteria for food.

Text Books

- William C. Frazier and Dennis C. Westhoff. 2013. Food Microbiology, 5th Edition, McGraw Hill, New York.
- James M. Jay, Martin J. Loessner and David A. Golden. 2005. Modern Food Microbiology, 7th Edition, Springer Publications, United States.
- Martin R. Adams and Maurice O. Moss. 2008. Food Microbiology, 3rd Edition, RSC Publishing, United Kingdom.

References

- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.
- Casida, L. E. 2007. Industrial Microbiology, New Age International Publishers, New Delhi, India.
- Reed, G. 2004. Prescott and Dunn's Industrial Microbiology, 4th Edition, CBS Publishers and Distributors, New Delhi, India.

Semester – VI

SS – 2: Industrial Microbiology

5 Hours / 5 Credits

Objectives

- To encompass the use of Industrially important microorganisms in the manufacture of food or industrial products.
- To understand the Fermentation process and design of various Fermentors.

To study the use of microorganisms for the production of Antibiotics, Vaccines, Organic acids, Organic solvents, Amino acids, Vitamins and Industrial enzymes.

Learning Outcomes

From the Industrial Microbiology paper, students acquire the knowledge in the large scale production of Industrial product and providing the trends to cater the needs of industry.

Unit–I: History of Industrial Microbiology; Industrially important microorganisms; Primary and Secondary metabolites from microorganisms; Design of Fermentor; Factors affecting Fermentor design; Types of Fermentor; Industrial Sterilization of Fermentor, Media and Air.

Unit–II: Production Strains – Screening techniques, Strain development, Preservation of Microorganisms and Preparation of Inoculum; Fermentation medium; Downstream Processing; Foam formation and Antifoam agents.

Unit–III: Microbial production of Antibiotics (Penicillin & Streptomycin), Vaccines (Hepatitis – B Vaccine & Rabies Vaccine) and Organic acids (Citric acid, Lactic acid & Acetic acid).

Unit–IV: Microbial production of Amino acids (Glutamic acid & Lysine), Vitamins (Vitamin – B2, B12, & Vitamin – C) and Enzymes (Amylases, Proteases & Pectinases).

Unit – V: Yeasts and its industrial uses; Production of Brewer’s Yeast; Production of Food & Fodder Yeast; Microbial production of Solvents (Ethanol, Acetone – butanol & 2,3 - butanediol) and Alcoholic beverages (Beer & Wine).

Text Books

- Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.
- Casida, L. E. 2007. Industrial Microbiology, New Age International Publishers, New Delhi, India.
- Waites, M. J. 2007. Industrial Microbiology, Blackwell Publishing Company, United Kingdom.

References

- Reed, G. 2004. Prescott and Dunn’s Industrial Microbiology, 4th Edition, CBS Publishers and Distributors, New Delhi, India.
- Stanbury, P. T and A. Whitaker. 2005. Principles of Fermentation Technology, Pergamon Press, New York.
- William C. Frazier and Dennis C. Westhoff. 2013. Food Microbiology, 5th Edition, McGraw Hill, New York.
- Martin R. Adams and Maurice O. Moss. 2008. Food Microbiology, 3rd Edition, RSC Publishing, United Kingdom.

Semester – VI

SSP – 2: Dairy Technology

0 Hour / 1 Credits

Objectives

- To encode the importance of the role of microorganisms in Dairy industries
- To obtain a good understanding of Dairy microbiology and become an Entrepreneur.

To obtain knowledge in food quality and spoilage of Dairy products.

Learning Outcomes

The Self study paper Dairy Technology is about the study of milk and milk-derived food products. It focuses on the biological, chemical, physical, and microbiological aspects of milk itself, and on the technological aspects of the transformation of milk into its various consumer products including fermented products, concentrated and dried products, butter and ice cream. This course also provides information about the role of microorganisms in Dairy products development.

Unit–I: Milk and Milk processing – Milk composition, Milk components, Milk processing, Products from milk and Changes to milk components during processing; Microflora of Raw milk.

Unit–II: Microbiology of Butter – Definition, Initial microflora, Processing and its effect on microflora, Spoilage and Pathogens; Microbiology of Cream – Definition, Initial microflora, Processing and its effect on microflora, Spoilage and Pathogens.

Unit–III: Microbiology of Concentrated and Dried milk products - Definition, Initial microflora, Processing and its effect on microflora, Spoilage and Pathogens.

Unit–IV: Microbiology of Cheese - Definition, Initial microflora, Types, Processing and its effect on microflora, Processed cheese, Value added cheese, Spoilage of cheese and Pathogens in cheese.

Unit – V

Probiotics and Probiotic products; Microbiology of Ice cream and related products - Definition, Initial microflora, Processing and its effect on microflora, Distribution, Spoilage, Pathogens (Growth and survival) and Toxins; HACCP system in manufacture of Ice cream.

Text Books

- Rhea Fernandes. 2009. Microbiology Handbook on Dairy Products, 1st Edition, Leatherhead Publishing, United Kingdom.
- Elmer H. Marth and James L. Steele. 2001. Applied Dairy Microbiology, 2nd Edition, Marcel Dekker, Inc., United Kingdom.
- Richard K. Robinson. 2002. Dairy Microbiology Handbook, 3rd Edition, John Wiley and Sons, Inc., United Kingdom.

References

- William C. Frazier and Dennis C. Westhoff. 2013. Food Microbiology, 5th Edition, McGraw Hill, New York.
- James M. Jay, Martin J. Loessner and David A. Golden. 2005. Modern Food Microbiology, 7th Edition, Springer Publications, United States.
- Martin R. Adams and Maurice O. Moss. 2008. Food Microbiology, 3rd Edition, RSC Publishing, United Kingdom.
- Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.

Semester – VI

Non Major Elective – Microbial Diseases and Health Care

2 Hours / 1 Credit

Objectives

- To make the students to understand the various diseases caused by microorganisms.
- To study the clinical conditions and preventive measures for microbial diseases.
- To provide the knowledge about Antibiotics, Drugs, Vaccines and Vaccination.

Learning Outcomes

To introduce the knowledge of the medically important microorganisms which are responsible for causing diseases. The course Microbial disease and health care will provide the knowledge to the students about microbial diseases and its preventive measures, vaccines and vaccination.

Unit-I: Microbial Infection – Types, Source, Mode of Transmission and Factors predisposing to Microbial Pathogenicity; Epidemiology of Diseases; Reservoirs of Microbial diseases.

Unit-II: Clinical conditions and prevention of Bacterial diseases – Typhoid, Cholera, Botulism, Anthrax, Tuberculosis and Leprosy; Antibiotics.

Unit-III: Clinical conditions and prevention of Viral diseases – AIDS, Rabies, Polio, Hepatitis, Small Pox and Dengue; Antiviral drugs; Vaccines and Vaccination schedule.

Unit-IV: Clinical conditions and prevention of Fungal diseases – Candidiasis, Cryptococcosis, Aspergillosis and Dermatophytes; Mycotoxins; Antifungal drugs.

Unit-V: Protozoa diseases – Amoebiasis, Malaria and Leishmaniasis; Antiprotozoan drugs; Helminth diseases - Ascariasis, Filariasis, and Taenia infection; Anthelmintic drugs.

Text Books

- Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. Medical Microbiology, 8th Edition, Elsevier Publications, United States.
- Subhash Chandra Parija. 2013. Textbook of Medical Parasitology, 4th Edition, All India Publishers and Distributors, India.
- Jagdish Chander. 2017. Textbook of Medical Mycology, 4th Edition, Jaypee Brothers Medical Publishers, India.

References

- Jawetz, E., J. L. Melnic and E. A. Adelberg. 2013. Review of Medical Microbiology, 26th Edition, Lange Medical Publishers, New York.
- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.

Semester – VI

Main Practical – VI

5 Hours / 4 Credits

- Assessment of Milk quality by MBRT.
- Enumeration of microorganisms in Milk and Water by SPC Method.
- Isolation and enumeration of microorganisms from Air.

Isolation and enumeration of microorganisms from Fruits and Vegetables.
Isolation and enumeration of Antibiotic producing fungi from soil.
Bacteriological examination of water by MPN test.
Isolation of Yeast from Grapes.

Question Paper Pattern for Semester Examinations

The question paper shall have three sections with the maximum of 70 marks with the following break-up:

Section - A

Section A shall contain 10 short answer questions without choice drawn from all the units on the basis of minimum two from unit. Each question shall carry 2 Marks. (10 x 2 = 20 marks)

Section - B

Section B shall contain 5 either or questions drawn from all the five units. Each question shall carry 4 marks. (5 x 4 = 20 marks)

Section – C

Section C shall contain 5 questions drawn one each from the five units. Three questions out of the five are to be answered each carrying 10 marks. (3 x 10 = 30 marks)

Regulation for Theory

1. Evaluation Scheme for Continuous Assessment (30)

Written tests (CA) (2) 20 marks

Attendance 05 marks

Other Components 05 marks

Other components may comprise assignments, seminars, open book test, Quiz, MCQs and on-line assignment.

2. Question Paper Pattern for CA

The question paper shall have three sections with the maximum of 50 marks with the following break-up:

Section - A

Section A shall contain 5 short answer questions without choice drawn from two units. Each question shall carry 3 marks. (5 x 3 = 15 marks)

Section - B

Section B shall contain 3 either or questions drawn from two units. Each question shall carry 5 marks.(3 x 5 = 15 marks)

Section – C

Section C shall contain 3 questions from two units. Two questions out of the three are to be answered each carrying 10 marks. (2 x 10 = 20 marks)

Question Paper Pattern for Semester Examinations

The question paper shall have three sections with the maximum of 70 marks with the following break-up:

Section - A

Section A shall contain 10 short answer questions without choice drawn from all the units on the basis of minimum two from unit. Each question shall carry 2 Marks. (10 x 2 = 20 marks)

Section - B

Section B shall contain 5 either or questions drawn from all the five units. Each question shall carry 4 marks. (5 x 4 = 20 marks)

Section – C

Section C shall contain 5 questions drawn one each from the five units. Three questions out of the five are to be answered each carrying 10 marks. (3 x 10 = 30 marks)

Regulation for Practicals

Question paper pattern for Core Practicals

Total: 100 Marks

The practical papers consist of the internal assessment (40 marks) and semester examination (60 marks)

Internal Assessment (40)

Class Work - 20 marks

Model exam - 20 marks

Semester Examination (60)

Evaluation Pattern for SSP (Health Management/Nutritional Biochemistry)

Submission of Assignment

One MCQ test covering the syllabus

Evaluation Pattern for Summer Lab Training

Submission of report with certificate of attending 15 days training before II year from the concerned lab – 2*

Programme: History

Year/Semester: I Year / I Semester

Credits: 5

Code:

Hours/Week: 5

HISTORY OF INDIA UP TO 712 A.D.

Objectives:

- To impart the main features of the cultural heritage of early India.
- To enable the students to learn the political, social, economic and religious condition of India.

Unit – I: Sources: Archaeological sources – Literary sources – Foreign accounts – Geographical Features – Pre and Proto-history: Paleolithic Age – Mesolithic Age – Neolithic Age – Chalcolithic Age – Indus Valley Civilization.

Unit – II: Aryans and Vedic Period: Expansion of Aryans in India – Rig Vedic Period – Later Vedic Period: Political – Social and Economic life – Evolution of Monarchy and Varna System – Mahajanapadas – Emergence of Jainism and Buddhism.

Unit – III: Mauryan Empire: Chandragupta – Bindusara – Ashoka: Concept of Dharma – Edicts – Administration – Economy – Art and Architecture – Disintegration of the Empire.

Unit – IV: Post-Mauryan Period: Sungas – Kanvas – Indo-Greeks – Sakas – Kushanas: Art and Architecture – Kharavelas – Satavahanas.

Unit – V: Gupta and Post Gupta Period: Political History – Administration – Art and Architecture – Literature – Harsha Vardhana – Arab Conquest of Sind.

Outcomes:

- The student can understand the cultural foundations of India and its gradual achievements over the years.
- The student would have a background understanding of the socio – economic, political and religious developments shaping India in its early phase.

Text Books:

1. Khurana K.L., Ancient India, Lakshmi Narain Agarwal, Agra, 2001.
2. Mahajan V. D., Ancient India, S. Chand & Co., New Delhi, 2019.

Books for Reference:

1. Basham A.L., The Wonder that was India, London, Macmillan, 2004.
2. Luniya B.N., Evolution of Indian Culture, Agra, Lakshmi Narain Publication, 2005.
3. Majumdar R.C., Raychaudhuri H.C. and Datta K., An Advanced History of India, Macmillan, Chennai, 2004.
4. Romila Thapar, The Penguin History of Early India: From the Origins to AD 1300, New Delhi, Penguin Books, 2002.
5. Sathyanatha Aiyar R., A Political and Cultural History of India, Madras, Viswanathan & Co., 1980.
6. Sharma L.P., History of Ancient India, New Delhi, Vikas Publisher, 1981.
7. Upinder Singh, A History of Ancient and Early Medieval India: From the Stone Age to the 12th Century, Pearson, New Delhi, 2008.

Year/Semester: I Year / I Semester
Credits: 5

Code:
Hours/Week: 5

HISTORY OF TAMIL NADU UP TO 1336 A.D.

Objectives:

- To become aware of the political, social and economic developments of Tamilnadu.
- To enable the students to learn the cultural contribution of ancient Tamils.

Unit – I: Sources – Geographical Features – Sangam Age – Cheras – Cholas – Pandyas – Administration – Society – Economy – Literature – Kalabhra Interregnum.

Unit – II: Pallavas: Origin – Early Pallavas and Later Pallavas – Political, Social and Economic Conditions – Bhakthi Movement – Art and Architecture – Literature – First Pandyan Empire.

Unit – III: Imperial Cholas – Vijayalaya – Raja Raja – I and Rajendra – I – Later Cholas: Kulothunga I – Administration – Social, Economic and Religious Conditions – Art and Architecture – Disintegration.

Unit – IV: Second Pandya Empire: Maravarman Sundara Pandyan I – Jatavaraman Sundra Pandya I – Maravarman Kulasekara Pandya – Administration – Social, Economic and Religious Conditions – Art and Architecture.

Unit – V: Muslim Invasions: Malik Kafur – Khusru khan – Ulugh khan – Establishment of Madurai Sultanate – Subordinate Chieftains of Medieval Period – Overseas contact of the Tamils.

Outcomes:

- The student knows the formation of various ruling dynasties and the consequent socio – economic and political developments in Tamilnadu.
- The student would understand the enriched cultural contribution of the Tamils.

Text Book:

1. Devanesan A., History of Tamil Nadu, Marthandam, Renu Publication, 2004.
2. Subramaniam N., History of Tamilnad upto 1336 A.D., Koodal Publishers, Madurai, 1972.

Books for Reference:

1. Chopra P.N., Ravindran T.K. and Subramanian N., History of South India: Ancient, Medieval & Modern, Delhi, Chand and Co., 2010.
2. Kanakasabhai V., The Tamils Eighteen Hundred Years Ago, New Delhi, Asian Educational Services, 1979.
3. Manoranjithamoni. C, History of Tamilnadu upto 1565 AD, Dave – Beryl Publications, Tirunelveli, 2012.
4. Nilakanta Sastri K. A., A History of South India: From Pre-historic Times to the Fall of Vijayanagar, Oxford University Press, Madras, 1958.
5. Nilakanta Sastri K. A., The Colas, University of Madras, 2000.
6. Pillai K.K., A Social History of the Tamils, University of Madras, 1975.
7. Srinivasa Iyengar P.T., History of the Tamils: From the Earliest Times to 600 A.D., New Delhi, Asian Educational Services, 1989.

Year/Semester: I Year / I Semester
Credits: 4

Code:
Hours/Week: 6

Allied – I: PRINCIPLES OF TOURISM

Objectives:

- To enable the students to understand the importance of tourism.
- To study about the development of tourism as an industry.

Unit – I: Nature and Scope of Tourism – Origin and Growth – Basic Components and Elements – Importance of Tourism.

Unit – II: Types of Tourism: Cultural – Adventure – Sports – Religious – Medical – Business – Ethnic and Eco-Tourism.

Unit – III: Tourism Product and Marketing: Characteristics, Nature and Types Products – Marketing Services – Familiarization Tours – Marketing Research.

Unit – IV: Tourism and Contemporary Issues: Tourism as an Industry – Role of Information Technology – Environmental Concerns – Human Rights and Tourism – Emerging Trends in Tourism.

Unit – V: Impact of Tourism: Social, Economic and Cultural Impact of Tourism – Multiplier Effect – Tourism and International Trade – Tourism and International Understanding: Manila Declaration.

Outcomes:

- It would enable the students to realize the significance of tourism for a nation.
- The students absorb the nuances on the evolution of tourism.

Text Book:

1. Barkat A. M. A., Travel and Tourism Management, New Delhi, Prentice Hall India Learning, 2015.
2. Bhatia A. K., Tourism Development: Principals and Practices, New Delhi, Sterling Publishers, 1983.

Books for Reference:

1. Charles R. Goeldner and Brent Ritchie J. R., Tourism: Principles, Practices, Philosophies, John Wiley & Sons, New Jersey, 2009.
2. Gill Pushpinda S., Dynamics of Tourism, Anmol Publication, Delhi 1999.
3. Kunal Chattopadhyay, Economic Impact of Tourism Development: An Indian Experience, Kanishka, 1995.
4. Lajipathi Raj H., Development of Tourism in India, Ropa Books, Hyderabad, 1993.
5. Page Stephen J., Tourism Management, New York, Routledge, 2015.
6. Parveen Sethi, Hand Book of Tourism, Anmol Publication, New Delhi, 1999.
7. Parveen Sethi, Millennium Trends in Travel and Tourism, Rajat Publication, Delhi 2002.
8. Percy. K. Singh, 50 years of Indian Tourism, Kanishka Publishers, Delhi, 1998.
9. Pran Nath Seth, Successful Tourism Management, New Delhi, Sterling Publishers, 1997.
10. Romila Chawla, Coastal Tourism and Development, Sonali Publications, New Delhi, 2004.
11. Sunetra Roday, Archana Biwal, Vandana Joshi, Tourism: Operations and Management, New Delhi, Oxford University Press, 2009.

Year/Semester: I Year / II Semester

Credits: 5

Code:

Hours/Week: 5

HISTORY OF INDIA (712 – 1526 A.D.)

Objectives:

- To enable the students to acquire knowledge about the role of Rajputs and Delhi Sultanate.
- To enable the students to learn the economic and religious policies pursued by the great rulers.

Unit – I: Impact of Arab's Invasion – Rajputs – Pratiharas – Palas – Chauhans – Rashtrakutas – Invasions of Muhammad Ghazni and Muhammad Ghori.

Unit – II: Slave Dynasty: Consolidation of the Delhi Sultanate – Qutb-Ud-Din Aibak – Iltutmish – Sultan Razia – Balban – Khalji Dynasty: Jalal-Ud-Din Khalji – Ala-Ud-Din Khalji.

Unit – III: Tughlaq Dynasty: Ghiyas-Ud-Din Tughlaq – Muhammed Bin Tughlaq – Feroz Tughlaq – Timur's Invasion.

Unit – IV: Sayyids and Lodis – Decline of the Sultanate – Administration – Social and Economic Condition – Art and Architecture.

Unit – V: Vijayanagar Empire: Polity and Administration – Social and Economic Condition – Art and Literature – Bahmani Kingdom.

Outcomes:

- The students are exposed to political and administrative aspects of the medieval period.
- It facilitates the understanding of the Delhi Sultanate's society, economy and culture.

Text Book:

1. Khurana K.L., History of India: Earliest Times to 1761 A.D., Lakshmi Narain Agarwal, Agra, 2006.
2. Mahajan V. D., History of Medieval India, S. Chand & Co., New Delhi, 2019.

Books for Reference:

1. Chaurasia R. S., History of Medieval India: From 1000 A.D. to 1707 A.D, New Delhi, Atlantic, 2002.
2. Habibullah ABM., The foundation of Muslim Rule in India, Central Book Depot, Allahabad, 1976.
3. Lanepoole, Medieval India, Universal Publication, Delhi, 1971.
4. Majumdar R. C., Raychaudhuri H.C. and Dutt R.C., An Advanced History of India, Macmillan, Chennai, 2004.
5. Mehta J.L., Medieval India, Sterling Publication, New Delhi, 1979.
6. Natarajan S., and Prema Ramakrishnan, Political and Cultural History of India, Secundrabad, 1991.
7. Satish Chandra, Medieval India, Part I & II, New Delhi, NCERT, 1971.
8. Sharma L.P., Medieval India, Konark Publication, New Delhi, 1993.
9. Srivastava M.Y., Society and Culture in Medieval India, Allahabad, Chugh Publication, 1975.
10. Srivastava A.L., History of India 1000 to 1707, Shivlal Agarwal Publication, Agra, 1976.
11. Tripathi R. P., Some Aspects of Muslim Administration, Central Book Depot, Allahabad, 1992.

Year/Semester: I Year / II Semester

Credits: 5

Code:

Hours/Week: 5

HISTORY OF TAMIL NADU (1336 – 1947 A.D.)

Objectives

- To become aware of the political, social and cultural developments of Tamilnadu.
- To enable the students to understand the impact of British administration and the role of Tamilnadu in freedom movement.

Unit – I: Sources – Tamilnadu under Vijayanagar Rule – Nayaks of Madurai, Tanjore and Senji: Political, Social, Economic and Cultural Contributions.

Unit – II: Marathas of Tanjore – Marava kingdoms of Ramnad and Sivaganga – Thondamans of Pudukottai – Nawabs of Arcot: Zulfiquar Ali Khan, Sadatullah Khan and Muhammad Ali.

Unit – III: Advent of the Europeans: Portuguese – Dutch – Danes – French – English – Anglo – French conflict in the Carnatic – Anglo Mysore Wars.

Unit – IV: Tamilnadu under the British Rule – Ryotwari Settlement – Christian Missionaries: Tamil Revivalism and Education – Poligar Rebellion – Vellore Mutiny – Social and Religious Reformers: Ramalinga Adigal, Vaikunda Swamigal, Rettamalai Srinivasan and Iyothee Thass Pandithar.

Unit – V: Role of Tamilnadu in the Freedom Movement – Political Awakening: Madras Native Association – Madras Mahajana Sabha – Justice Party – Self – Respect Movement – Dravidar Kazhagam.

Outcomes:

- The students would realize the socio – economic and political developments under various rulers up to the arrival of European powers in Tamilnadu.
- The British rule, various reform movements and freedom struggle as well as the governance of Tamilnadu after independence as a focal point of understanding.

Text Books:

1. Devanesan A., History of Tamil Nadu, Marthandam, 2004.
2. Subramaniam N., Social and Cultural History of Tamilnad (1336 – 1984 A.D.), Ennes Publications, Udumalpet, 1994.

Books for Reference:

1. Chopra P.N., Ravindran T.K. and Subramaniam N., History of South India, Chand and Co. Delhi, 1979.
2. Eugene F. Irshick, Politics and Social Conflict in South India, The Non-Brahman Movement and Tamil Separatism, 1916-1929, Bombay, OUP, 1969.
3. Kanakasabhai V., The Tamils Eighteen Hundred Years Ago, Asian Educational Services, New Delhi, 1979.
4. Rajayyan K., History of Tamilnadu, (1565-1965), Madurai Publishing House, Madurai, 1977
5. Sathanatha Aiyar R., History of the Nayaks of Madura, University of Madras, 1980.
6. Srinivasan C.K., The Maratha Rule in the Carnatic, Annamalai University, 1944.
7. Varghese Jeyaraj S., Social-Economic History of Tamil Nadu (1565-1967), Uthamaalayam, Anns Publications, 2017.
8. Vriddhagirisan V., The Nayaks of Tanjore, Asian Educational Service, New Delhi, 1955.

Year/Semester: I Year / II Semester

Credits: 4

Code:

Hours/Week: 5

Allied – II: TOURISM AND TRAVEL MANAGEMENT

Objectives:

- To enable the students to understand the origin and development of tourism in India.
- To make them to know about the importance of travel management and the relative role of regional, national and international organisations.

Unit – I: International Tourism Organisations: United Nations World Tourism Organisations (UNWTO) – International Air Transport Association (IATA) – United Federation of Travel Agents Association (UFTAA) – Pacific Asia Travel Association (PATA).

Unit – II: Tourism in India: Development of Tourism – Sargent Committee – Tourist Information Offices – Ministry of Tourism – Department of Tourism – India Tourism Development Corporation – State Tourism Development Corporation – Tamilnadu Tourism Development Corporation (TNTDC).

Unit – III: Travel Agents and Tour Operators: Types of Travel Agencies – Functions – Sources of Income – Types of Tour Operators – Package Tours.

Unit – IV: Tourism Regulations: Travel Regulations – Economic Regulations – Health Regulations – Law and Order Regulations.

Unit – V: Tourism Management: Accommodation – Modes of Transport – Indian Railway Catering and Tourism Corporation (IRCTC) – Dimensions of Domestic and International Tourism.

Outcomes:

- The student will understand the growth of tourism since independence of India.
- The student would know the various issues on tourism planning and the role of various national and international organisations.

Text Books:

1. Barkat A. M. A., Travel and Tourism Management, New Delhi, Prentice Hall India Learning, 2015.
2. Bhatia A. K., Tourism Development: Principals and Practices, New Delhi, Sterling Publishers, 2018.

Books for Reference:

1. Charles R. Goeldner and Brent Ritchie J. R., Tourism: Principles, Practices, Philosophies, John Wiley & Sons, New Jersey, 2009.
2. Gill Pushpinda S., Dynamics of Tourism, Anmol Publication, Delhi 1999.
3. Kunal Chattopadhyay, Economic Impact of Tourism Development: An Indian Experience, Kanishka, 1995.
4. Lajipathi Raj H., Development of Tourism in India, Ropa Books, Hyderabad, 1993.
5. Page Stephen J., Tourism Management, New York, Routledge, 2015.
6. Parveen Sethi, Hand Book of Tourism, Anmol Publication, New Delhi, 1999.
7. Parveen Sethi, Millennium Trends in Travel and Tourism, Rajat Publication, Delhi 2002.
8. Pran Nath Seth, Successful Tourism Management, New Delhi, Sterling Publishers, 1997.
9. Sunetra Roday, Archana Biwal, Vandana Joshi, Tourism: Operations and Management, New Delhi, Oxford University Press, 2009.

Year/Semester: II Year / III Semester
Credits: 5

Code:
Hours/Week: 5

HISTORY OF INDIA (1526 – 1707 A. D.)

Objectives:

- To enable the students to understand the condition of India for the establishment of Mughal Empire.
- To enable students to learn the major political, social and cultural developments during the Muslim Rule.

Unit – I: Foundation of the Mughal Empire: Sources – India on the Eve of Babur’s Invasion – Babur – Humayun – Sher Shah and his Administration.

Unit – II: Consolidation of the Empire: Akbar: Rajput Policy – Religious Policy – Jahangir – Nur Jahan – Shah Jahan.

Unit – III: Aurangzeb – Deccan policy – Religious policy – North – West Frontier policy – Rise of Marathas under Shivaji.

Unit – IV: Mughal Administration – Social and Economic Conditions – Sufi Movement – Bakhti Movement – Art and Architecture – Literature.

Unit – V: Decline of the Mughal Empire – Popular Revolts: Jats – Satnamis – Afghans – Sikhism – Advent of the Europeans.

Outcomes:

- The students realize the administrative and economic developments of the medieval period.
- The students understand the contributions of the Imperial Mughals.

Text Books:

1. Sharma L. P., History of Medieval India, New Delhi, Konark Publication, 1993.
2. Khurana K.L., History of India (1526 – 1967 A.D.), Agra, Lakshmi Narain Agarwal, 1995.

Books for Reference:

1. Bakshi S. R., Advanced History of Medieval India, New Delhi, Anmol Publication, 2002.
2. Banerjee A.C., New History of Medieval India, New Delhi, S. Chand & Co., 1990.
3. Chandra, Satish, History of Medieval India (1800-1700), Orient Black Swan, 2009.
4. Irfan Habib, The Agrarian system of Mughal India (1556 – 1707), Bombay, Asia Publishing House, 1957.
5. John F. Richard, The New Cambridge History of India, Cambridge University Press, 1996.
6. Lanepoole, Medieval India, Universal Publication, Delhi, 1971.
7. Mehta J.L., Advanced Study in the History of the Medieval India (1000 – 1526 A.D.), Sterling Publishers, New Delhi, 1989.
8. Nurul Hasan S., Religion, State and Society in Medieval India, Oxford University Press, New Delhi, 2005.
9. Srivastava A.L., History of India 1000 to 1707, Shivalal Agarwal Publication, Agra, 1976.
10. Tripathi R. P., Some Aspects of Muslim Administration, Central Book Depot, Allahabad, 1992.
11. Vincent A. Smith, The Oxford History of India, New Delhi, OUP, 2002.

Year/Semester: II Year / III Semester
Credits: 5

Code:
Hours/Week: 5

HISTORY OF INDIA (1707 – 1857 A. D.)

Objectives:

- To enable the students understand the establishment and consolidation of the British Rule in India.
- To study the factors for the emergence of national consciousness against the foreign rule.

Unit – I: Advent of Europeans: Portuguese – Dutch – English and French East India Companies: Carnatic Wars – Battle of Plassey – Third Battle of Panipat – Battle of Buxar.

Unit – II: Consolidation of the Company's rule: Dual Government – Permanent Revenue Settlement – Subsidiary Alliance – Reforms of William Bentinck – Doctrine of Lapse.

Unit – III: Native Resistance to the Company's Rule: Anglo-Mysore Wars – Anglo-Sikh wars – Anglo-Maratha Wars – South Indian Rebellion.

Unit – IV: Constitutional Development – Regulating Act – Pitt's India Act – Charter Acts of 1793, 1813, 1833 and 1853.

Unit – V: Indian Response to British Rule: Peasant Movements and Tribal Uprisings in the 18th and 19th Centuries: The Kol Rebellion – The Mopla Rebellion – The Santal Rebellion – Great Revolt of 1857: Causes, Nature, Failure and Consequences.

Outcomes:

- The student understands the arrival of Europeans and the consolidation of British Rule in India.
- The student has knowledge on the challenges to the British rule and the constitutional developments.

Text Book:

1. Grover B.L., Grover S., A New Look at Modern Indian History, New Delhi, S. Chand & Co., 2004.
2. Khurana K.L., History of India (1526 – 1967 A.D.), Agra, Lakshmi Narain Agarwal, 1995.

Books for Reference:

1. Banerjee A.C., The New History of Modern India, Delhi, Bagchi & Co, 1983.
2. Bayly C.A., An Illustrated History of Modern India 1600-1947, Bombay, Oxford University Press, 1991.
3. Desai A.R., Social Background of Indian Nationalism, Popular Prakashan, Bombay, 1976.
4. Majumdar R.C., Raychaudhuri H.C. and Dutt R.C., An Advanced History of India, Macmillan, Chennai, 2004.
5. Percival Spear, The Oxford History of India 1740 – 1975, New Delhi, Oxford University Press, 2000,
6. Rajayyan K., History of Tamilnadu, (1565 – 1965), Madurai Publishing House, Madurai, 1977
7. Ramachandran C., East India Company and the South Indian Economy, Madras, New Era Publications, 1980.
8. Sekhar Bandyopadhyay, From Plassey to Partition: A History of Modern India, New Delhi, Orient Longman, 2004.
9. Thompson Edward & Garratt G.T., A History of British Rule in India, Delhi, Atlantic Publishers, 1999.

Year/Semester: II Year / III Semester
Credits: 4

Code:
Hours/Week: 5

Allied – III: Principles of Public Administration

Objectives

- It briefly traces upon the core elements of Public Administration that includes problems in administration.
- It incorporates the Budget and other financial aspects of administration.

Unit – I: Nature, Scope and Importance of Public Administration – Different Approaches – Relations with Other Social Sciences – Public and Private Administration.

Unit – II: Organization – Theories: Classical Theory – Human Relations Theory – Principles of Organization: Hierarchy – Span of Control – Unity of Command – Centralization VS Decentralization – Formal and Informal Organizations.

Unit – III: Chief Executive – Line, Staff and Auxiliary Agencies – Departments – Public Corporations – Independent Regulatory Commissions.

Unit – IV: Personnel Administration – Recruitment and Training – Classification of Services – Promotion – Retirement – Association.

Unit – V: Financial Administration – Budget and its Principles – Process of Budget Making – Parliamentary Control Over Finances – Accounting and Auditing.

Outcomes:

- The students understand the theories and key factors governing public administration.
- The students would realize the structure of public administration and its financial management highlighting budget and control.

Text Book

1. Vishnoo Bhagwan & Vidya Bhushan – Public Administration, S. Chand & Co. New Delhi, 2006.

Books for Reference:

1. Avasthi A. and Maheswari S.R., Public Administration, Lakshmi Narain Aggarwal, Agra 1996.
2. Bidyut Chakrabarty and Prakash Chand – Public Administration in a Globalizing World, Sage Publications, New Delhi, 2012.
3. Felix A., Nigro & Lloyd G.Nigro – Modern Public Administration, Harper and Row, London, 1973.
4. Pandey A.K., Handbook of Public Administration, Dominant pub, New Delhi, 2005.

Year/Semester: II Year / IV Semester

Credits: 5

Code:

Hours/Week: 5

HISTORY OF INDIA (1858 – 1947 A. D.)

Objectives:

- To learn the significance of Queen's Proclamation and the policy of the British Government on Indian Administration.
- To understand the emergence of Indian National Congress and its role for the liberation of India.

Unit – I: Queen's Proclamation – Reforms of Lord Ripon and Lord Curzon – Socio – Religious Reform Movements: Brahma Samaj, Arya Samaj, Prarthana Samaj, Theosophical Society, Wahabi Movement, Aligarh Movement.

Unit – II: Indian National Movement – Formation of the INC – Moderates – Extremists – Partition of Bengal – Swadeshi Movement – Formation of Muslim League – Minto Morley Reforms – Lucknow Pact – Home Rule Movement – Montague Chelmsford Reforms.

Unit – III: Gandhian Era: Rowlat Act and Jallianwalabagh Massacre – Khilafat Movement – Non Cooperation Movement – Swaraj Party – Simon Commission – Civil Disobedience Movement – Round Table Conferences – Gandhi-Irwin Pact – Communal Award and Poona Pact.

Unit – IV: Government India Act of 1935 – Congress Ministries and Provincial Autonomy – The August Offer – Individual Satyagraha – Indian National Army (INA) – The Cripps Mission – Quit India Movement.

Unit – V: C. Rajagopalachari Formula – Wavell Plan – Shimla Conference – INA Trial – Cabinet Mission – Rahmat Ali and The Idea of Pakistan – Mohammed Ali Jinnah and Two Nation theory – Mountbatten Plan – Indian Independence Act.

Outcomes:

- The students would understand the role of political and reform movements under the crown rule, leading to Constitutional Advancements.
- The students come to know the consolidation of independent struggle under Gandhiji and the challenges of partition and independence.

Text Book:

1. Bipan Chandra, India's Struggle for Independence, Penguin Books, New Delhi, 1989.

Books for Reference:

1. Ahluwalia M. M., Freedom Struggle in India 1858 to 1909, Delhi, Ranjit Printers and Publications, 1968.
2. Chhabra G.S., Advanced Study in The History of Modern India, 1920 – 1947, Sterling Publishers, New Delhi, 1984.
3. Chopra P.N., Quit India Movement, Publication Division, New Delhi, 1992.
4. Damodaran Vinita & Maya Kumar: Postcolonial India, New Delhi, Manohar, 2000.
5. Majumdar R.C., Raychaudhuri H.C. and Kali Kinkar Datta, An Advanced History of India, Macmillan, New Delhi, 2001.
6. Pran Chopra, Uncertain India: A Political Profile of Two Decades of Freedom, Asia Publishing House, Bombay, 1968.
7. Sekhar Bandyopadhyay, From Plassey to Partition: A History of Modern India, Orient Longman, New Delhi, 2004.
8. Sumit Sarkar, Modern India 1885 – 1947, Macmillan, New Delhi, 1983.
9. Tara Chand, History of Freedom Movement in India, Publication Division Ministry of India, New Delhi, 1983.

Year/Semester: II Year / IV Semester

Code:

Credits: 5

Hours/Week: 5

CONTEMPORARY HISTORY OF INDIA (1947 – 2014 A. D.)

Objectives:

- To understand and update knowledge on Contemporary issues and challenges
- To prepare the students for competitive examinations.

UNIT – I: Nehru Era – Constitution making – Integration – Five Year Plans – India's Foreign Policy: Panch-Sheel and NAM – Kashmir Issue – Sino – Indian War of 1962.

UNIT – II: Lal Bahadur Shastri – Domestic Policy – Indo – Pak War of 1965 and Tashkent Agreement – Indira Gandhi: 1966 – 1975 – Internal Reforms – Indo – Soviet Treaty of Friendship – Indo – Pak War of 1971 and Simla Agreement.

UNIT – III: Jayaprakash Narayan and Total Revolution – Indira Gandhi and Emergency – Janata Government: Internal Reforms and Foreign Policy – Re-Emergence of Indira Gandhi: Khalistan Issue and Operation Blue Star.

UNIT – IV: Rajiv Gandhi: Programmes and Policies – Rajiv – Jayewardene Accord and Creation of SAARC – V.P. Singh and National Front Government – P.V. Narashima Rao: New Economic Policy – Ayodhya Issue and Emergence of BJP.

UNIT – V: Changing Trends in Coalition Governments: United Front Governments – NDA and UPA Coalition Governments – Economic Reforms – Consolidation of Economic Development – Growth of Science and Technology – Foreign Policy Directions.

Outcomes:

- It enables the students to grasp the challenges faced in the making of the Constitution of independent India, five year plans and India's war with the neighbours.
- It enables the students on current affairs as well as the challenges of successive governments to facilitate their preparation for competitive examination.

Text Book:

1. Bipan Chandra, Mridula Mukherjee and Aditya Mukherjee – India since Independence, New Delhi, Penguin, 2008.
2. Venkatesan G., History of Contemporary India, Madurai, J.J. Publication, 2001.

Reference Books:

1. Bipan Chandra, Communalism in Modern India, Delhi, Vikas Publications, 1987.
2. Christophe Jaffrelot, India Since 1950, New Delhi, Yatra Books, 2012.
3. Dutt, V.P., India's Foreign Policy, New Delhi, Vikas Publications, 1993.
4. Grover, B.L., and Grover, S. A New Look at Modern Indian History, New Delhi, S. Chand & Co., 2004.
5. Ira Pande, India 60: Towards a New Paradigm, New Delhi, HarperCollins, 2007.
6. Keswani K.B., History of Modern India (1800 – 1984 A.D.), Bombay, Himalaya Publishing House, 1985.
7. Mahajan, V.D., History of Modern India (1919 – 1982), New Delhi, Chand & Co. 2004.
8. Pal R., Brass, The Politics of India since Independence, New York, Cambridge University Press, 2001.
9. Ramachandra Guha, India After Gandhi, Noida, Picador, 2008.
10. Satish Chander, Fifteen Years of Indian Independence 1947 – 1962, Delhi, Culture Meeting Publications, 1963.
11. Shashi Tharoor, India: From Midnight to the millennium, New Delhi, Penguin Books, 2000.
12. Venkatesan G., History of Contemporary India, Rajapalayam: V.C. Publications, 2016.

Year/Semester: II Year / IV Semester

Code:

Credits: 4

Hours/Week: 6

Allied – IV: Outlines of Comparative Governments

Objectives:

- To make the students understand the state and its important organs including judiciary that maintains balance between the pillars of government.
- To study the role of pressure groups and political parties for the effective functioning of democracy.

UNIT – I: State and its Elements – Unitary and Federal – Forms of Governments: Monarchy – Democracy – Dictatorship.

UNIT – II: Constitutions: Aristotle’s classification of Constitutions – Modern classification: Written – Unwritten – Rigid and Flexible Constitutions – Amendments: USA and Switzerland.

UNIT – III: Theory of Separation of Powers – Legislature: Types and Functions – Direct Legislation.

UNIT – IV: Executive: Types and Functions – Judiciary – Rule of Law – Administrative Law – Judicial Review.

UNIT – V: Political Parties – Types and Functions of Political Parties – Adult Suffrage – Pressure Groups.

Outcomes:

- It makes the students to understand state and its elements, types of constitutions and the significance of the theory of separation of powers.
- The students would realize the types and functions of executives and the role of judiciary as well political parties in a state.

Text Book

1. Agarwal R.C., Political Theory: Principles of Political Science. New Delhi, S. Chand & Co. 2002.

Reference Books:

1. Eddy Asirvatham & K.K. Mishra, Political Theory. New Delhi, S. Chand & Co. 2004.
2. Ray S. N., Modern Comparative Politics, New Delhi, Prentice – Hall, 1999.
3. Rout B.C., Political Theories: Concepts and Ideologies. New Delhi, S. Chand & Co. 1987.
4. Vidya Dhar Mahajan, Political Theory: Principles of Political Science, New Delhi, S. Chand & Co. 2013.
5. Wheare K. C., Federal government, London, oxford University Press, 1963.

Year/Semester: III Year / V Semester

Code:

Credits: 5

Hours/Week: 5

HISTORY OF EUROPE – I (1453 – 1789 A.D.)

Objectives

- To understand the causes and failure of eastern Byzantium empire.
- To know the concept of the Age of Reasons.
- To discuss the establishment of colonies in Asia.

Unit – I: Beginning of Modern Europe: Fall of Constantinople – Emergence of Nation States – Geographical Discoveries: Portugal and Spain – Renaissance: Literature, Art and Architecture.

Unit – II: Reformation: Martin Luther – Zwingli – Calvin – English Reformation – Counter Reformation: Council of Trent – Inquisition – Ignatius Loyola.

Unit – III: Period of Conflict: Emergence of Mercantilism – Establishment of Colonies – Thirty Years War – England Under the Stuart Dynasty: Glorious Revolution.

Unit – IV: Era of Absolutism: Louis XIV – Peter the Great – Catherine II – Frederick – Features of the Age of Absolutism.

Unit – V: Era of Enlightenment and Scientific Progress: Montesquieu – Voltaire – Rousseau and Diderot – Agrarian Revolution – Industrial Revolution.

Outcomes:

- The students realize the significance of Geographical Discoveries, Renaissance and Reformations in Christianity.
- The students understand religious wars, absolute monarchs, colonization, scientific progress and various revolutions.

Text Book:

1. Khurana K.L., Modern Europe [1453 -1789 A.D.], Lakshmi Narain Agarwal, Agra, 2018.

Books for Reference

1. Arun Battacharjee, A History of Europe (1453 – 1789), Sterling, New Delhi, 1981.
2. Ferguson W and Bruun G., A Survey of European Civilization, Houghton & Co., Boston, 1969.
3. Fisher H. A. L., A History of Europe, Prentice Hall, New Delhi, 1936.
4. James Edgar Swain, A History of World Civilization, S.Chand & Co., New Delhi, 1999.
5. Ketelbey C. D. M., A History of Modern Times from 1789, OUP, New Delhi, 1976.
6. Norman Lowe, Mastering Modern World History, Macmillan, London, 2013.
7. Phul R. K., World Civilization, Prentice Hall, New Delhi, 1987.
8. Roberts J. M., History of the World, Oxford University Press, New York, 1993.
9. Weech W. N., History of the World, London, 2001.

Year/Semester: III Year / V Semester

Code:

Credits: 5

Hours/Week: 5

HISTORY OF CHINA AND JAPAN (1911 – 1990 A.D.)

Objectives:

- To present an overview of the History of China and Japan highlighting their march from insular nations to their present dynamic position.
- To trace their role in World Affairs in the last three decades of the 20th Century.

Unit – I: Background – Chinese Revolution of 1911 – Causes – Sun-Yat-Sen and Kuomintang – Impact of the Revolution – Yuan-Shi-Kai – China and the First World War – May Fourth Movement.

Unit – II: Background – Japanese Imperialism – Japan and First World War – 21 Demands – Washington Conference.

Unit – III: The Manchurian Crisis – Rise of Militarism in Japan – Second Sino – Japanese War – China and Second World War – CCP – KMT Rift – China under Mao-Tse-Tung and the Cultural Revolution.

Unit – IV: China under Deng Xiaoping and his Economic Reforms – China's Foreign policy 1949-1990: Sino-Soviet Relations – China and the West – China and the Third World – China and the U.N.

Unit – V: Japan and Second World War: Japanese Invasion of South East Asia – Attack on Pearl Harbour – Allied Occupation 1945-1952: New Constitution – Reconstruction – Economic Reforms – Foreign policy 1952-1990.

Outcomes:

- The students get to know the revolutionary changes in China and the imperial Japan's global ambitions and annexations.
- The students may understand the role of Mao, Den Xiaoping in shaping China and Japanese advancement under new Constitution after Second World War.

Text Book:

1. Majumdar R.C. and Srivatsava A.L., The Far East, Chand and Co, New Delhi, 2000.

Books for Reference:

1. Beckmann G.M., The Modernisation of China and Japan, New York, Harper and Row, 1962.
2. Borton H., Japan's Modern Century, New York, The Reynold Press, 1955.
3. David S.G. and Goodman, China and the West: Ideas and activists, Manchester University Press.
4. Dutt Gargi and Dutt V.P., China's Cultural Revolution, Bombay, Asia Publishing House, 1970.
5. Dutt V.P., China's Foreign Policy (1958 – 1962), Bombay, Asia Publishing House, 1964.
6. Gupta R.S., History of Modern China, New Delhi. Sterling Publishers, 1981.
7. John King Fairbank and Merle Goldman, China: A New History, Harvard University Press, Cambridge, Massachusetts London, England, 2006
8. Krishnamurti. V.M, History of the Far East (1840-1970 A.D), Vijayalakshmi Publications, Neyyoor, 1976.
9. Shivkumar Jain, History of Far East in Modern Times, S. Chand & Co., New Delhi, 1982.
10. Wolfram Eberhard, A History of China, London, Routledge Kegan Paul, 1977.

Year/Semester: III Year/ V Semester

Code:

Credits: 5

Hours/Week: 6

CONSTITUTION OF INDIA

Objectives:

- To inculcate knowledge on constitution, the most important document governing the nation and the individuals.
- To orient the student towards understanding the mechanism which governs the centre – state equilibrium on policy planning that includes socio – economic development.

UNIT I: Background – Sources – Preamble – Basic Principles – Salient Features – Citizenship.

UNIT – II: Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Special Provisions Relating to Certain Classes.

UNIT – III: Union Government: Executive – Legislature – Judiciary – Judicial Review – Judicial Activism on Human Rights and Environmental Issues.

UNIT – IV: State Government and Local Self – Government: Executive – Legislature – Judiciary – Panchayat Raj – Municipalities.

UNIT – V: Nature of Indian Federalism – Relations Between the Union and the States – Public Services – Public Service Commission – Election Commission – Amendments.

Outcomes:

- The students are aware of the core ideas on constitution, its making and the rights and duties.
- It provides knowledge on the union and state governments, public services, organs of the government and constitutional amendments.

Text Book:

1. Pylee M.V., Constitutional Government in India, New Delhi, S.Chand & Co, 2012.

Reference Books:

1. Bidyut Chakrabarty and Rajendra Kumar Pandey, Indian Government and Politics, New Delhi: Sage Publications, 2012.
2. Durga Das Basu, Introduction to the Constitution of India, New Delhi, Prentice Hall, 1996.
3. Gautam, D.N. Fifty Years of Indian Constitution, New Delhi, Manak Publication, 2001.
4. Kapur, A.C. Select Constitutions, New Delhi, S. Chand & Co., 2005.
5. Mehta, S.M. Constitution of India and Amendment Acts, New Delhi, Deep & Deep, 1990.
6. Subba Rao, T.V. Constitutional Development in India, New Delhi, Deep & Deep, 1996.

Year/Semester: III Year / VI Semester

Credits: 5

Code:

Hours/Week: 5

HISTORIOGRAPHY

Objectives:

- To study the nature of history in relation with other disciplines.
- To make the student to understand the various ideas that shaped the work of leading historians.
- To learn the basic principles and techniques of research methodology.

Unit – I: Nature and Scope of History – Kinds of History – History and Other Social Sciences – Uses and Abuses of History – Sources: Primary and Secondary – Plagiarism.

Unit – II: Historical Writing of the West: Herodotus – Thucydides – Montesquieu – Edward Gibbon – Arnold Toynbee – Hegel – Karl Marx.

Unit – III: Historical Writing of India: Kalhana – Abul Fazal – R.G. Bhandarkar – J.N. Sarkar – Irfan Habib – K.A. Nilakanda Shastri – Bipan Chandra.

Unit – IV: Research Methodology: Selection of Topic for Research – Requisites of a Research Scholar – Objectivity and Subjectivity.

Unit – V: Historical Method: Collection of Data – Criticism: External and Internal – Synthesis – Exposition – Mechanics of Thesis Writing: – Arrangement of Thesis – Documentation – Footnotes – Bibliography.

Outcomes:

- The students know the nature of history and the contribution of noted historians of the past with special reference to India.
- Students are familiar with the issues involving research methodology that includes selection of topic, collection of data, thesis writing and its arrangement with foot notes and bibliography.

Text Book:

1. Sheik Ali, History: Its Theory and Method, Delhi, Macmillan, 2005.

Books for Reference:

1. Aggarwal, J.C., Teaching of History: A Practical Approach, New Delhi, Vikas Publishing House Pvt. Ltd., 1992.
2. Carr E. H., What is History? New York, Penguin Books, 1961.
3. Elton G. R., The Practice of History, Princeton, N.J. Recording for the Blind & Dyslexic, 2003.
4. Manickam S., Theory of History & Method of Research, Madurai, Padumam Publishers, 1997.
5. Rajayyan, K., History in Theory and Method, New Delhi, Ratna Publications, 1995.
6. Subramaniam, N., Historiography, Madurai, Koodal Publishers, 1978.

Year/Semester: III Year / V Semester

Credits: 5

Code:

Hours/Week: 5

MAKERS OF MODERN INDIA

Objectives:

- To know about the great political leaders of modern India.
- To know about our social and religious thinkers and their thoughts.

Unit – I: Political: G. Gokhale – B. G. Tilak – M.K. Gandhi – Subhash Chandra Bose – Nehru – Abul Kalam Azad.

Unit – II: Social: Raja Rammohan Roy – Ishwar Chandra Vidyasagar – Jyoti Rao Phule – Sri Narayana Guru – B.R. Ambedkar – E.V.Ramaswamy.

Unit – III: Religious: Dayanand Saraswati – Ramakrishna Paramahansa – Swami Vivekananda – Aurobindo Ghosh – Sir Syed Ahmad Khan.

Unit – IV: Cultural: Rabindranath Tagore – Bankim Chandra Chatterjee – Subramanya Bharathi – Bharathidasan – T.V. Kalyanasundaram – Desika Vinayagam Pillai.

Unit – V: Women: Savitribai Phule – Pandita Ramabai – Annie Besant – Vijayalakshmi Pandit – Sarojini Naidu – Muthu Lakshmi Reddi.

Outcomes:

- The students have knowledge on the great political leaders of Modern India who played a crucial role in the liberation of India.
- They are familiar with the revolutionary social reforms, great writers and thinkers who shaped our thought process through the enrichment of Indian culture.

Text Book:

1. Ramachandra Guha, Makers of Modern India, Harvard University Press, Cambridge, 2013.

Books for Reference:

1. Agarwal R. C., and Mahesh Bhatnagar – Constitutional Development and National Movement of India, S. Chand & Co., New Delhi, 2014.
2. Bali, D.R. – Modern Political Thought, Sterling Publications, New Delhi, 1993.
3. Bharathi, K.S., – Encyclopedia of Eminent Thinkers : The political thought of B.R. Ambedkar Vol. IX., Concept Publishing Company, New Delhi, 1956.
3. Grover B.L., Grover S., A New Look at Modern Indian History, S. Chand & Co., New Delhi, 2004.
4. Lal S., 50 Magnificent Indians of 20th Century, Jaico Publication, Chennai, 2011.
5. Rajmohan Gandhi, Modern South India: A History from the 17th Century to our Times, Aleph Book Company, New Delhi, 2018.
6. Sankar Ghose, – Leaders of Modern India, Akited Publications, New Delhi, 1980.

Year/Semester: III Year / VI Semester

Code:

Credits: 5

Hours/Week: 5

HISTORY OF EUROPE – II (1789 – 2000 A.D.)

Objectives

- To analyze the nature of French Revolution and the emergence of Napoleon Bonaparte.
- To study the rise of nationalism in 19th century with special reference to Italy and Germany.
- To learn the causes, course and results of the first and second world war.
- To highlight the developments during the Cold War and its role in international relations.

Unit – I: French Revolution 1789 – Napoleon Bonaparte – Congress of Vienna – Era of Metternich – French Revolutions of 1830 and 1848.

Unit – II: Liberal National Upheavals: Unification of Italy – Unification of Germany – October Revolution of 1917: Causes and Results.

Unit – III: First World War: Causes – Course – Results – Peace Treaties – League of Nations.

Unit – IV: Inter-War Period: Nazism, Fascism and Imperialism – Second World War: Causes – Course – Consequences.

Unit – V: Europe since 1945: UNO and World Peace – Cold War: Emergence of Two Power Blocs – Reunification of Germany – Disintegration of USSR – European Union.

Outcomes:

- The students get to know the French Revolution and the developments leading to the unification of Italy, Germany and on Balkan crisis.
- They are familiar with the issues involving First and Second World War, peace process, UNO and the emergence of cold war politics in international relations.

Text Book:

1. Pradeep Kumar, Ghosh, History of Europe, New Delhi, Pearson, 2012.

Books for Reference:

1. Dorn Brose, Eric. A History of the Great War: World War One and the International Crisis of the Twentieth Century, OUP, 2010.
2. Ketelbey, A History of Modern Times From 1789, Oxford University Press, New Delhi, 2000.
3. Lipson, E., Europe in the 19th and 20th Centuries, Prentice Hall of India, New Delhi, 1940.
4. Settar, S., World History, Landmarks in Human Civilization, Macmillan, New Delhi, 1973.
5. Thomson, D., World History from 1917 to 1968, Oxford University Press, New Delhi, 1969.

Year/Semester: III Year / VI Semester

Code:

Credits: 5

Hours/Week: 5

HISTORY OF USA (1865 – 1990 A.D.)

Objectives:

- To study the importance of Reconstruction.
- To understand the causes for the economic depression.
- To know about the causes and consequences of the cold war.

Unit – I: Background – Reconstruction – Andrew Jackson – The growth of American Economy – Rail Roads – Big Business – Populist Movement.

Unit – II: The End of the Frontier – America as a World Power 1898 – 1920 – The Progressive Era – Theodore Roosevelt – W.H.Taft – Woodrow Wilson.

Unit – III: America and World War I – American Role in Paris Peace Conference – America Between the World Wars – 1920's – 1930's – The Great Depression – F.D. Roosevelt – the New Deal.

Unit – IV: America and World War II – UNO – Truman and Eisenhower Eras.

Unit – V: Decades of Change 1960 – 1990: – J.F. Kennedy – Lyndon Johnson – Civil Rights Movement – America in Asia, Korea and Vietnam – Nixon to George W. Bush – End of Cold War.

Outcomes:

- The students can grasp the growth of U.S. economy and the emergence of U.S.A. as a global power.
- It facilitated their understanding on the role of various U.S. Presidents in making it as a great power despite the cold war politics.

Text Book:

1. Majumdar R.C. and Srivatsava A.L., History of United States of America, SBD Publications & Distributors, New Delhi, 2001.

References:

1. David, A. Shannon - Twentieth Century America, The Progressive Era Vol. I, Rand McNolly, 1977.
2. Hendry Bamford Parkes - The United States of America: A History, Scientific Book Agency, 1975.
3. Henry Bamford Parkes, The United States of America: A History, Scientific Book Agency, 1975.
4. Joshi,P.S., Gholkar - History of United States of America,1900 – 1945 A.D. S. Chand & Co., New Delhi, 1980
5. K. Rajayyan, A History of the United States, Ratna Publications, Tirunelveli, 2000.
6. Richard Hofstadter, ed. The American Republic Vol. II, Prentice Hal of India, New Delhi, 1965.
7. Richard N.Current, Harry Williams, & Frank Freidel - American History: A Survey Since 1865, Vol II, Scientific Book Society, New Delhi, 1975.
8. Subrahmanian, N. - History of the United States of America, Ennes Publications, Madurai, 1990.

Year/Semester: III Year / VI Semester

Code:

Credits: 5

Hours/Week: 5

CONTEMPORARY HISTORY OF TAMIL NADU (1947 – 2016 A.D.)

Objectives:

- To become aware of developments in Tamilnadu since independence.
- To study the major developments during Congress, DMK and ADMK governments.
- To highlight the role of Tamilnadu for the socio – economic transformation and its impact on nation building.

Unit – I: Background – Congress Governments (1947 – 1954): Omandur P. Ramasamay – Kumarasamy Raja – First General Election 1952 – Rajaji: Kula Kalvi Thittam – Formation of Andhra State and States Reorganisation.

Unit – II: Congress Governments (1954 – 1967): General Elections – Kamaraj era: Schemes for Development – Bhaktavatchalam: Anti-Hindi Agitation – Food Crisis – Fall of Congress Government.

Unit – III: DK and Growth of DMK – Politics of Cultural Nationalism – General Elections – DMK Governments under the Leadership of C.N. Annadurai and M. Karunanithi: Policies and Populist Programmes – Prohibition.

Unit – IV: Emergence of AIADMK – General Elections – AIADMK Governments under the Leadership of MGR and J. Jayalalitha: Policies and Welfare Programmes.

Unit – V: Contemporary Issues: Language Policy – Reservation policy – River Water Disputes – Problem of Sri Lankan Tamils – Impact of Coalition Politics on Tamilnadu.

Outcomes:

- The students are familiar with the Congress, DMK, AIADMK governments that governed Tamilnadu with its policies and programmes.
- The students understand the socio – economic developments and the contemporary issues of Tamilnadu.

Text Book:

1. Devanesan A., History of Tamil Nadu, Marthandam, Renu Publication, 2004.
2. Venkatesan G., History of Modern Tamil Nadu, V.C. Publications, Rajapalayam, 2016.

Books for Reference:

1. Bala Jeyaraman, Kamaraj: The Life and Times of K. Kamaraj, Rupa Publications, New Delhi, 2013.
2. Kannan R., Anna: The Life and Times of C.N. Annadurai, Penguin Books, New Delhi, 2010.
3. Kannan. R, MGR: A Life, Penguin Books, New Delhi, 2017.
4. Philip Spratt, D.M.K in Power, Nachiketa Publications, Bombay, 1970.
5. Rajmohan Gandhi, The Rajaji story, 1937-1972, Bombay, Bharatiya Vidya Bhavan, 1984.
6. Ramasamy A., DMK: Rise and contribution, Chennai, Puthu Vasantham Pathippagam, 2009.
7. Roopa Swaminathan, M.G. Ramachandran: Jewel of The Masses, New Delhi, Rupa & Co., 2002.
8. Sandhya Ravishankar, Karunanidhi: A Life in Politics, HarperCollins Publications, Noida, 2018.
9. Thandavan R., All India Anna Dravida Munnetra Kazhagam: Political Dynamics in Tamilnadu, Madras, Tamil Nadu Academy of Political Science, 1987.
10. Vaasanthi, Amma: Jayalalithaa's Journey from Movie Star to Political Queen, Juggernaut Books, New Delhi, 2016.
11. Varghese Jeyaraj S., Social-Economic History of Tamil Nadu (1565 – 1967), Uthamaalayam, Anns Publications, 2017.

Year/Semester: III Year / VI Semester

Code:

Credits: 5

Hours/Week: 5

INDIA AND HER NEIGHBOURS

Objectives

- To enable the students to understand the core issues on India's foreign policy and the challenges faced with its South Asian neighbours.
- To make them realize the importance of regional organisations for the promotion of peace and stability.

Unit – I: Foreign Policy: Determinants of Foreign Policy – Evolution of India's Foreign Policy – Objectives – Basic Principles.

Unit – II: Pakistan and Bangladesh: India and Pakistan: Factors Influencing Indo-Pak Relations – Areas of Conflict – Crisis and Co-operation – India and Bangladesh: Emergence of Bangladesh under Mujibur Rahman – Areas of Crisis and Co-operation – Farakka Barrage Dispute.

Unit – III: China and Nepal: Sino-Indian Relationship – Chinese Action in Tibet – Panch-Sheel Agreement – Strains and Normalization Process of Sino-Indian Relationship – Border Issues – India and Nepal: Interactions between India and Nepal – Economic Co-operation.

Unit – IV: Sri Lanka, Burma and Bhutan: India and Sri Lanka since Independence – Ethnic Problem – Civil War and its Impact: India and Burma – India and Bhutan.

Unit – V: India's Role in the Regional Organisations: NAM – SAARC – ASEAN – Importance of Indian Ocean.

Outcomes:

- Students know the basic principles and evolution of foreign policy under successive governments.
- To know the challenges in India's relationship with its neighbours and India's role in regional organisations.

Text Book:

1. David Ludden, India and South Asia: A Short History, London, Oneworld Publication, 2014.
2. Jayapalan. N, India and Her Neighbours, Atlantic Publishers and Distributors, New Delhi, 2000.

Books for Reference:

1. Catherine R. Schenk, International Economic Relations Since 1945, Routledge, 2011.
2. Chatterjee Aneek, International Relations Today: Concepts and Applications, Dorling Kindersley, 2010.
3. John W. Young and John Kent, International Relations Since 1995, OUP, 2013.
4. Joyce P., Kaufman, Introduction to International Relations: Theory and Practice, Rowman & Littlefield, 2013.
5. Khanna V.N., International Relations, Vikas Publishing House, New Delhi, 2018.
6. Peu Ghosh, International Relations, PHI Learning, New Delhi, 2013.
7. Taylor C. Sherman, William Gould, Sarah Ansari, From Subjects to Citizens: society and everyday state in India and Pakistan (1947 – 1970), Cambridge University Press, 2014.

Year/Semester: III Year / VI Semester

Code:

Credits: 5

Hours/Week: 5

HUMAN RIGHTS

Objectives

- To highlight the importance of Human Rights from historical perspective.
- To study the role of National and International organisations for the protection of Human Rights.

Unit – I: Nature and Scope of Human Rights – Theories of Human Rights – Evolution of Human Rights: Magna Carta (1215) – Petition of Rights (1628) – American Declaration of Independence (1776) – Declaration of the Rights of Man and the Citizen (1789) – Classification of Human Rights.

Unit – II: I & II World Wars and Human Rights – UNO and Human Rights: Universal Declaration of Human Rights (UDHR) – International Covenant on Civil and Political Rights (ICCPR) – International Covenant on Economic, Social and Cultural Rights (ICESCR) – Helsinki Charter.

Unit – III: Human Rights and Non-Governmental Organisations (NGO's): International Committee of the Red Cross – Amnesty International – Human Rights Watch: International Commission of Jurists (ICJ) – African Human Rights System.

Unit – IV: Human Rights in India: Constitution and Human Rights – Protection of Human Rights Act, 1993 – State and National Human Rights Commissions – Law Enforcing Agencies and Human Rights.

Unit – V: Contemporary Issues on Human Rights: Women's Rights - Children's Rights – Rights of Dalits, Adivasis, Minorities, Refugees and Third Gender – Environment and Human Rights – Public Interest Litigation.

Outcomes:

- Students are familiar with the concept of significance of Human Rights to protect themselves and the society through redressal mechanisms.
- Students are aware of the organizations protecting the human rights and how the rights are violated especially in women, children, workers and marginalized groups.

Text Book:

1. Mohanasundaram K., Human Rights: Theories and Practice, New Delhi, Concept Publishing Company, 2013.

Books for Reference

1. Arjun Dev, Indira Arjun Dev and Das Gupta, Human Rights: The Source Book. New Delhi, National Council of Educational Research and Training, 1996.
2. Basu, L.N., Human Rights in a Global Perspective. Jaipur: Aavishkar Publishers, 2003.
3. Gopal Bhargava, Human Rights: Conflict to Build Peace. Kalpaz Publication, Delhi. 2003.
4. Jyotsna Tiwari, Scope and Categories of Human Rights, Delhi, Isha Books, 2006.
5. Lina Gonsalves, Women and Human Rights, New Delhi, A.P.H. Publishing Corporation, 2001.
6. Subramanian S., Human Rights: International Challenges, New Delhi, Manas Publication, 2004.
7. Umesh Bhatt, Human Rights: Achievements and Challenges. Vista International Publishing House, Delhi, 2005.
8. Vinod Sharma, Human Rights Violation: A Global Phenomenon, New Delhi, A.P.H. Publishing Corporation, 2002.

