



SACRED HEART COLLEGE (AUTONOMOUS)

Tirupattur – 635 601, Tamil Nadu, S.India

Resi : (04179) 220103

College : (04179) 220553

Fax : (04179) 226423

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Sample OBE Curriculum of B.Sc., Computer Science and MCA Programmes



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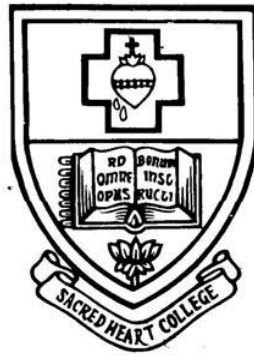
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B.SC. COMPUTER SCIENCE PROGRAMME

(EFFECTIVE FROM THE ACADEMIC YEAR 2021-22 ONWARDS)





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JUNE - 2023

DEPARTMENT OF COMPUTER SCIENCE

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PROGRAMME STRUCTURE

I. B.Sc., Computer Science Programme Structure

Sem	Part	Subcode	Subtitle	Hours	Credits
1	I	LT114	Tamil – I	5	3
	II	LE115AT	English –I	5	2
	III	AM114C	Allied Mathematics -I	6	5
	III	CS120	Problem Solving Techniques	3	3
	III	CS121	Web Development Using HTML	4	4
	IV	VE105A/B	Christian Religion –I / Value Education –I	2	1
	IV	SK104	Communication Skills	2	1
	IV	CE103	Communicative English –I	-	1
	II	LE115AP	English Lab –I	-	1
	III	PCS108	Practical -I: Web Development Using HTML	3	2
2	I	LT214	Tamil –II	5	3
	II	LE215AT	English –II	5	2
	III	AM214C	Allied Mathematics –II	6	5
	III	CS221	Digital Computer Fundamentals	3	3
	III	CS222	Programming Using C	4	4
	IV	VE205A/B	Christian Religion –II / Value Education –II	2	1
	IV	SK204	Leadership Skills	2	1
	IV	CE203	Communicative English –II	-	1
	II	LE215AP	English Lab –II	-	1
	III	PCS212	Practical -II: Programming Using C	3	2
3	I	LT312	Tamil –III	5	3
	II	LE309T	English –III	5	2
	III	AP309B	Allied Physics for Computer Science I	4	3
	III	CS322	Computer Organization And Architecture	3	3
	III	CS323	Data Structures and Algorithms Using C	4	4
	IV	VE306	Human Rights	2	1
	IV	SK304	Technical Skills	2	1
	III	PCS309	Practical -III: Data Structures And Algorithms Using C	3	2
	II	LE309P	English Lab –III	-	1



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Sem	Part	Subcode	Subtitle	Hours	Credits
4	I	LT411P / SS	Tamil -IV :Poem / Short Story	5	3
	II	LE409T	English –IV	5	2
	III	AP409B	Allied Physics For Computer Science II	4	3
	III	CS422	Software Engineering	3	3
	III	CS423	Relational Database Management Systems	4	4
	IV	VE406	Environmental Science	2	1
	IV	SK404	Employability Skills	2	1
	III	PAP409B	Allied Physics Practical's for Computer Science	2	1
	III	PCS412	Practical -IV: Relational Database Management Systems	3	2
	II	LE409P	English Lab –IV	-	1
	V	CO-SHE	Co-Curricular – Groups and Movements	-	2
	V	CO-DED	Co-Curricular – Outreach	-	2
	5	III	CS540	Programming Using Java	4
III		CS541	Web Development Using XML	4	4
III		CS542	Programming Using PHP	3	3
III		CS4543	Operating Systems	4	4
III		CS544 A / B / C /D	Elective I : Computer Graphics / Data Mining And Warehousing / Decision Support System / Software Testing And Quality Assurance	4	4
III		PCS515	Practical -V :Programming Using Java	3	2
III		PCS516	Practical -VI :Web Development Using XML	3	2
III		PCS517	Practical -VII :Programming Using PHP	3	2
III			Non Major Elective -I	2	1
6	III	CS633	Mobile Applications Development	4	4
	III	CS634	Linux and Shell Programming	4	4
	III	CS635	Programming Using Python	3	4
	III	CS636	Microprocessor Using 8086/88	4	4
	III	CS637 A / B / C /D	Elective II :Computer Networks / Software Project Management / Security Systems / Cognitive Computing	4	4
	III	PCS627	Practical - VIII :Mobile Applications	3	2



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			Development		
III	PCS628		Practical -IX :Programming Using Python	3	2
III	PCS629		Practical -X :Linux and Shell Programming/Microprocessor Using 8086/88	3	2
III	PCS630J		Project Work	-	4
III			Non Major Elective II	2	1



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II. DISTRIBUTION OF CREDITS FOR B.SC. (CS) PROGRAMME

Part	Subject	Credits Distribution (Semester Wise)						Total
		1	2	3	4	5	6	
I	Language I: Tamil	3	3	3	3	-	-	12
II	Language II: English Theory	2	2	2	2	-	-	8
	Language II: English Practical	1	1	1	1	-	-	4
III	Allied I: Mathematics	5	5	-	-	-	-	10
	Allied II: Physics Theory	-	-	3	3	-	-	6
	Allied II: Physics Practical	-	-	-	1	-	-	1
	Main : Theory	7	7	7	7	15	16	59
	Main : Theory – Elective	-	-	-	-	4	4	8
	Main : Practical	2	2	2	2	6	6	20
	Project Work	-	-	-	-	-	4	4
	Non Major Elective	-	-	-	-	1	1	2
IV	Skill Elective & Value Education	03	03	02	02	-	-	10
V	Co – Curricular	-	-	-	04	-	-	4
VI	Additional Credits	-	-	-	-	-	-	-
Total Credits								148

III. REGULATIONS FOR THEORY COURSES

1. Each theory course will have a maximum of 100 marks.
2. For a theory course, Continuous Assessment (CA) is 50 marks and Semester Examination is 50 marks.
3. There is no passing minimum for CA
4. Evaluation Scheme for Continuous Assessment

S.NO.	CA Component	Marks
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1.	First CA	15
2.	Second CA	15
3.	Attendance	5
4.	MCQ Test Using MOODLELMS	5
5.	Assignment/Open Book Test /Problem Solving	5
6.	Other Components (Seminars, Library reference works, Group Discussions, Field Visits and Quiz)	5
TOTAL		50

5. Question Paper Pattern for Continuous Assessment Tests

Time:2 Hrs.

The Question Paper shall consist of three sections

S.No	CA Question Paper Pattern	Mark
1	Part– A (6 x 2 =12) Answer all Questions.	12
2	Part – B (3 x 6 =18) 3 Questions with internal choice (either or type)	18
3	Part – C (2 x10 =20) Answer any two questions out of 3questions.	20
Total		50

6. Question Paper Pattern for Semester

Time:3 Hrs.



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S.No	Semester Question Paper Pattern	Marks
1	Part - A (10 x 2 = 20) Answer all Questions. Two questions from each unit.	20
2	Part - B (5 x 7 = 35) 5 Questions with internal choice (either or type). One question from each	35
3	Part - C (3 x 15 = 45) Answer any three questions out of 5 questions. One question from each unit.	45
Total		100

IV. REGULATIONS FOR PRACTICAL COURSES

1. Each practical course will have a maximum of 100 marks.
2. For a practical course, CA is 50 marks and Semester Examination is 50 marks.
3. There is no passing minimum for CA
4. The duration of semester 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
5. The features of every programming language are listed in the syllabus; however, the students are expected to carry out several exercises in each feature of the programming language.
6. Evaluation Scheme for Continuous Assessment

S.NO.	CA Component	Marks
1.	CA For each practical paper, only one CA test will be conducted.	20
2.	Performance in the practical session	20



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	Every practical session will carry a maximum of 10 marks and it is divided as follows: Initial Preparation & Observation : 5marks. Debugging & Execution of Program : 5marks. 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	
3.	Attendance	5
4.	Module Development / Viva Voce / MCQ Test Using MOODLE LMS	5
TOTAL		50

7. Question pattern for practical examination

Time: 3Hrs

Max. Marks: 40+10(for Record) = 50

The question paper pattern for continuous assessment test is same as that the semester practical examination.

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 30 students. Hence a question paper in practical should have 10 questions.

In each section, one question will be asked from the list of exercise completed in the practical. Another question will be a general question covering the features of the programming language.



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V. REGULATIONS FOR PROJECT WORK COURSE

Learning Objective

The students are every given adequate exposure and opportunity to develop a full-pledged software according to his taste and ability.

Guidelines

- 1) A group of students can choose a problem related to application area or system software and solve it by presenting appropriate computer programs using any programming language.
- 2) During the course of V Semester, the student groups will be guided to select a topic for the project work that is scheduled for the VI semester.
- 3) A faculty member as a guide will be available to 2 groups of students. Maximum of 5 students can be placed in a group.
- 4) Students will be allotted a lot by the guide. Among the allotted students the group can be formed by the faculty.
- 5) Guidance will be given to plan the entire project and do system study. Actual coding and debugging using the machine must be done by the student's groups.
- 6) Evaluation of the project and allotting of marks and will be done under the components CA and semester.
- 7) Passing minimum is 40%. A failed candidate has to improve his project work and submit it.
- 8) Methodology of project work is to be taught in the V and the VI Semester.
- 9) Each student can submit a separate report for the evaluation purpose.
- 10) Two copies of the project report are to be prepared.
 - a. One will be kept by the candidate
 - b. The other copy is meant for the Library

11) Evaluation



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CA Components			50 Marks
1.	First Review	10 Marks	
2.	Second Review	10 Marks	
3.	Implementation and Testing	30 Marks	
Total		50 Marks	
Semester Examinations			50 Marks
1.	Evaluation of Project Work Document	40 Marks	
2.	Viva – Voce	10 Marks	
Total		50 Marks	
Total			100 Marks

12) Project Report Contents

Requirement Analysis	10 Marks
Design	10 Marks
Implementation	10 Marks
Testing and Documentation	10 Marks
Total	40 Marks

Internal examiner and the external examiner will evaluate the project report separately and average will be calculated as the final semester mark of the student.

13) Project Plan

Project area	Work product
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



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	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



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VI. TEMPLATE FOR OBE FRAMEWORK

Programme: B.Sc. Computer Science		SEM	
Course Code	Course Title	Hours	Credits
Cognitive Level	K-1: Remembering K-2: Understanding K-3: Applying K-4: Analyzing K-5: Evaluating K-6: Creating		
Learning Objectives	The Course aims to		
UNIT	CONTENT	HOURS	
I	Unit title in capital letters		
II			
III			
IV			
V			
Teaching Resources	i. Textbook 1. ii. Reference 1. Morris M Mano, "Computer System Architecture", Prentice Hall of India Pvt. Ltd., New Delhi, 1991. iii. Web References		



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	<p>(i) Online Tutorial</p>
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	<p>1.</p>
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	<p>(ii) Online Quiz</p>
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	<p>1.</p>
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Course Outcomes	On completion of the course, students should be able to	
	CO1:	
	CO2:	
	CO3:	
	CO4:	
	CO5:	

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1															
CO2															
CO3															
CO4															
CO5															
PO Mean									PSO Mean						
Strength of Correlation of PO Mean									Strength of Correlation of PSO Mean						

CO Mapping Score with PO/PSO		Mean PO/PSO Mapping Score	
Strength of Correlation	Value	Strength of Correlation	Range
Strongly Correlating(S)	3	Strongly Correlating(S)	Above 2.5



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Moderately Correlating (M)	2	Moderately Correlating (M)	2.0 – 2.49
Weakly Correlating (W)	1	Weakly Correlating (W)	1.0 – 1.99
No Correlation (N)	0	No Correlation (N)	Below 1

	Name of the Faculty	Signature
Prepared by		
Verified by		

VII. CURRICULUM WITH OBE FRAMEWORK

PROGRAMME OUTCOMES

- PO1: Discuss their new knowledge and understanding; apply new ideas in order to acquire employability/self-employment
- PO2: Pursue higher learning programmes and become entrepreneurs
- PO3: Recognize moral and ethical values and be socially responsible citizens in the society
- PO4: Apply analytical, technical, problem solving, critical thinking skills, and decision-making skills in solving real life problems in one's life and in the society.
- PO5: Direct their own self-learning through MOOC courses, co-curricular activities, industrial exposures and field trainings
- PO6: Develop their own broad conceptual background in Biological sciences, Computing sciences, Languages and culture, Management studies, Physical sciences, etc.
- PO7: Demonstrate communication skills both oral and written in personal and academic pursuits

PROGRAMME SPECIFIC OUTCOMES

After completing this program the student will be able to

- PSO 1: Acquire knowledge of computing, mathematics, and basic sciences that may be relevant and appropriate to the domain
- PSO 2: Analyse a problem, identify and define the computing requirements, design, implement, and evaluate computer-based system, process, component, or program



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- PSO 3: Apply Software Development Life Cycle principles to build Software Products and to become a IT professional.
- PSO 4: Become an Entrepreneur and Communicate effectively to accomplish a common goal
- PSO 5: Analyse the local and global impact of computing on individuals, organizations, and society
- PSO 6: Pursue higher studies in the Computer Science domain and to engage in continuous professional development.

PO/PSO	PSO						
	1	2	3	4	5	6	Avg
PO1							
PO2							
PO3							
PO4							
PO5							
PO6							
PO7							
PO Mean							
Strength of Correlation of PO Mean							

Programme: B.Sc Computer Science		SEM	I
Course Code	PROBLEM SOLVING TECHNIQUES	Hours	Credits
CS120		3	3



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Learning Objectives	The Course aims to					
	<ul style="list-style-type: none"> 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. To appreciate the logic behind every problem. To learn the use of appropriate data structures while developing an algorithm for a problem. 					
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) Algorithm	14(a) Theory (OR) (b) Algorithm	15(a) Theory (OR) (b) Algorithm
	Section-C	16. Theory	17. Theory	18. Theory	19. Program	20.Program
UNIT	CONTENTS					HOURS
I	INTRODUCTION TO COMPUTER PROBLEM SOLVING Introduction – Problem Solving Aspect – Implementation of Algorithms – Program verification – Efficiency of Algorithms – Analysis of Algorithms.					10
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.					10
III	FACTORING METHODS					9



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	Finding the Square Root of a Number – Smallest Divisor of an Integer – GCD of Two Integer – Generating Prime Numbers – Generation of Pseudo-Random Numbers.	
IV	ARRAY TECHNIQUES Array Order Reversal – Finding Maximum Number in a Set – Removal of Duplicates from an Ordered Array.	8
V	MERGING, SORTING AND SEARCHING Two-way Merge, Sorting by Exchange, Binary Search, Hash Searching.	8
Teaching Resources	<p>i. Textbook</p> <p>1. Dromey R G, “How to Solve it by Computer”, Dorling Kindersley India Pvt.Ltd, Pearson Education :2007.</p> <p>Unit - I : Ch. 1.1, 1.2, 1.4, 1.5, 1.6, 1.7</p> <p>Unit - II : Ch. 2.1, 2.2, 2.3, 2.4, 2.6, 2.8.</p> <p>Unit - III : Ch. 3.1, 3.2, 3.3, 3.4, 3.6.</p> <p>Unit - IV : Ch. 4.1, 4.3, 4.4.</p> <p>Unit - V : Ch. 5.1, 5.3, 5.7, 5.8</p> <p>ii. References</p> <p>2. Michael Schneider, Steven W. Weingart, David M. Perlman, “An Introduction to Programming and Problem Solving with Pascal”, Wiley Eastern Limited, New Delhi:1982.</p> <p>3. Harold Abelson and Gerald Sussman with Julie Sussman, “Structure and Interpretation of Computer Programs”, MIT Press:1985.</p> <p>4. Ronald A. Pasko, “Problem Solving Basics and Computer Programming”, Jones And Bartlett Publishers, 2nd Edition:2001.</p> <p>iii. Web References</p> <p>(i) Online Tutorial</p> <p>1. http://nptel.ac.in/courses/106104074/</p>	



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	<p>2. http://javahungry.blogspot.com/2014/06/algorithm-problem-solving-techniques-or-approaches-for-software-programmer.html</p> <p>(ii) Online Quiz</p> <p>1. https://www.tutorialspoint.com/cplusplus/cpp_online_quiz.htm</p> <p>2. http://www.withoutbook.com/OnlineTestStart.php?quizId=11</p> <p>(iii) Online Compiler</p> <p>1. https://www.tutorialspoint.com/compile_cpp11_online.php</p> <p>2. https://www.codechef.com/ide</p>	
Course Outcomes	On completion of the course, students should be able to	
	CO1: Develop programming techniques required to solve a given problem.	K1, K2
	CO2: Develop problem solving skill using top – down design principles.	K2
	CO3: Design an algorithm for a problems that requirement various mathematical techniques along with suitable data structures.	K1, K3
	CO4: Develop techniques to handle array structures.	K4
	CO5: Develop techniques such as searching and sorting.	K5

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	2	1	2	3	2	1	2	3	2	1	1	2	2	1.83
CO2	3	3	1	3	3	3	1	2.42	3	3	3	3	1	2	2.5
CO3	3	3	1	3	3	3	1	2.42	3	3	3	2	2	3	2.66
CO4	3	3	1	3	3	3	1	2.42	3	3	3	3	2	3	2.83



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CO5	3	3	1	3	3	2	1	2.28	3	3	2	3	3	3	2.83
PO Mean								2.30	PSO Mean						2.53
Strength of Correlation of PO Mean						Moderately Correlating		Strength of Correlation of PSO Mean				Strongly Correlating			

	Name of the Faculty	Signature
Prepared by	Prof. J. John Arockiaraj	
	Mrs. A. Logeshwari	
Verified by	Dr. L. Ravi	



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Programme: B.Sc. Computer Science		SEM																												
Course Code	Web Development Using HTML					Hours	Credits																							
CS121						4	4																							
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To provide a comprehensive overview of the two largest Web technologies, Hyper Text Mark-up 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. To design a Web forms for data collection and validation. To learn to develop an industry standard web pages using Frames and CSS. 																													
	<table border="1"> <thead> <tr> <th>Section</th> <th>I-Unit</th> <th>II-Unit</th> <th>III-Unit</th> <th>IV-Unit</th> <th>V-Unit</th> </tr> </thead> <tbody> <tr> <td>Section-A</td> <td>1-2</td> <td>3-4</td> <td>5-6</td> <td>7-8</td> <td>9-10</td> </tr> <tr> <td>Section-B</td> <td>11.a) Theory (OR) b) Program</td> <td>12.a)Theory (OR) b) Program</td> <td>13.a)Theory (OR) b) Program</td> <td>14.a)Theory (OR) b) Program</td> <td>15.a) Theory (OR) b) Program</td> </tr> <tr> <td>Section-C</td> <td>16.Program</td> <td>17.Theory /Program</td> <td>18.Program</td> <td>19.Theory/ Program</td> <td>20.Theory/ Program</td> </tr> </tbody> </table>							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 /Program	18.Program	19.Theory/ Program
Section	I-Unit	II-Unit	III-Unit	IV-Unit	V-Unit																									
Section-A	1-2	3-4	5-6	7-8	9-10																									
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Section-C	16.Program	17.Theory /Program	18.Program	19.Theory/ Program	20.Theory/ Program																									
Blue Print of the Question Paper																														
UNIT	CONTENTS						HOURS																							
I	<p>HTML BASICS, FORMATTING TAGS AND LISTS</p> <p>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:</p>						12																							



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	Ordered List – Unordered List – Definition List.	
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.	12
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.	12
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.	12
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.	12
Teaching Resources	i. Textbook 1. Jon Ducktt. “Web Programming with HTML, CSS and JAVA 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	



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ii. Reference

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 Edition 2000
3. Alexis Goldstein, Louis Lazaris, Estelle Weyl. "HTML5 & CSS3 for the RealWorld".

iii. Web References

(i) Online Tutorial

1. <http://www.w3schools.com/css>
2. <http://www.tutorialspoint.com/css>

(ii) Online Quiz

1. <http://www.Indiabix.com/online-test/>

Course Outcomes

On completion of the course, students should be able to

CO1: Demonstrate the important HTML tags for designing static pages	K1, K3
CO2: Design web pages using objects such as Links and Images	K5
CO3: Select web elements to create webpages using Frames & Forms	K3
CO4: Design a web page that incorporates cascading style sheets	K5
CO5: Design a web page using the CSS properties such as background, list, table and Outlines	K5

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	2	1	3	2	3	2	2.29	3	3	1	2	1	3	2.16
CO2	3	3	1	3	2	3	1	2.29	3	3	1	2	1	3	2.16



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CO3	3	3	1	3	3	3	1	2.43	3	3	2	2	1	3	2.33
CO4	3	3	1	3	3	3	1	2.43	3	3	2	2	1	3	2.33
CO5	3	3	1	3	3	3	1	2.43	3	3	2	3	1	3	2.5
PO Mean								2.37	PSO Mean						2.29
Strength of Correlation of PO Mean								Moderately Correlating	Strength of Correlation of PSO Mean						Moderately Correlating

	Name of the Faculty	Signature
Prepared by	Dr. L. Ravi	
	Prof. P. KarthiK	
Verified by	Dr. L. Ravi	



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Programme: B.Sc. Computer Science		SEM	
Course Code	PRACTICAL – I: Web Development Using HTML	Hours	Credits
PCS108		3	2
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To understand the Heading, Phrase and Presentational Tags. To implement Links and List in Web Pages To explore CSS tags while designing Web Pages. To apply the frames to divide web pages into sections. To create web forms using the Forms elements. 		
Blue Print of Practical Courses	Section	Description Type and Choice	Marks
	A	One Programming Question	20 Marks
	B	One Programming Question	20 Marks
	Total Marks		40 Marks
PART	CONTENTS		HOURS
I	1. Heading Elements 2. Phrase Tags 3. Presentational Tags 4. Lists 5. Links 6. Images 7. Tables 8. Forms 9. Frames		45



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	10. Cascading Style Sheet	
Course Outcomes	On completion of the course, students should be able to	
	CO1: Creating Heading, Lists and Phrases	K1, K6
	CO2: Implementing a hyperlinked web pages using links	K3
	CO3: Developing a table and lists in web page	K3
	CO4: Designing a Web Forms to persist data with server	K6
	CO5: Applying frames and CSS styles in web design	K3

Mapping of COs with PSOs & POs

CO/PO	PO								PSO								
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg		
CO1	3	2	1	2	3	2	1	2	3	2	1	1	2	2	1.83		
CO2	3	3	1	3	3	3	1	2.42	3	3	3	3	1	2	2.5		
CO3	3	3	1	3	3	3	1	2.42	3	3	3	2	2	3	2.66		
CO4	3	3	1	3	3	3	1	2.42	3	3	3	3	2	3	2.83		
CO5	3	3	1	3	3	2	1	2.28	3	3	2	3	3	3	2.83		
PO Mean								2.30	PSO Mean								2.53
Strength of Correlation of PO Mean								Moderately Correlating	Strength of Correlation of PSO Mean								Moderately Correlating



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Programme: B.Sc. Computer Science		SEM	II																						
Course Code	DIGITAL COMPUTER FUNDAMENTALS	Hours	Credits																						
CS221		3	3																						
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To explore the Number System, Number Conversion from one Base to another Base and Complements. 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. 																								
	Blue Print of the Question Paper	<table border="1"> <thead> <tr> <th>Section</th> <th>I-Unit</th> <th>II-Unit</th> <th>III-Unit</th> <th>IV-Unit</th> <th>V-Unit</th> </tr> </thead> <tbody> <tr> <td>Section-A</td> <td>1-2</td> <td>3-4</td> <td>5-6</td> <td>7-8</td> <td>9-10</td> </tr> <tr> <td rowspan="2">Section-B</td> <td>11.a)Theory (OR) b) Theory</td> <td>12.a)Theory (OR) b) Theory</td> <td>13.a)Theory (OR) b) Theory</td> <td>14.a)Theory (OR) b) Theory</td> <td>15.a) Theory (OR) b) Theory</td> </tr> <tr> <td>Section-C</td> <td>16.Theory</td> <td>17. Theory</td> <td>18. Theory</td> <td>19.Theory</td> <td>20. Theory</td> </tr> </tbody> </table>	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
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																			
UNIT	CONTENTS			HOURS																					
I	<p>NUMBER SYSTEM AND BINARY ARITHMETIC'S</p> <p>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,</p>			10																					



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	Division.Complements: n's and n-1's Complements.	
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.	8
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.	7
IV	COMBINATIONAL CIRCUITS Combinational Circuits: Half and Full Adders – Half Subtractor and Full Subtractor - Encoders and Decoders – Multiplexers – De-multiplexers.	10
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.	10
Teaching Resources	<p>i. Textbook</p> <p>1. Morris M Mano, “Digital Logic and Computer Design”, Prentice Hall of India Pvt. Lt., New Delhi:2001.</p> <p>Unit - I : Chap. 1.1 - 1.8</p> <p>Unit - II : Chap. 2.1 - 2.7</p> <p>Unit - III : Chap. 3.1 - 3.3, 3.5& 3.8</p> <p>Unit - IV : Chap. 4.3, 4.4, 5.5 & 5.6</p> <p>Unit - V : Chap. 6.1 - 6.3 & 6.6</p> <p>ii. References</p> <p>1. Morris M Mano, “Computer System Architecture”, Prentice Hall of India Pvt.Lt., New Delhi:1991.</p> <p>2. Donald P. Leach and Albert Paul Malvino, “Digital Principles and</p>	



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	<p>Application”, Fifth Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi:2003.</p> <p>3. Thomas C. Bartee, “Computer Architecture and Logic Design”, McGraw Hill International Edition, New Delhi:1991.</p> <p>iii. Web References</p> <p>(i) Online Tutorial</p> <p>1. https://www.geeksforgeeks.org/introduction-of-logic-gates/</p> <p>2. https://www.tutorialspoint.com/computer_logical_organization/logic_gates.htm</p> <p>(ii) Online Quiz</p> <p>1. https://www.avatto.com/computer-science/test/mcqs/digital-electronics/questions/90/1.html</p> <p>2. https://www.geeksforgeeks.org/digital-logic-number-representation-gq/</p>	
Course Outcomes	On completion of the course, students should be able to	
	CO1: Perform conversions among different number systems, to be familiar with basic logic gates,	K1,K2,K6
	CO2: Examining the Logic circuits and truth table for Boolean functions	K1,K2
	CO3: Simplify Boolean functions by using k-map method and Boolean Laws and Theorems.	K1,K5
	CO4: Design of combinational circuits such as Adder, Subtractor, Multiplexer, Encoder and Decoder etc.	K1,K2
	CO5: Understand the design of sequential Circuits such as Flip-Flops, Edge-trigger and master slave flip flops.	K1,K2

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg



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CO1	3	1	1	3	2	3	2	2.14	3	3	1	2	2	3	2.33
CO2	3	1	1	3	2	3	2	2.14	3	3	1	2	2	3	2.33
CO3	3	1	1	3	2	3	2	2.14	3	3	1	2	2	3	2.33
CO4	3	1	1	3	2	3	2	2.14	3	3	1	2	2	3	2.33
CO5	3	1	1	3	2	3	2	2.14	3	3	1	2	2	3	2.33
PO Mean								2.14	PSO Mean						2.33
Strength of Correlation of PO Mean				Moderately Correlating				Strength of Correlation of PSO Mean				Strongly Correlating			

Prepared by	Name of the Faculty	Signature
	Dr.S.Sagayaraj	
	Mrs.A.Logeshwari	
Verified by	Dr. L. Ravi	



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Programme: B.Sc. Computer Science						SEM	
Course Code	PROGRAMMING USING C					Hours	Credits
CS222						4	4
Learning Objectives	The Course aims to <ul style="list-style-type: none"> 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. 						
	Section	I-Unit	II-Unit	III-Unit	IV-Unit	V-Unit	
Blue Print of the Question Paper	Section-A	1-2	3-4	5-6	7-8	9-10	
	Section-B	11.	12.	13.	14.	15.	
		a) Theory (OR) b) Program	a)Theory (OR) b) Program	a)Theory (OR) b) Program	a)Theory (OR) b) Program	a)Theory (OR) b) Program	a) Theory (OR) b) Program
	Section-C	16. Theory/ Program	17. Program	18. Program	19. Theory / Program	20. Program	
UNIT	CONTENTS						HOURS
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),						12



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	break and continue, exit() function, goto and label, The ?: operator.	
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.	12
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.	12
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.	12
V	FILE MANAGEMENT IN C Introduction – Defining and Opening a File – Closing a File – Input / Output Operations on Files.	12



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Teaching Resources	<p>i. Textbook</p> <p>1. E.Balagurusamy, “Programming in ANSI C”, Seventh Edition, McGraw Hill Education Private Limited, NewDelhi:2016.</p> <p>Unit - I : Chap. 2to 7</p> <p>Unit - II : Chap. 8 to 10</p> <p>Unit - III : Chap. 12</p> <p>Unit - IV : Chap. 10& 11</p> <p>Unit - V : Chap. 13</p> <p>ii. References</p> <p>1. YashavantKanetkar, “Let us C”, BPB Publications, Tenth Edition - New Delhi:2010</p> <p>2. Ashok N.Kamthane, “Programming in C”, Second Impression, Pearson:2012.</p> <p>iii. Web References</p> <p>(i) Online Tutorial</p> <p>1. https://www.w3schools.com/c/c_getstarted.php</p> <p>2. https://www.tutorialspoint.com/cprogramming/c_program_structure.htm</p> <p>3. https://www.programiz.com/c-programming</p> <p>(ii) Online Quiz</p> <p>2. http://www.cprogramming.com/tutorial/c-tutorial.html/</p> <p>3. http://www.tutorialspoint.com/cprogramming/</p> <p>(iii) Online Compiler</p> <p>1. https://www.tutorialspoint.com/compile_c_online.php</p>
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Course Outcomes	On completion of the course, students should be able to	
	CO1: Describe the basic concepts of C programming	K1
	CO2: Able to choose right data representation formats based on the requirement of problems	K3
	CO3: Acquire decision making and looping concepts	K4
	CO4: Compare and contrast various programming constructs and looping	K2
	CO5: Design and develop modular programming	K5
	CO6: Explore usage of arrays , strings , structure and files	K3,K5
	CO7: Effective utilization of pointers	K3
	CO8: Write a program on computer, edit, compile, debug , correct and recompile and run it	K5

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	2	1	2	2	2	2	2	3	3	2	1	1	2	2
CO2	3	2	1	2	2	2	2	2	3	3	2	1	1	2	2
CO3	3	2	1	3	2	2	2	2.14	3	3	2	1	1	1	1.83
CO4	3	2	1	3	2	2	2	2.14	3	3	2	1	1	1	1.83
CO5	3	3	1	3	3	3	1	2.43	3	3	2	3	2	2	2.5
CO6	3	3	1	3	3	3	1	2.43	3	3	2	2	2	3	2.5
CO7	3	3	1	3	3	3	1	2.43	3	3	1	3	1	3	2.33
CO8	3	2	1	3	2	2	2	2.14	3	2	1	1	1	1	1.5



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PO Mean	2.21	PSO Mean	2.06
Strength of Correlation of PO Mean	Moderately Correlating	Strength of Correlation of PSO Mean	Moderately Correlating

Prepared by	Name of the Faculty	Signature
	Dr. L. Ravi	
	Prof. P. KarthiK	
Verified by	Dr. L. Ravi	

Programme: B.Sc. Computer Science		SEM	
Course Code	PRACTICAL – I: Programming Using C	Hours	Credits
PCS212		3	2
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To understand the Control Structures. To create Functions using Arrays. To analyze the usage of pointers. To implement Structure and arrays. To evaluate data and text file handling 		
Blue Print of Practical Courses	Section	Description Type and Choice	Marks
	A	One Programming Question	20 Marks
	B	One Programming Question	20 Marks
	Total Marks		40 Marks



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PART	CONTENTS	HOURS
III	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	45
Course Outcomes	On completion of the course, students should be able to	
	CO1: Analyzing using Control Structures	K4
	CO2: Evaluating linear and non-linear data structure using arrays	K5
	CO3: Creating reusable code segment using Functions	K6
	CO4: Implementing pointers for address manipulation	K1, K2
	CO5: Applying Data and Text File handling methods	K3, K5

Mapping of COs with PSOs & POs

CO/PO	PO								PSO							
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg	
CO1	3	2	1	2	3	2	1	2	3	2	1	1	2	2	1.83	
CO2	3	3	1	3	3	3	1	2.42	3	3	3	3	1	2	2.5	



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CO3	3	3	1	3	3	3	1	2.42	3	3	3	2	2	3	2.66
CO4	3	3	1	3	3	3	1	2.42	3	3	3	3	2	3	2.83
CO5	3	3	1	3	3	2	1	2.28	3	3	2	3	3	3	2.83
PO Mean								2.30	PSO Mean						2.53
Strength of Correlation of PO Mean								Moderately Correlating	Strength of Correlation of PSO Mean						Strongly Correlating

	Name of the Faculty	Signature
Prepared by	Dr. L. Ravi	
	Prof. P. KarthiK	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science		SEM	III			
Course Code	COMPUTER ORGANIZATION AND ARCHITECTURE		Credits			
CS322			3			
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> 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. 					
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
UNIT	CONTENTS					HOURS
I	COMPUTER ORGANIZATION AND DESIGN Instruction Codes - Computer Registers - Computer Instructions – Timing and Control – Instruction Cycle - Memory Reference Instructions.					10



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II	PROGRAMMING THE BASIC COMPUTER Introduction - Machine language - Assembly language - The assembler - Program loops - Programming arithmetic and logical operation – Subroutines - Input-output programming.	8
III	CENTRAL PROCESSOR UNIT Introduction – General Register Organization – Stack Organization – Instruction Formats – Addressing Modes	7
IV	INPUT / OUTPUT ORGANIZATION Peripheral Devices – I/O interface – Asynchronous Data Transfer – Modes of Transfer - Direct Memory Access.	9
V	MEMORY ORGANIZATION Memory Hierarchy – Main Memory - Associative Memory – Cache Memory – Virtual Memory.	11
Teaching Resources	i. Textbook 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 Books: 1. William Stallings. “Computer Organization and Architecture”. 8th edition. Pearson Publication, 2010 2. Morris Mano. “Digital Login and Computer Design”. New Delhi: Prentice Hall of India Private Limited, 2001. iii. Web References:	



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	<p>(i) Online Tutorial</p> <ol style="list-style-type: none"> www.learncomputerscienceonline.com/computer-organization-and-architecture/ www.computer-pdf.com/architecture/ www.tutorialspoint.com/computer_logical_organization <p>(ii) Online Quiz</p> <ol style="list-style-type: none"> https://www.freeonlinetest.in/question-and-answer/computer-knowledge/computer-organization-mcq-test https://www.geeksforgeeks.org/computer-organization-and-architecture-gg/ https://examradar.com/computer-organization-architecture-multiple-choice-question-answer-online-test/ 	
Course Outcomes	On completion of the course, students should be able to	
	CO1: Study basic computer organization, design and micro-operations.	K1,K2
	CO2: Prepare machine code from the instructions	K1,K2,K3
	CO3: Understand CPU organization and different types of addressing modes	K1,K2
	CO4: Understand how the Input/ Output devices communicate with the computer	K1,K2
	CO5: Analyzing the applying different types of memory in a Computer system	K1,K2,K4

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	1	1	3	2	3	2	2.14	3	3	1	2	2	3	2.33



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CO2	3	1	1	3	2	3	2	2.14	3	3	1	2	2	3	2.33
CO3	3	1	1	3	2	3	2	2.14	3	3	1	2	2	3	2.33
CO4	3	1	1	3	2	3	2	2.14	3	3	1	2	2	3	2.33
CO5	3	1	1	3	2	3	2	2.14	3	3	1	2	2	3	2.33
PO Mean								2.14	PSO Mean						2.33
Strength of Correlation of PO Mean						Moderately Correlating			Strength of Correlation of PSO Mean						Moderately Correlating

	Name of the Faculty	Signature
Prepared by	Dr. S. Sagayaraj	
	Mr. S. Mohanraj	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science						SEM	III
Course Code	DATA STRUCTURES AND ALGORITHMS USING C					Hours	Credits
CS323						4	4
Learning Objectives	<p>The Course aims to.</p> <ul style="list-style-type: none"> To recognize the fundamental Concepts of Data Structures and understand the working principles of Arrays and Linked List To examine Stacks and Queues To appraise and classify the various Sorting and Searching Algorithms To evaluate and relate Trees with Graphs To formulate the algorithms and design the necessary Programs in C for the various Concepts Studied in this Course 						
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) 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 (OR) Program	18. Theory (OR) Program	19.Theory	20.Theory	
UNIT	CONTENTS					HOURS	
I	<p>ARRAYS AND LINKED LIST</p> <p>Arrays: Characteristics of Array-One dimensional Array-Operation with Array: Insertion, Deletion and Sorting-Manipulation of using pointer-Representation of Sparse matrix</p>					14	



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	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.	
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.	14
III	TREES Basic Terms-Binary Trees-Binary Tree Representation-Operation on Binary Tree-Traversal of a Binary Tree-Binary Search Tree.	10
IV	SEARCHING AND SORTING Searching Techniques: Searching- Linear (Sequential) Search-Binary Search. Sorting Techniques: Sorting-Insertion Sort-Selection Sort-Bubble Sort-Quick sort.	12
V	GRAPH Terminologies of Graphs-Graphs Representation-Traversal of Graphs-Breadth First Search-Depth First Search.	10
Teaching Resources	i. Textbook 1. Ashok N.Kamthne, "Introduction to Data Structure in C", Pearson Education, 2005. 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	



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	<p>Unit - III: Ch. 8.1-8.3, 8.7-8.12</p> <p>Unit - IV: Ch.11.1-11.4, 10.1-10.6</p> <p>Unit - V: Ch. 9.1-9.6</p> <p>ii. References</p> <ol style="list-style-type: none"> SeymoreLipshutz, “Theory problems of Data structure”,Schaum’s outline series, McGraw Hill Book Company, 1986. Horowitz E and Shani S, “Fundamentals of Data structure in C”, Universities Press (India) Pvt.Ltd., 2008. <p>iii. Web References</p> <p>(i) Online Tutorial</p> <ol style="list-style-type: none"> http://www. Cprogramming.com/algorithms-and-data-structures.html http://www. Tutorialspoint.com http://www. ece.uwaterloo.ca/~dwharder/aads/Lecture materials/ <p>(ii) Online Quiz</p> <ol style="list-style-type: none"> https://www.sanfoundry.com/1000-data-structure-questions-answers/ http://www.tcyonline.com/tests/data-structure-test <p>(iii) Online Compiler</p> <ol style="list-style-type: none"> https://www.onlinegdb.com/Sy-fU7gJW 	
Course Outcomes	On completion of the course, students should be able to	
	<p>CO1:Identify the fundamental Concepts of Data Structures andinterpretthe working principles of Arrays and Linked List</p>	K1
	<p>CO2:Understand and exploreStacks and Queues</p>	K1, K2
	<p>CO3:Compareand contrastthe various Sorting and Searching Algorithms</p>	K3
	<p>CO4:Assessandcompare Trees with Graphs and implement them in a program</p>	K4
<p>CO5:Devise the algorithms and Create code for the necessary Programs in C for the various Concepts Studied in this Course</p>	K5, K6	



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Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	3	1	3	3	3	1	2.42	3	3	1	2	2	2	2.16
CO2	3	3	1	3	3	2	1	2.28	3	3	2	2	3	3	2.66
CO3	3	3	1	3	2	2	1	2.42	3	3	1	2	3	3	2.5
CO4	3	2	1	2	2	3	2	2.14	3	3	2	2	1	3	2.33
CO5	3	3	1	3	3	3	1	2.42	3	3	2	2	2	3	2.5
PO Mean								2.33	PSO Mean						2.43
Strength of Correlation of PO Mean								Moderately Correlating	Strength of Correlation of PSO Mean						Moderately Correlating

	Name of the Faculty	Signature
Prepared by	Dr. M. Maria Dominic	
	Mr. M. Sarlinraj	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science		SEM	III
Course Code	PRACTICAL-III: DATA STRUCTURES AND ALGORITHMS USING C	Hours	Credits
PCS309		3	2
Learning Objectives	<p>The Course aims to.</p> <ul style="list-style-type: none"> To Recognize the fundamental Concepts of Data Structures To Understand the working principles of Arrays and Linked List To Examine Stacks and Queues To Appraise and Classify the various Sorting and Searching Algorithms To Evaluate and Relate Trees with Graphs 		
Blue Print of Practical Courses	Section	Description Type and Choice	Marks
	A	Programming Question	20 Marks
	B	Programming Question	20 Marks
	Total Marks		40 Marks
UNIT	CONTENTS		HOURS
I - V	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		45



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10. Graph Representation and Traversals		
Course Outcomes	On completion of the course, students should be able to	
	CO1: Understand fundamental Concepts of Data Structures and implement it in a program using Arrays and Linked list	K1, K2, K3
	CO2: Construct and perform operations related with Stacks and Queues in program	K1, K3
	CO3: Programs to demonstrate fundamental algorithmic problems includes Tree Traversals	K3
	CO4: Compare and creating various Sorting and Searching Algorithms and implement it while solving a problem.	K4, K6
	CO5: Assess and Compare Trees with Graphs and construct a program to use it.	K5

Mapping of COs with PSOs & Pos

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	2	1	2	3	2	2	2.14	3	3	1	2	1	3	2.16
CO2	3	2	1	2	3	3	2	2.28	3	3	1	2	1	3	2.16
CO3	3	2	1	3	2	2	2	2.14	3	2	2	2	2	3	2.33
CO4	3	2	1	3	2	2	2	2.14	3	3	2	2	3	3	2.66
CO5	3	2	1	2	2	2	2	2	3	3	3	2	3	3	2.83
PO Mean								2.14	PSO Mean						2.42
Strength of Correlation of PO Mean								Moderately Correlating	Strength of Correlation of PSO Mean						Moderately Correlating



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	Name of the Faculty	Signature
Prepared by	Dr. M. Maria Dominic	
	Mr. M. Sarlinraj	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science						SEM	IV
Course Code	SOFTWARE ENGINEERING					Hours	Credits
CS422						3	3
Learning Objectives	<p>The Course aims to.</p> <ul style="list-style-type: none"> Understand the basic software engineering concepts, principles, practices and the processes that are used to build software system Acquire knowledge of how to perform requirement engineering tasks to state clear and complete the software solution. Learn concepts of how Analysis, Design processes are conducted in a software project. Understand the various testing strategies to develop and deliver quality software Understand purpose and importance of the project management from the perspective of planning, tracking and completion of project 						
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	
UNIT	CONTENTS					HOURS	
I	SOFTWARE PROCESS The Software Engineering – Software Process – Process Model – Prescriptive Models – Specialized Models – Unified Process – Personal					10	



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	Software Process – Team Software Process – Agile Process – Extreme Programming.	
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.	8
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.	10
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.	10
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	7



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	Identification – Risk Projection – Risk Refinement – Risk Mitigation, Monitoring and Management – The RMMM Plan.	
Teaching Resources	<p>i. Textbook</p> <p>1. Jeeva Pressman, Roger S. “Software Engineering a practitioner’s Approach”, 7th Edition. New York: McGraw Hill International Edition, 2010.</p> <p>Unit - I: Ch. 1.1-1.6, 2.1-2.6, 3.1-3.4.</p> <p>Unit - II: Ch 5, 6, 7, 8.2, 8.4.</p> <p>Unit - III: Ch. 9, 10.1-10.3, 10.5-10.7, 11.1-11.4.</p> <p>Unit - IV: Ch. 14, 16.1-16.3, 16.6, 17.1-17.3, 17.6-17.8, 18.1-18.7.</p> <p>Unit - V: Ch. 24, 27, 28.</p> <p>ii. References</p> <p>1. Rajib Mall. Fundamentals of Software Engineering. New Delhi PHI Learning Pvt Ltd., 2009</p> <p>2. James K.L Software Engineering New Delhi: PHI Learning Pvt Ltd., 2009</p> <p>iii. Web References</p> <p>(i) Online Tutorial</p> <p>1. http://www.scribd.com/doc/27252883/Software-Engineering-Notes</p> <p>2. https://www.geeksforgeeks.org/software-engineering-introduction-to-software-engineering/</p> <p>3. http://www.Engineeringppt.blogspot.in/2011/12/pressman-software-engineerring-ppt-pdf.html.</p> <p>(ii) Online Quiz</p> <p>1. https://www.sanfoundry.com/software-engineering-questions-answers/</p>	
	On completion of the course, students should be able to	
Course Outcomes	CO1: State and deliver an effective software engineering process, based on knowledge of widely used development lifecycle models.	K1
	CO2: Classify, select and examine requirements.	K2, K4



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	CO3: Translate a requirements specification to develop design, using a structured and organized process	K3, K5
	CO4: Formulate a testing strategy for a software system, employing techniques such as unit testing, test driven development and functional testing.	K4, K5
	CO5: Apply the knowledge, techniques, and skills to implement of a software product	K3, K5

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	3	1	3	3	3	1	2.42	3	3	3	2	2	2	2.16
CO2	3	3	1	2	2	3	2	2.28	3	3	2	2	2	3	2.5
CO3	3	3	1	3	3	3	2	2.57	3	3	3	2	2	3	2.66
CO4	3	3	1	2	2	2	2	2	3	3	1	3	2	2	2.33
CO5	3	2	1	2	3	3	2	2.28	3	3	3	2	3	3	2.83
PO Mean								2.31	PSO Mean						2.49
Strength of Correlation of PO Mean								Moderately Correlating	Strength of Correlation of PSO Mean						Moderately Correlating

Prepared by	Name of the Faculty	Signature
	Dr. R. Sandrilla	



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	Mr. M. Sarlinraj	
Verified by	Dr. L. Ravi	

Programme: B.Sc Computer Science		SEM	IV			
Course Code	RELATIONAL DATABASE MANAGEMENT SYSTEM	Hours	Credits			
CS423		4	4			
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To understand the basic principles of Databases and Data Models. To know about the Relational Data Structures and Relational Algebra. To understands 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. 					
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 (OR) Program	19.Program	20.Theory
UNIT	CONTENTS					HOURS
I	BASIC CONCEPTS AND DATA MODELS Basic concepts and definition – Data Dictionary – Database System –					12



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	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.	
II	RELATIONAL MODEL Structure of Relational Model – Relational Algebra - Entity Relationship Model: Basic E-R Concepts - ER Diagram Symbols.	12
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.	12
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.	12
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.	12
Teaching Resources	i Textbook 1. S.K. Singh, “Database Systems - Concept, Design and Applications”, Dorling	



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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 Elmasriand 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-gq/er-and-relational-models-gq/>
3. <https://www.geeksforgeeks.org/dbms-gq/sql-gq/>
4. <https://www.geeksforgeeks.org/dbms-gq/database-design-normal-forms-gq/>

Course	On completion of the course, students should be able to	
Outcomes	CO1: Gain a good understanding of the architecture functioning of	K1, K2



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	database management systems as well as associated tools and techniques.	
	CO2: Implement the Entity Relationship Diagram using various E-R Diagram Symbols.	K3
	CO3: Develop a good database design using normalization techniques.	K4
	CO4: Create and understand the use of structured query language & PL/SQL, its syntax, its working and its scope.	K1, K2, K6
	CO5: Acquire a good understanding of database systems concepts and to be in a position to use and design databases for different applications.	K3, K5

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	2	1	3	3	3	1	2.28	3	3	2	2	3	1	2.33
CO2	3	2	1	3	3	3	1	2.28	3	3	3	2	3	2	2.5
CO3	3	3	1	3	3	3	1	2.28	3	3	3	3	3	3	3
CO4	3	3	1	3	3	3	1	2.28	3	3	3	3	3	3	3
CO5	3	3	1	3	3	3	1	2.28	3	3	3	3	3	3	3
PO Mean								2.28	PSO Mean						2.76
Strength of Correlation of PO Mean							Moderately Correlating		Strength of Correlation of PSO Mean						Strongly Correlating



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	Name of the Faculty	Signature
Prepared by	Prof. J. John Arockiaraj	
	Mr. S. Mohanraj	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science		SEM	IV
Course Code	PRACTICAL – IV: RELATIONAL DATABASE MANAGEMENT SYSTEM	Hours	Credits
PCS412		3	2
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To introduce a basic knowledge about SQL and table manipulations. To explore the manipulation of tables using various functions. Special features of SQL like views, nested and sub queries and its scope. To appreciate the construction of PL/SQL block with program control section, functions and procedures. To analyze the need for the features of PL/SQL like triggers, packages and cursors. 		
Blue Print of the Question Paper	Section	Description Type and Choice	Marks
	A	One Programming Question	20 Marks
	B	One Programming Question	20 Marks
	Total Marks		40 Marks
PART	CONTENTS		HOURS
I - V	<p>SQL</p> <ol style="list-style-type: none"> Creating, Altering and Dropping a Table. Manipulating a Table with Selection, Projection and Ordering. Manipulating a Table with Aggregate, Numeric, 		45



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	<p>String and Date Functions.</p> <p>4. Creating, Manipulating and Dropping with Views.</p> <p>5. Manipulation of Nested Queries and Sub-Queries.</p> <p>PL/SQL</p> <p>6. Program Control Statements.</p> <p>7. Functions and Procedures</p> <p>8. Triggers.</p> <p>9. Packages.</p> <p>10. Cursors.</p>	
Course Outcomes	Upon successful completion of the course, students will be able to	
	CO1: Basic understanding of SQL and tables manipulations.	K1, K2
	CO2: To apply the use of various functions in SQL table manipulations.	K2, K3
	CO3: To analyze and evaluate the need for special features of SQL.	K4, K5
	CO4: To impart the understanding requirement for constructing a PL/SQL block.	K2, K3
	CO5: To create and to evaluate the need for incorporating the features of PL/SQL.	K5, K6

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	3	1	3	3	3	1	2.42	3	3	3	3	3	3	3



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CO2	3	3	1	3	3	3	1	2.42	3	3	3	3	3	3	3
CO3	3	3	1	3	3	3	1	2.42	3	3	3	3	3	3	3
CO4	3	3	1	3	3	3	1	2.42	3	3	3	3	3	3	3
CO5	3	3	1	3	3	3	1	2.42	3	3	3	3	3	3	3
PO Mean								2.42	PSO Mean						3
Strength of Correlation of PO Mean						Moderately Correlating			Strength of Correlation of PSO Mean						Strongly Correlating

	Name of the Faculty	Signature
Prepared by	Prof. J. John Arockiaraj	
	Mr. S. Mohanraj	
Verified by	Dr. L. Ravi	

Programme: B.Sc. Computer Science		SEM	
Course Code	PROGRAMMING USING JAVA	Hours	Credits
CS540		4	4



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Learning Objectives	The Course aims to					
	<ul style="list-style-type: none"> To acquire the programming skills in core java and Classes and Objects. To learn the art of Inheritance, Interface and Packages. To understand the Exceptions, I/O and Multithreading concepts. To recognize the Applet and AWT controls. To learn the Interaction between AWT control and Data Base. 					
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) Program	15.a) Theory (or) b) Program
	Section-C	16. Theory	17. Program	18. Program	19. Program	20. Program
UNIT	CONTENTS					HOURS
I	FOUNDATION, ESSENTIALS, CONTROL STATEMENT AND CLASSES & OBJECTS Stage of Java – origin of Java – challenges - features - Object-Oriented Programming; Java Essentials: Elements - API - variables - primitive data types – String Class - operators –combined assignment operators - conversion –scope – comments - keyboard input; Control Statements: <i>if,if-else</i> , nested <i>if&if-else-if</i> statements – logical operators – comparison – conditional operator – <i>switch</i> – increment and decrement – <i>while, do-while&for</i> loops – nested loops – <i>break</i> and <i>continue</i> ; Classes and Objects: classes and objects - modifiers - passing arguments– constructors - package & import - static class members –method overloading– constructor overloading – returning objects – <i>this</i> variable –					15



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	recursion – nested & inner classes – abstract classes & methods.	
II	<p>ARRAYS, STRING HANDLING, INHERITANCE, INTERFACE AND PACKAGES</p> <p>Introduction –processing array – passing arrays – returning arrays – String arrays – two Dimensional Arrays - Arrays with Three or More Dimensions;</p> <p>String Handling : String class – concatenation – comparison – substring – methods – other methods–<i>StringBuffer, StringBuilder&StringTokenizer</i> classes;Inheritance: basics –inheriting and overriding superclass methods – calling superclass constructor – polymorphism – inherit from different classes – abstract classes – final Class; Interfaces:Basics – multiple Interfaces – multiple inheritance using interface – multilevel interface –</p> <p>Packages – Create and access packages in NetBeans IDE – static Import and package class – access specifiers.</p>	15
III	<p>EXCEPTION HANDLING, I/O AND FILE HANDLING AND MULTITHREADING</p> <p>Introduction - <i>try</i> and <i>catch</i> block - multiple <i>catch</i> block - nested <i>try</i> - finally Block – <i>throw</i> Statement – exception propagation – <i>throw</i> Clause - custom exception – built-in exception; Multithreading:Introduction – threads – thread creation – life cycle – joining a thread – scheduler & priority – synchronization – inter-thread communication – thread control – thread Pool – thread group – daemon thread; Files and I\O Streams: <i>file</i> Class – streams – byte streams – filtered byte streams – <i>RandomAccessFile</i> class – character streams.</p>	10
IV	<p>APPLET AND GUI PART I</p> <p>Fundamentals – applet class – life cycle – steps for applet program – passing values through parameters – graphics – event handling; GUI I:GUI – creating windows – dialog boxes – layout managers – AWT component classes – Swing component classes – applications of AWT controls.</p>	10



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V	GUI PART II AND JAVA DATABASE CONNECTIVITY Event handling – AWT components – AWT graphics classes – Swing controls – application using Swing and AWT; Java Database Connectivity: types of drivers – JDBC architecture – JDBC classes & interfaces – steps in JDBC applications – creating a new Database and table with JDBC.	10
Teaching Resources	i. Textbook 1. S.Sagayaraj, R.Denis, P.Karthik&D.Gajalakshmi, “Constructive Java Programming“, Universities Press, 2021 Unit - I : Ch. 1.1 – 1.5, 2.1 – 2.11, 3.1 – 3.15 & 4.1- 4.13 Unit – II : Ch. 5.1 – 5.8, 6.1 – 6.9, 7.1 - 7.7 & 8.1 – 8.8 Unit – III : Ch. 9.1 – 9.10, 10.1 - 10.12 & 11.1 – 11.6 Unit – IV : Ch. 12.1 – 12.7 & 13.1 – 13.7 Unit - V : Ch. 14.1 – 14.5& 15.1 – 15.5. ii. Reference 4. Patrick Naughton and Herbert Schildt. The Complete Reference JAVA 2. 3rd Edition. Tata McGraw-Hill Edition, 1999. 5. Muthu C. Programming with JAVA. 2nd Edition. Vijay Nicole Imprints, 2011 6. Ken Arnold Gosling and Davis Holmen. The Java Programming Language. 3rd Edition. Addition Wesley Publication. iii. Web References (i) Online Tutorial 1. https://www.w3schools.com/java/java_getstarted.asp 2. https://www.javatpoint.com/java-tutorial 3. https://www.tutorialspoint.com/java/java_basic_syntax.htm (ii) Online Quiz 4. www.bullraider.com/quiz/core-java-quiz 5. www.javatpoint.com/examaccess .	
Course	On completion of the course, students should be able to	
Outcomes	CO1: Identify classes, objects, members of a class and the relationships	K1,K2,K5



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	among them needed for a specific problem.	
	CO2: Design program using inheritance, interface and packages	K1,K2,K5
	CO3: Create Java application programs using package and exception handling	K1,K2,K6
	CO4: Develop programs using the Java standard class library.	K1,K2,K6
	CO5: Develop software using applet, AWT controls, and JDBC	K1,K2,K6

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	3	1	3	3	3	2	2.57	3	3	3	3	2	3	2.83
CO2	3	3	1	3	3	3	2	2.57	3	3	3	3	2	3	2.83
CO3	3	3	1	3	3	3	2	2.57	3	3	3	3	2	3	2.83
CO4	3	3	1	3	3	3	2	2.57	3	3	3	3	2	3	2.83
CO5	3	3	1	3	3	3	2	2.57	3	3	3	3	2	3	2.83
PO Mean								2.57	PSO Mean						2.83
Strength of Correlation of PO Mean								Strongly Correlating	Strength of Correlation of PSO Mean						Strongly Correlating

Prepared by	Name of the Faculty	Signature
	Dr. S. Sagayaraj	



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	Prof. P. KarthiK	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science						SEM	V
Course Code	Web Development using XML					Hours	Credits
CS541						4	4
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To know data Store and Transport over the Web using XML. To understand the Fundamentals of XML. To understand DTD and its uses. To understand Schema, Xlink, Xpointer and its uses. To understand JSON, XML DOM and its uses. 						
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	
UNIT	CONTENTS					HOURS	
I	<p>FUNDAMENTALS OF XML</p> <p>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 – WellFormed and Valid Documents - Applying CSS Style to</p>					13	



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	XML.	
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.	8
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 – ModelGroups - Attribute Groups - Targeting Namespaces - "Inheriting" from Other Schemas.	18
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.	13
V	XML DOM What Is DOM, Anyway? - What DOM Is Not-Why Do I Need 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.	8
Teaching Resources	i. Textbook 2. Ron schmelzer. et al.,“XML and Web Services Unleashed”,Sams Publications, 2002.	



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	<p>Unit 1 : Ch. 1 & 2</p> <p>Unit 2 : Ch. 3</p> <p>Unit 3 : Ch. 4</p> <p>Unit 4 : Ch. 5</p> <p>Unit 5 : Ch. 7</p> <p>ii. Reference</p> <p>1. David Chappell and Tyler Jewell,“Java Web Services. 1 st Edition”, O’Reilly, 2002.</p> <p>iii. Web References</p> <p>(i) Online Tutorial</p> <p>1. http://www.w3schools.com/xml/</p> <p>2. http://www.scribd.com/doc/29110068/XML-and-Web-Services</p> <p>3. http://msdn.microsoft.com/en-us/library/ms996507.aspx</p> <p>(ii) Online Quiz</p> <p>3. http://www.indiabix.com/online-test/</p> <p>4. http://www.pskills.org/xml.jsp</p> <p>(iii)Online Compiler</p> <p>1. http://compileonline.com/</p>	
Course Outcomes	On completion of the course, students should be able to	
	CO1:Describe how namespaces are used in XML and Follow XML syntax rules.	K1,K2
	CO2:Explore and Validate XML using DTD.	K2
	CO3:Construct XSL for transforming to HTML.	K1 , K3
	CO4: Construct XPath expressions for use within XSLT style sheet templates.	K5,K6
	CO5: Be able to write the schema for the given XML documents in both DTD and XMLSchema languages and recommend XML DOM to support	K4, K5, K6



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	XML documents	
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Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	2	1	2	3	2	1	2	3	2	1	1	2	2	1.83
CO2	3	3	1	3	3	3	1	2.42	3	3	3	3	1	2	2.5
CO3	3	3	1	3	3	3	1	2.42	3	3	3	2	2	3	2.66
CO4	3	3	1	3	3	3	1	2.42	3	3	3	3	2	3	2.83
CO5	3	3	1	3	3	2	1	2.28	3	3	2	3	3	3	2.83
PO Mean								2.30	PSO Mean						2.53
Strength of Correlation of PO Mean						Moderately Correlating		Strength of Correlation of PSO Mean				Strongly Correlating			

Prepared by	Name of the Faculty	Signature
	Dr. M. Maria Dominic	
	Mrs. A. Logeshwari	



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Verified by	Dr. L. Ravi	
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Programme: B.Sc Computer Science		SEM	V			
Course Code	PROGRAMMING WITH PHP		Hours			
CS542			3			
Credits			3			
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To learn PHP as a server scripting language and a powerful tool for making dynamic and interactive Web pages To Understand File handling concepts in PHP To connect, access, and update a MySQL database through PHP To access XML via PHP DOM. 					
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) Theory (OR) (b) Program	14(a) Theory (OR) (b) Program	15(a) Theory (OR) (b) Theory
	Section-C	16.Theory	17. Theory	18.Theory (OR) Program	19.Program	20.Theory
UNIT	CONTENTS					HOURS
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					10



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	System Functions - PHP Arrays PHP Sorting Arrays PHP Super global - String Functions - Date and Time Functions-Mathematical Functions - Miscellaneous Functions.	
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 .	5
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.	15
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.	8
V	PHP – XML PHP XML Parsers - PHP Simple XML Parser - PHP Simple XML - GetPHP XML Expat PHP XML DOM .	7
Teaching Resources	<p>i. Textbook</p> <p>1. Julie C.Meloni, “Sams Teach yourself PHP, MySQL and Apache”, Fourth Edition, Sams Publishing, 2008.</p> <p>Unit - I : Ch. 3 – 8, 10</p> <p>Unit - II : Ch. 11</p> <p>Unit - III : Ch. 12-13</p> <p>Unit - IV : Ch. 16</p> <p>Unit - V : Ch. 28</p> <p>ii. Reference</p>	



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	<p>1. Nowicki, et al. “Professional PHP”, Wrox Press, 2000.</p> <p>iii. Web References</p> <p>i. Online Tutorial</p> <p>1. www.w3schools.com</p> <p>2. www.php.net</p> <p>3. www.phpclasses.org</p> <p>ii. Online Quiz</p> <p>1. https://codescracker.com/exam/showtest.php?subid=8</p> <p>2. https://www.w3schools.com/quiztest/quiztest.asp?qtest=PHP</p> <p>3. https://studypedia.com/php/php-online-quiz1/</p>	
Course Outcomes	Upon completion of this course, students should be able to	
	CO1: Understand Basic PHP Syntax for Variables, Language Construct and Arrays	K1,K2
	CO2: Implement and validate PHP Forms	K2, K5
	CO3: Explore File, Date, Time, Cookies, Session and Exception Handling in PHP	K1,K3
	CO4: Create Query MYSQL Database using PHP and use PHP DOM to access XML	K5, K6
	CO5: Conclude that PHP Server Scripting Language, and a Powerful tool for Making Dynamic and Interactive Web Pages.	K4

Mapping of COs with PSOs & POs

CO/PO	PO	PSO
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	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	2	1	2	3	2	1	2	3	2	1	1	2	2	1.83
CO2	3	3	1	3	3	3	1	2.42	3	3	3	3	1	2	2.5
CO3	3	3	1	3	3	3	1	2.42	3	3	3	2	2	3	2.66
CO4	3	3	1	3	3	3	1	2.42	3	3	3	3	2	3	2.83
CO5	3	3	1	3	3	2	1	2.28	3	3	2	3	3	3	2.83
PO Mean								2.32	PSO Mean						2.53
Strength of Correlation of PO Mean							Moderately Correlating	Strength of Correlation of PSO Mean						Strongly Correlating	

	Name of the Faculty	Signature
Prepared by	Dr. M. Maria Dominic	
	Mr. S. Mohanraj	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science						SEM	V
Course Code	OPERATING SYSTEMS					Hours	Credits
CS543						4	4
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To acquire the principles of Operating System, Process, it's 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. 						
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	
UNIT	CONTENTS					HOURS	
I	<p>OPERATING SYSTEM OVERVIEW AND PROCESS DESCRIPTION</p> <p>Operating System Objectives and Functions - The Evolution of Operating Systems -Developments Leading to Modern Operating Systems - Process</p>					12	



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	Description and Control: What is a Process? - Process States - Process Description - Process Control - Security Issues.	
II	UNIPROCESSOR, MULTIPROCESSOR AND REAL-TIME SCHEDULING Types of Processor Scheduling - Scheduling Algorithms - Multiprocessor Scheduling - Real-Time Scheduling.	12
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.	12
IV	MEMORY MANAGEMENT AND VIRTUAL MEMORY Memory Management Requirements - Memory Partitioning – Paging – Segmentation - Security Issues – Virtual Memory: Hardware and Control Structures - Operating System Software.	12
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.	12
Teaching Resources	i. Textbook 1. William Stallings,” Operating Systems: Internals and Design Principles”, 7 th Edition, Pearson Education Inc., Fourth Impression: 2016. ii. Reference 1. Madnick S.E and Donovan J.J. “Operating Systems”. New Delhi: McGraw hill International Book Co, 1987.	
Course	On completion of the course, students should be able to	



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Outcomes	CO1:Acquire and Understand the concepts of OS, the basic principles used in the design of modern operating system and process related issues.	K1, K2
	CO2: Apply the concepts of threads and mechanisms for process synchronization.	K3
	CO3:Analyze the concepts related to deadlock and memory management.	K5
	CO4:Apply the concepts of virtual memory management, file system.	K3
	CO5: Evaluate the concepts of secondary storage structure, protection	K4

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	1	1	2	3	3	1	2.14	3	2	1	2	3	3	2.33
CO2	3	2	1	3	3	3	1	2.42	3	2	1	2	3	3	2.33



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CO3	3	3	1	3	3	3	1	2.57	3	3	2	3	3	3	2.83
CO4	3	3	1	3	3	3	1	2.57	3	3	1	3	2	3	2.5
CO5	3	2	1	3	3	3	1	2.42	3	3	2	2	2	3	2.5
PO Mean								2.42	PSO Mean						2.49
Strength of Correlation of PO Mean							Moderately Correlating		Strength of Correlation of PSO Mean					Moderately Correlating	

	Name of the Faculty	Signature
Prepared by	Prof. J. John Arockiaraj	
	Prof. A. Josephine Sahaya Mala	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science						SEM	IV
Course Code	COMPUTER GRAPHICS					Hours	Credits
CS544A						3	3
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> • Recognize applications, principles and commonly used algorithms for Line-Drawing, Circle and Character Generating in computer graphics. • Understand matrix representation of basic geometric transformations and apply on the objects. • Experiment various clipping methods and its transformation to graphics display device. • Analyze User Dialogue and various input functions in Computer Graphics. • Summarize projections and visible surface detection techniques 						
	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		
UNIT	CONTENTS					HOURS	
I	<p>OVERVIEW OF GRAPHICS SYSTEM Raster scans display - Random scan display - Graphics software's - Output Primitives: Points and Lines - Line drawing algorithms: DDA Algorithm - Bresenham's Line Algorithm - Circle generating algorithms: Properties of Circles - Mid Point Circle Algorithm.</p>					9	



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II	<p>2D TRANSFORMATIONS</p> <p>Two-Dimensional Transformation: Translation-Scaling-Rotation - Homogenous Representation - Inverse Transformation - Composite Transformation: Translation –Rotation - Scaling-Pivot point Rotation-fixed point scaling - Other Transformation: Reflection-Shear.</p>	9
III	<p>2D VIEWING AND CLIPPING</p> <p>The viewing pipeline - Window to Viewport coordinate Transformation - Clipping operation - Point clipping - line clipping: Cohen Sutherland line clipping - Polygon clipping: Sutherland Hodgeman polygon clipping.</p>	9
IV	<p>GRAPHICAL USER INTERFACES AND 3D TRANSFORMATION</p> <p>The User Dialogue - Input of Graphical Data: Locator, Stroke, String, Valuator, And Choice, Pick Devices - Interactive picture construction techniques - Three Dimensional Display Methods: 3D Transformation - 3D Viewing.</p>	9
V	<p>Unit – V: Visible Surface Detection Methods</p> <p>Visible Surface Detection: Back Face Detection - Depth Buffer Method - A Buffer Method - Scan Line Method - Depth Sorting Method - Area Subdivision Method.</p>	9
Teaching Resources	<p>i. Textbook</p> <p>1. Donald Hearn and Pauline Baker M. Computer Graphics C version 2nd Edition, Prentice Hall, 2011(Reprint).</p> <p>Unit I :Ch 2.1, 2.7, 3.1-3.2, 3, 3.11, 3.14</p> <p>Unit II :Ch 5.1-5.4</p> <p>Unit III :Ch 6.1-6.7, 6.8</p> <p>Unit IV :Ch 8.1-8.2, 9.1, 10.1, 11.1- 11.3</p> <p>Unit V:Ch 13.1-13.8</p>	



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	<p>ii. References</p> <ol style="list-style-type: none"> Neumann W.M. and Sproull R.F. Principles of Interactive Computer Graphics 2nd Edition Tata McGraw Hill International: 1979. Edward Angel. Interactive Computer Graphics 5th Edition Pearson Education, 2009. <p>iii. Web References</p> <p>(i) Online Tutorial</p> <ol style="list-style-type: none"> https://www.academia.edu/5750589/Computer_Graphics_C_Version_by_Donald_Hearn_and_M_Pauline_Baker_II_Edition http://www.cprogrammingexpert.com/C/Tutorial/graphics.aspx http://www.opengl.org/archives/resources/code/samples/glut_examples/examples.html http://www.Openglsamples.sourceforge.net/ http://www.openglsamples.sourceforge.net/triangle.html <p>(ii) Online Quiz</p> <ol style="list-style-type: none"> https://www.sanfoundry.com/1000-computer-graphics-questions-answers/ 	
<p>Course Outcomes</p>	<p>Upon completion of this course, students should be able to</p>	
	<p>CO1:Identify applications, principles and commonly used algorithms for Line-Drawing, Circle and Character Generating in computer graphics.</p>	<p>K1,K2</p>
	<p>CO2:Apply and compare the algorithms for drawing 2D images also explain aliasing, anti-aliasing techniques.</p>	<p>K2</p>
	<p>CO3: Analyze and apply clipping algorithms and transformation on 2D images.</p>	<p>K1, K2, K3</p>
	<p>CO4: Analyze User Dialogue and various input functions in Computer Graphics.</p>	<p>K5</p>
<p>CO5:Solve the problems on viewing transformations and explain the projection and hidden surface removal algorithms.</p>	<p>K4</p>	

Mapping of COs with PSOs & POs

CO/PO	PO								PSO							
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg	



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CO1	3	2	1	2	3	2	1	2	3	2	1	1	2	2	1.83
CO2	3	3	1	3	3	3	1	2.42	3	3	3	3	1	2	2.5
CO3	3	3	1	3	3	3	1	2.42	3	3	3	2	2	3	2.66
CO4	3	3	1	3	3	3	1	2.42	3	3	3	3	2	3	2.83
CO5	3	3	1	3	3	2	1	2.28	3	3	2	3	3	3	2.83
PO Mean								2.32	PSO Mean						2.53
Strength of Correlation of PO Mean								Moderately Correlating	Strength of Correlation of PSO Mean						Strongly Correlating

	Name of the Faculty	Signature
Prepared by	Dr. R. Sandrilla	
	Mr. M. Sarlinraj	
Verified by	Dr. L. Ravi	



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OBE FRAMEWORK FOR THE B.SC. COMPUTER SCIENCE

Programme: B.Sc. Computer Science		SEM	
Course Code	PRACTICAL – V: PROGRAMMING USING JAVA	Hours	Credits
PCS515		3	2
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To implement object oriented programming concepts To create and import user defined java packages To develop programs using Inheritance and Interface To develop multi-threaded programs To design GUI application using AWT and JDBC. 		
Blue Print of Practical Courses	Section	Description Type and Choice	Marks
	A	One Programming Question	20 Marks
	B	One Programming Question	20 Marks
	Total Marks		40 Marks
PART	CONTENTS		HOURS
I	1. Class and Objects		5
	2. Inheritance and Interface		5
	3. Packages		5
	4. String Handling		5
	5. Exception Handling		5
	6. File Handling		5
	7. Multithreading		5
	8. Menu and Dialogue Box		5



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	9. Applet and AWT Controls	5
	10. GUI application with JDBC	5
Course Outcomes	On completion of the course, students should be able to	
	CO1: Understanding the OOPs concepts	K1,K2
	CO2: Creating programs using Class and Object, Inheritance and Interface	K5
	CO3: Manipulating the Strings, Files and Exceptions in Program	K6
	CO4: Experimenting the thread concept in program	K6
	CO5: Designing a Desktop application with Database Connectivity	K5

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	3	1	3	3	3	2	2.57	3	3	3	2	2	3	2.67
CO2	3	3	1	3	3	3	2	2.57	3	3	3	2	2	3	2.67
CO3	3	3	1	3	3	3	2	2.57	3	3	3	2	2	3	2.67
CO4	3	3	1	3	3	3	2	2.57	3	3	3	2	2	3	2.67
CO5	3	3	1	3	3	3	2	2.57	3	3	3	2	2	3	2.67
PO Mean								2.57	PSO Mean						2.67
Strength of Correlation of PO Mean								Strongly Correlating	Strength of Correlation of PSO Mean						Strongly Correlating

Prepared by	Name of the Faculty	Signature
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	Dr. S. Sagayaraj	
	Prof. P. KarthiK	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science		SEM	VI
Course Code	PRACTICAL– VI: WEB DEVELOPMENT USING XML	Hours	Credits
PCS516		3	2
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To understand XML concepts To implement XSLT/CSS forms To Explore namespace and XML Schemas To connect Xpath, Xpointer, Xlink To understand XHTML and XFORMS 		
Blue Print of Practical Courses	Section	Description Type and Choice	Marks
	A	Programming Questions	20 Marks
	B	Programming Questions	20 Marks
	Total Marks		40
PART	CONTENTS		HOURS
I - V	<ol style="list-style-type: none"> XML Document Structure Rules of XML Structure XML with XSLT/CSS Namespaces in XML Creating XML Schemas XPath XPointer XLink XHTML XFORMS 		45



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Course Outcomes	Upon successful completion of the course, students will be able to	
	CO1: Understanding XML concepts	K1, K2
	CO2: Implement XSLT/CSS forms	K3
	CO3: Explore namespace and XML Schemas	K1, K3
	CO4: Connect Xpath, Xpointe,Xlink	K4, K5, K6
	CO5: Understanding XHTML and XFORMS	K2

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	2	1	2	3	2	1	2	3	2	1	1	2	2	1.83
CO2	3	3	1	3	3	3	1	2.42	3	3	3	3	1	2	2.5
CO3	3	3	1	3	3	3	1	2.42	3	3	3	2	2	3	2.66
CO4	3	3	1	3	3	3	1	2.42	3	3	3	3	2	3	2.83
CO5	3	3	1	3	3	2	1	2.28	3	3	2	3	3	3	2.83
PO Mean								2.30	PSO Mean						2.53
Strength of Correlation of							Moderately		Strength of Correlation				Strongly		



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PO Mean	Correlating	of PSO Mean	Correlating
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	Name of the Faculty	Signature
Prepared by	Dr. M. Maria Dominic	
	Mrs. A. Logeshwari	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science		SEM	V
Course Code	PRACTICAL – VII: PROGRAMMING WITH PHP	Hours	Credits
PCS517		3	2
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> • To understand the PHP concepts. • To Implement PHP forms. • To Explore File, Date, Time, Cookies, Session and Exception Handling in PHP. • To Connect and Transact PHP with MYSQL • To Understand PHP DOMs 		
Blue Print of the Question Paper	Section	Description Type and Choice	Marks
	A	One Programming Question	20 Marks
	B	One Programming Question	20 Marks
	Total Marks		40 Marks
PART	CONTENTS		HOURS
I– V	<ol style="list-style-type: none"> 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 		45



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	9. Forms and Databases 10. XMLs	
Course Outcomes	Upon successful completion of the course, students will be able to	
	CO1: Understand the PHP concepts.	K1, K2
	CO2: Implement and Validate PHP forms	K3,K5
	CO3: ExploreFile, Date, Time, Cookies, Session and Exception Handling in PHP	K1, K3
	CO4: Connect and Transact PHP with MYSQL	K6
	CO5: Understand the PHP DOMs	K4, K2

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	2	1	2	3	2	1	2	3	2	1	1	2	2	1.83
CO2	3	3	1	3	3	3	1	2.42	3	3	3	3	1	2	2.5
CO3	3	3	1	3	3	3	1	2.42	3	3	3	2	2	3	2.66
CO4	3	3	1	3	3	3	1	2.42	3	3	3	3	2	3	2.83
CO5	3	3	1	3	3	2	1	2.28	3	3	2	3	3	3	2.83
PO Mean								2.30	PSO Mean						2.53



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Strength of Correlation of PO Mean	Moderately Correlating	Strength of Correlation of PSO Mean	Strongly Correlating
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	Name of the Faculty	Signature
Prepared by	Dr. M. Maria Dominic	
	Mr. S. Mohanraj	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science						SEM	IV
Course Code	MOBILE APPLICATIONS DEVELOPMENT					Hours	Credits
CS633						4	4
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To understand mobile application development process. To know UI controls and develop user interfaces. To develop a mobile applications. To understand the concept of SQLite. 						
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) Program	14(a) Program (OR) (b) Theory	15(a) Program (OR) (b) Theory	
	Section-C	16.Theory	17. Program	18.Theory (OR) Program	19. Theory (OR) Program	20. Theory (OR) Program	
UNIT	CONTENTS					HOURS	
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					12	



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	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.	
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.	12
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 Stage fright – Playing audio – Playing video – Capturing media.	12
IV	THE MATURING PLATFORM Location – Simulating your location within the emulator – Using Location Manager and Location Provider – Working with Maps – Converting places and addresses with Geocoder – Bluetooth and sensors – Exploring Android’s Bluetooth capabilities – Interacting with the Sensor Manager –	12



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	App Widgets – 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.	
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.	12
Teaching Resources	<p>i Textbook</p> <ol style="list-style-type: none"> 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. <p>ii Reference</p> <ol style="list-style-type: none"> 4. Dave Smith and Jeff Friesen, “Android Recipes: A Problem – Solution Approach”, Rakmo Press (P) Ltd, New Delhi : 2011. <p>iii Web Reference</p> <p>i) Online Tutorial</p> <ol style="list-style-type: none"> 4. Android Developer’s Guides - available at http://developer.android.com/ 	
Course Outcomes	On completion of the course, students should be able to	
	CO1: Describe the platforms upon which the Android operating System will run.	K1



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CO2: Create a simple application that runs under the Android operating system.	K2 &K6
CO3: Access and work with the Android file system.	K3 & K5
CO4: Create an application that uses multimedia under the Android operating system.	K6
CO5: Access and work with database under the Android operating system.	K2 & K4

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	2	1	3	3	3	1	2.28	3	3	2	2	3	1	2.33
CO2	3	2	1	3	3	3	1	2.28	3	3	3	2	3	2	2.5
CO3	3	3	1	3	3	3	1	2.28	3	3	3	3	3	3	3
CO4	3	3	1	3	3	3	1	2.28	3	3	3	3	3	3	3
CO5	3	3	1	3	3	3	1	2.28	3	3	3	3	3	3	3
PO Mean								2.28	PSO Mean						2.76
Strength of Correlation of PO Mean							Moderately Correlating		Strength of Correlation of PSO Mean						Strongly Correlating



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	Name of the Faculty	Signature
Prepared by	Prof. P. Karthick	
	Prof. C. Sathishkumar	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science						SEM	IV
Course Code	LINUX AND SHELL PROGRAMMING					Hours	Credits
CS634						4	4
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> State the major components and describe the architecture of the UNIX operating system. To learn and understand UNIX commands. State how the shell functions at the user interface and command line interpreter. Create structured shell programming with flow control constructs. 						
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) Program	14(a) Program (OR) (b) Theory	15(a) Program (OR) (b) Theory	
	Section-C	16.Theory	17. Program	18.Theory (OR) Program	19. Theory (OR) Program	20. Theory (OR) Program	
UNIT	CONTENTS					HOURS	
I	<p>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</p>					12	



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	Commands..	
II	<p>UNIX COMMANDS</p> <p>Essential 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.</p>	12
III	<p>SHELL PROGRAMMING - I</p> <p>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.</p>	12
IV	<p>SHELL PROGRAMMING - II</p> <p>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.</p>	12
V	<p>SYSTEM CALLS</p> <p>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(), rewiddir(), closedir(). Process related calls - exec(), fork(), wait(), exit(). Interrupted system calls – Error Handling: strerrorn – perror().</p>	12
Teaching Resources	<p>i Textbook</p> <p>1. YashavantKanetkar. Unix Shell Programming. New Delhi: BPB Publisher, 1996. Unit – I : Ch. 1, 2, 3.</p>	



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Unit – II : Ch. 4, 5, 6, 7, 8.

Unit – III : Ch. 9 - 10

Unit – IV : Ch. 11.

2. BM. Harwani. Unix and Shell programming. OXFORD University press.

Unit – V : Ch. 7.1, 7.2.1- 7.2.6, 7.3, 7.4, 7.5, 7.8.

ii Reference

1. Kernighan. et al. The UNIX Programming Environment. 2nd Edition. New Delhi: Prentice Hall of the India, 1988.

iii Web Reference

(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. www.compileonline.com/execute_bash_online.php/

On completion of the course, students should be able to

**Course
Outcomes**

Mapping of COs with PSOs & POs

CO/PO

PO

PSO



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	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg	
CO1																
CO2																
CO3																
CO4																
CO5																
PO Mean									PSO Mean							
Strength of Correlation of PO Mean						Moderately Correlating			Strength of Correlation of PSO Mean						Strongly Correlating	

	Name of the Faculty	Signature
Prepared by	Prof. P. Karthick	
	Prof. C. Sathishkumar	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science						SEM	VI
Course Code	PROGRAMMING USING PYTHON					Hours	Credits
CS635						3	4
Learning Objectives	<p>The Course aims to.</p> <ul style="list-style-type: none"> • Learn fundamental concepts such as input and output functions in Python programming. • Acquire core Python scripting elements such as data types • Utilize various flow control structures in Python • Obtain programming constructs in creating functions in Python • Learn file handling operations in Python. 						
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) Program	13(a) Theory (OR) (b) Program	14(a) Theory (OR) (b) Program	15(a) Theory (OR) (b) Program	
	Section-C	16. Theory (OR) Program	17. Theory (OR) Program	18. Theory (OR) Program	19. Theory (OR) Program	20. Theory (OR) Program	
UNIT	CONTENTS						HOURS
I	<p>INTRODUCTION TO PYTHON PROGRAMMING</p> <p>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.</p>						9



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II	DATA TYPES AND OPERATIONS Data Types and Operations: Numbers- Strings - List- Tuples – Set- Dictionaries -Data type conversion.	9
III	FLOW CONTROL Flow Control: Decision Making- Selection Structures-Loops-Nested Loops- Types of Loops.	9
IV	FUNCTIONS, MODULES AND PACKAGES Functions: Function Definition-Function Calling - Function Arguments - Recursive Functions - Function with more than one return value- 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.	9
V	FILE HANDLING AND EXCEPTION HANDLING 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- Exception Handling: Built-in Exceptions - Handling Exceptions - Exception with Arguments- Raising Exception - User-defined Exception - Assertions in Python	9
Teaching Resources	i. Textbook 1. Jeeva Jose and P. Sojan Lal, “Introduction to Computing and Problem Solving with Python”, Khanna Book Publishing Co. (P) Ltd., 2016. Unit - I: Ch. 1.1 – 1.12 Unit - II: Ch. 2.1-2.8 Unit - III: Ch. 3.1-3.5 Unit - IV: Ch. 4.1-4.6	



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	<p>Unit - V: Ch. 6.1-6.8& 8.1-8.6</p> <p>ii. Reference</p> <p>1. John ChSatyanarayana, M Radhika Mani & B N Jagadesh, “Python Programming”, Universities Press, 2018.</p> <p>iii. Web References</p> <p>(i) Online Tutorial</p> <p>1. www.learnpython.org/</p> <p>2. https://www.codecademy.com/learn/python</p> <p>3. https://www.Codementor.io</p> <p>4. https://www.Python.org</p> <p>5. https://www.onlinegdb.com/Sy-fU7gJW</p> <p>(ii) Online Quiz</p> <p>1. https://www.javatpoint.com/python-mcq</p> <p>2. https://www.sanfoundry.com/1000-python-questions-answers/</p>	
Course Outcomes	On completion of the course, students should be able to	
	CO1: Understand and express Python’s core elements in Python.	K1
	CO2: Understand and apply Python’s core data types while developing new programs	K1, K3, K5
	CO3: Apply flow control structure to develop python programs	K3
	CO4: Understand various programming constructs and develop functions in Python	K1, K5
CO5: Understand the different file handling operations and develop python program	K2, K5	

Mapping of COs with PSOs & POs



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CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	2	1	2	2	2	2	2	2	2	2	2	2	2	2
CO2	3	2	1	2	2	2	2	2	2	2	2	2	2	2	2
CO3	3	2	1	2	2	2	2	2	2	2	2	2	2	2	2
CO4	3	2	1	2	2	2	2	2	2	2	2	2	2	2	2
CO5	3	2	1	2	2	2	2	2	2	2	2	2	2	2	2
PO Mean								2	PSO Mean						2
Strength of Correlation of PO Mean								Moderately Correlating	Strength of Correlation of PSO Mean						Moderately Correlating

Prepared by	Name of the Faculty	Signature
		Dr. L. Ravi
	Mr. M. Sarlinraj	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science						SEM	VI
Course Code	MICROPROCESSOR USING 8086/88					Hours	Credits
CS636						4	4
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To Understand the basic architecture of the Microprocessor To learn the instruction sets of the processor To write applications using assembly level language program To study the input/output interfaces of the processor To understand the importance of interrupts in programming 						
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) Program	13.a)Theory (OR) b) Program	14.a)Theory (OR) b) Theory	15.a) Theory (OR) b) Theory	
	Section-C	16.Theory	17. Program	18. Program	19.Theory	20. Theory	
UNIT	CONTENTS					HOURS	
I	<p>SOFTWARE ARCHITECTURE AND MACHINE CODING</p> <p>Microcomputer : PC – 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 - The Stack - I/O Address Space.</p>					15	



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II	<p>MICROPROCESSOR PROGRAMMING – I</p> <p>The MOV instruction – The Instruction Set Of 8086 - Data Transfer Instructions - Arithmetic Instructions - Logic Instructions - Shift Instructions - Rotate Instructions.</p>	10
III	<p>MICROPROCESSOR PROGRAMMING – II</p> <p>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.</p>	10
IV	<p>I/O INTERFACE OF THE 8086 MICROPROCESSOR</p> <p>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</p>	15
V	<p>INTERRUPT INTERFACE OF THE 8086</p> <p>Interrupt Mechanism, Types, and Priority – Interrupt Vector Table - Interrupts Instructions- Enabling/Disabling Of Interrupts-External Hardware Interrupt Interface-External Hardware Interrupt Signals-Software Interrupt-Non-Maskable Interrupt-Reset-Internal Interrupt Functions.</p>	10
Teaching Resources	<p>i. Textbook</p> <p>3. Triebel. et al. The 8088 And 8086 Microprocessors Programming, Interfacing Software, Hardware And Applications. 4th Edition. New Delhi: Prentice Hall Of The India, 2011.</p> <p>Unit - I: Ch. 1.1 – 1.2, 2.1-2.13</p> <p>Unit - II: Ch.3.3 -3.4,5.1-5.5</p> <p>Unit - III: Ch. 6.1-6.6</p>	



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	<p style="text-align: center;">Unit - IV: Ch. 8.1-8.4, 8.14-8.18</p> <p style="text-align: center;">Unit - V: Ch. 11.1-11.5 & 11.9-11.12</p> <p>ii. Reference</p> <p>7. John Uffenbeck, The 8086/8088 Family, Design, Programming And Interfacing. 7th Edition. New Delhi: Prentice Hall of India, 2000.</p> <p>iii. Web References</p> <p>i. Online Tutorial</p> <p>1. https://www.udemy.com/course/8086-microprocessor-architecture-in-one-video-in-easy-way/</p> <p>2. https://www.geeksforgeeks.org/microprocessor-tutorials/</p> <p>3. https://www.tutorialspoint.com/microprocessor/microprocessor_8086_instruction_sets.htm</p> <p>ii. Online Quiz</p> <p>5. https://mcqmate.com/quiz/39/8086-microprocessor</p> <p>6. https://www.goconqr.com/quiz/10973890/microprocessor-and-assembly-language-8085-8086</p> <p>7. https://examradar.com/microprocessor-8086-mcqs-set-1/</p>	
Course Outcomes	On completion of the course, students should be able to	
	CO1: Identify the types of internal organization, registers and translation model of assembly language to machine language.	K1,K2
	CO2: Describe the various instruction set of the processor to develop programs	K1,K2,K5
	CO3: Understand the micro-program, subroutines, loops and string instructions to design a program.	K1,K2,K6
CO4: Determinethe pin-layout, minimum, maximum mode and I/O	K1,K2,K3	



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	organization.	
	CO5:Observe the various types of interrupts and its mechanism	K1,K2

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	3	1	3	3	3	2	2.57	3	3	3	2	2	3	2.67
CO2	3	3	1	3	3	3	2	2.57	3	3	3	2	2	3	2.67
CO3	3	3	1	3	3	3	2	2.57	3	3	3	2	2	3	2.67
CO4	3	3	1	3	3	3	2	2.57	3	2	2	2	2	3	2.67
CO5	3	3	1	3	3	3	2	2.57	3	2	2	2	2	3	2.67
PO Mean								2.57	PSO Mean						2.67
Strength of Correlation of PO Mean							Strongly Correlating		Strength of Correlation of PSO Mean					Strongly Correlating	

	Name of the Faculty	Signature
Prepared by	Dr. S. Sagayaraj	
	Mr. S. Mohanraj	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science							SEM	VI
Course Code	COMPUTER NETWORKS						Hours	Credits
CS637A							4	4
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To acquire and understand the basic concepts of Computer Networks, network model and transmission media. Understand the concepts of error detection and correction with various techniques. Analyze the IPV4 and IPV6 protocols and their applications. Evaluate the protocols such as SMTP, TCP, UDP and their scope. Apply the knowledge in various components of internet related issues. 							
	Section	I-Unit	II-Unit	III-Unit	IV-Unit	V-Unit		
Blue Print of the Question Paper	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		
UNIT	CONTENTS						HOURS	
I	<p>DATA COMMUNICATIONS Introduction: Data Communications – Networks – Network Models: Layers in the OSI Model – Addressing. Transmission Media: Guided Media – Unguided Media.</p>						12	



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II	<p>DATA LINK LAYER</p> <p>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.</p>	12
III	<p>NETWORK LAYER</p> <p>Internet Protocol: Internetworking – IPv4 – IPv6 – Transition from IPv4 to IPv6 - Delivery, forwarding and Routing: Delivery- Forwarding.</p>	12
IV	<p>TRANSPORT LAYER</p> <p>Process-to-Process Delivery: User Datagram Protocol – TCP. Quality of service: Data Traffic – Congestion – Congestion Control – Quality of Service.</p>	12
V	<p>APPLICATION LAYER</p> <p>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.</p>	12
Teaching Resources	<p>i. Textbook</p> <p>1. Behrouz A Forouzan, “Data Communication and Networking”, 4th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi: 2008.</p> <p>ii. Reference</p> <p>1. Andrew S Tanenbaum,” Computer Networks”, 4th Edition, Pearson Education, New Delhi: 2003.</p>	
Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1:Understand OSI& TCP/IP reference models and discuss the K2</p>	



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	functionalities of each layer in these models.	
	CO2:Discuss and Analyze flow control and error control mechanisms and apply them using standard data link layer protocols	K5
	CO3:Design subnets and calculate the IP addresses to fulfil network requirements of an organization	K3
	CO4: Explain the details of Transport Layer Protocols (UDP, TCP) and suggest appropriate protocol in reliable/unreliable communication.	K1
	CO5: Analyze the features and operations of various application layer protocols such as HTTP, DNS and SMTP.	K5

Mapping of COs with PSOs & POs

CO/PO	PO									PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg	
CO1	3	3	1	3	3	3	1	2.42	3	2	1	3	3	3	2.5	
CO2	3	3	1	3	3	3	1	2.42	3	3	1	3	3	3	2.66	
CO3	3	3	1	3	3	3	1	2.42	3	3	1	3	3	3	2.66	
CO4	3	3	1	3	3	3	1	2.42	3	3	1	3	3	3	2.66	
CO5	3	2	1	3	3	3	1	2.28	3	3	1	3	3	3	2.66	
PO Mean								2.39	PSO Mean						2.62	
Strength of Correlation of PO Mean							Moderately Correlating		Strength of Correlation of PSO Mean						Strongly Correlating	



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	Name of the Faculty	Signature
Prepared by	Prof. J. John Arockiaraj	
	Prof. A. Josephine Sahaya Mala	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science		SEM	IV
Course Code	PRACTICAL -VIII :MOBILE APPLICATIONS DEVELOPEMENT	Hours	Credits
PCS627		3	2
Learning Objectives	<p>The Course aims to</p> <ul style="list-style-type: none"> To understand mobile application development process. To know UI controls and develop user interfaces. To develop a mobile applications. To develop CURD applications. To publish applications in play store. 		
Blue Print of the Question Paper	Section	Description Type and Choice	Marks
	A	One Programming Question	20 Marks
	B	One Programming Question	20 Marks
	Total Marks		40 Marks
PART	CONTENTS		HOURS
I	1. Hello World Application 2. Android's Common Controls 3. Adapters and List Controls 4. Menus and Action Bars 5. Telephony and SMS 6. Notification and Multimedia 7. Location and Map		45



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	8. Drag and Drop	
	9. CRUD Operations	
	10. Publishing Android Apps	



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Course Outcomes	Upon successful completion of the course, students will be able to	
	CO1: Describe the platforms upon which the Android operating System will run.	K1
	CO2: Create a simple application that runs under the Android operating system.	K2 & K6
	CO3: Access and work with the Android file system.	K3 & K5
	CO4: Create an application that uses multimedia under the Android operating system.	K6
	CO5: Access and work with database under the Android operating system.	K2 & K4

Mapping of COs with PSOs & POs

CO/PO	PO								PSO							
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg	
CO1	3	3	1	3	3	3	1	2.42	3	3	3	3	3	3	3	
CO2	3	3	1	3	3	3	1	2.42	3	3	3	3	3	3	3	
CO3	3	3	1	3	3	3	1	2.42	3	3	3	3	3	3	3	
CO4	3	3	1	3	3	3	1	2.42	3	3	3	3	3	3	3	
CO5	3	3	1	3	3	3	1	2.42	3	3	3	3	3	3	3	
PO Mean								2.42	PSO Mean							3



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Strength of Correlation of PO Mean	Moderately Correlating	Strength of Correlation of PSO Mean	Strongly Correlating
------------------------------------	------------------------	-------------------------------------	----------------------

	Name of the Faculty	Signature
Prepared by	Prof. P. Karthick	
	Prof. C. Sathishkumar	
Verified by	Dr. L. Ravi	

Programme: B.Sc Computer Science		SEM	VI
Course Code	PRACTICAL-IX: PROGRAMMING USING PYTHON	Hours	Credits
PCS628		3	2
Learning Objectives	<p>The Course aims to.</p> <ul style="list-style-type: none"> Understand fundamental python syntax and semantics in Python programs. Learn to use right data type representation while developing the programs in Python. Acquires various program structures to solve the problem in Python programming. Learn to construct the function, modules and package as manageable units in Python. Attain the depth practical knowledge in solving problems associated with function, file operation and exception handlings using Python language 		
Blue Print of Practical	Section	Description Type and Choice	Marks
	A	Programming Question	20 Marks



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Courses	B	Programming Question	20 Marks
	Total Marks		40 Marks
UNIT	CONTENTS		HOURS
I-V	<ol style="list-style-type: none"> 1. Types of Operators 2. Numbers 3. Strings 4. List & Dictionaries 5. Tuples & Set 6. Flow Control 7. Functions 8. Modules and Packages 9. File Handling 10. Exception Handling 		45
Course Outcomes	On completion of the course, students should be able to		
	CO1: Understand and use various programming elements in Python.	K1, K3	
	CO2: Compare and select appropriate Data types to solve problems in Python.	K3, K4	
	CO3: Implement Conditionals and Loops for Python Programs	K3	
	CO4: Construct program to execute function, modules and packages.	K3, K5	
	CO5: Develop program to perform file operations in Python	K5	

Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	2	1	2	2	2	2	2	2	2	2	2	2	2	2
CO2	3	2	1	2	2	2	2	2	2	2	2	2	2	2	2



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CO3	3	2	1	3	2	2	2	2.14	2	2	2	2	2	2	2
CO4	3	2	1	2	2	2	2	2	2	2	2	2	2	2	2
CO5	3	2	1	2	2	2	2	2	2	2	2	2	2	2	2
PO Mean								2.02	PSO Mean						2
Strength of Correlation of PO Mean								Moderately Correlating	Strength of Correlation of PSO Mean						Moderately Correlating

	Name of the Faculty	Signature
Prepared by	Dr. L. Ravi	
	Mr. M. Sarlinraj	
Verified by	Dr. L. Ravi	



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Programme: B.Sc Computer Science		SEM	VI
Course Code	PRACTICAL – X: LINUX AND SHELL PROGRAMMING / MICROPROCESSOR USING	Hours	Credits
PCS629	8086/88	3	2
Learning Objectives	<p>The Course aims to</p> <p>Part I</p>		
	<p>Part II</p> <ul style="list-style-type: none"> To implement the various instruction sets of the processor To design applications for regular processes To convert data from one format to another To develop programs using string and loop instructions To facilitate the CALL and RET instruction in a program 		
Blue Print of the Question Paper	Section	Description Type and Choice	Marks
	Part – I -A	One Programming Question	20 Marks
	Part – II - B	One Programming Question	20 Marks
	Total Marks		40 Marks
PART	CONTENTS		HOURS
I	Part – I: Programming With Shell Script and System Calls 1. Shell Script - Sequential structure		22.5



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	<ol style="list-style-type: none"> 2. Shell Script – Iterative Control Structure 3. Shell Script – Strings 4. Shell Script – Files 5. Shell script - Command line arguments 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() 	
II	<p>Part - II: MICROPROCESSOR USING 8086/88</p> <ol style="list-style-type: none"> 1. 8 and 16 Bit Arithmetic Operation and Logical Operation. 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. 	22.5
Course Outcomes	Upon successful completion of the course, students will be able to	
	CO1: Understanding the data manipulation from registers and memory using the various instruction set	K1,K2,K6
	CO2: Design applications for regular processes	K4,K5
	CO3: Create programs using string and loop instructions	K5,K6
	CO4: Experiment the CALL and RET instruction in a program	K3,K6



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Mapping of COs with PSOs & POs

CO/PO	PO								PSO						
	1	2	3	4	5	6	7	Avg	1	2	3	4	5	6	Avg
CO1	3	3	1	3	3	3	2	2.57	3	2	3	2	3	3	2.67
CO2	3	3	1	3	3	3	2	2.57	3	3	3	2	2	3	2.67
CO3	3	3	1	3	3	3	2	2.57	3	3	3	2	3	3	2.67
CO4	3	3	1	3	3	3	2	2.57	3	3	3	2	2	3	2.67
PO Mean								2.57	PSO Mean						2.67
Strength of Correlation of PO Mean						Strongly Correlating			Strength of Correlation of PSO Mean						Strongly Correlating

Prepared by	Name of the Faculty	Signature
		Dr. S. Sagayaraj
	Mr. S. Mohanraj	
Verified by	Dr. L. Ravi	



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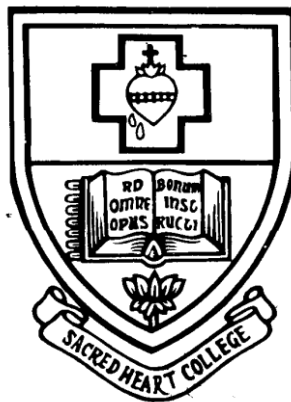
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Master of Computer Applications (MCA)

Regulations and Curriculum

(Effective for the Batches admitted from the Academic Year 2022-2023)





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PG AND RESEARCH DEPARTMENT OF COMPUTER APPLICATIONS,

SACRED HEART COLLEGE (AUTONOMOUS),

TIRUPATTUR, TIRUPATTUR DT-635 601

MCA Curriculum

I. Vision

We intend to impart Knowledge of Computer Applications into the young aspiring graduates who can adapt to the demanding needs of the Information Technology Industry and can contribute to the Research and Development Sector of the Country and the Globe.

II. Mission

The department strives to educate the underprivileged rural section of young graduates by providing state of the art infrastructure and adapting to the blend of e-Learning with traditional teaching pedagogy to shape them as industry ready professionals and socially relevant researcher.

III. Name of the Programme

Master of Computer Applications (MCA)

IV. Duration

To fulfil the requirements for acquiring MCA, a student may clear all the courses in a minimum of two years and a maximum of 4 years.

V. Eligibility

Candidates who have passed the under mentioned degree examinations in any recognized institution or as equivalent thereto, provided they have undergone the programmes under 10+2+3 pattern.



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a. B.C.A/B.E.S./B.Sc. in Computer Science /Mathematics/Physics/Statistics/Applied Sciences with Mathematics as one of the subjects at the Higher Secondary level (i.e., in +2 level of the 10+2 pattern) OR

b. B.Com. / B.Com CA / Bachelor of Bank Management / B.B.A. / B.L.M. / B.A. Corporate Secretaryship / B.A. Economics / Any other Bachelor's Degree in any discipline with Business Mathematics and Statistics or Mathematics / Statistics in main/allied level OR

c. B.E./B.Tech or M.B.A

Medium of Instruction

The medium of instruction is only in **English**.

VI. Programme Outcomes at Postgraduate Level

Postgraduates will be able to

PO1: Demonstrate intense knowledge in their discipline

PO2: Exhibit specialized skills to plan, analyze and draw conclusions related to their respective field of study in theory and in practice

PO3: Develop expertise in their field of study through projects and research activities

PO4: Prepare themselves to incorporate new technologies in their own discipline and demonstrate excellence in their area of specialization

PO5: Develop social and ethical responsibility in the transfer and management of knowledge.

VII. Programme Educational Objectives (PEOs) of M.C.A

PEO1: To prepare the students to be skilled professionals, innovators or entrepreneurs engaged in technology development and deployment in the industry.

PEO2: To train the students for the industry by imparting sound background in theoretical and applications-oriented courses relevant to the latest trends in the industry.



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PEO3: To imbibe the quality of providing solutions and develop system based applications for real time problems in various domains involving technical, managerial, economic and social constraints.

PEO4: To pursue higher studies in computing or related disciplines

PEO5: To become effective teachers by inculcating the taste for teaching and learning.

PEO6: To Comprehend effective documentation and presentations

PEO7: To actively involve in research and development in the industry or academia.

PEO8: To recognize the need for and develop the ability to engage in continuous learning as a computing professional

VIII. Graduate Attributes (GAs) of M.C.A

GA1: Possess strong technical skills

GA2: Problem Solving and Analytical ability

GA3: Passionate in Design, Development and Deployment of Software

GA4: Communication Efficacy

GA5: Adopting to Latest Trends and Technological advancements

GA6: Professionally ethical

GA7: Ability to work in Team

GA8: Adhere Lifelong Learning

GA9: Espouse self-learning abilities

GA10: Create and deliver technical documents and presentations

GA11: Transform into Entrepreneurs, Innovators and Researchers

IX. Program Specific Outcomes (PSOs) of M.C.A

PSO1: Understand and apply the knowledge of computing skills inherited from the course to abstract and model real time problems.

PSO2: Integrate the problem solving and technical abilities to design and deploy software

PSO3: Identify, scrutinize, adopt and apply modern tools and technologies as per the requirements

PSO4: Realize the importance of working in a team and team building.

PSO5: Able to inculcate ad-hoc learning abilities with communication efficacy.



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X. PEO – PO Mapping

PEO	PO1	PO2	PO3	PO4	PO5	Mean Score
PEO1	3	3	3	3	3	3
PEO2	3	3	3	3	3	3
PEO3	3	3	3	2	2	2.6
PEO4	2	1	2	1	1	1.4
PEO5	2	2	2	1	3	2
PEO6	1	1	2	1	1	1.2
PEO7	3	3	3	1	1	2.2
PEO8	1	1	3	1	3	1.8
Mean Overall Score						2.15
Result						High

High – (2.1 – 3), Medium – (1.1 – 2), Low – (0 – 1)

XI. PO – GA Mapping

PO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	Mean Score
PO1	3	3	3	2	3	2	1	1	1	2	3	2.2
PO2	3	3	3	1	3	1	1	1	1	1	3	1.9
PO3	3	1	1	1	3	1	1	2	2	2	2	1.8
PO4	1	1	1	3	1	3	3	1	1	1	1	1.6
PO5	1	2	1	3	2	1	1	3	3	2	3	2
Mean Overall Score												2
Result												Medium

High – (2.1 – 3), Medium – (1.1 – 2), Low – (0 – 1)

XII. PEO – GA Mapping

PEO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	Mean Score
PEO1	3	3	3	2	3	2	2	3	2	2	3	2.5
PEO2	2	2	3	3	2	3	3	2	2	3	2	2.4
PEO3	3	3	2	3	3	3	3	3	3	3	3	2.9



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PEO4	3	3	3	3	2	2	3	2	3	3	2	2.6
PEO5	3	2	2	3	3	2	3	3	3	2	2	2.5
PEO6	2	3	3	2	2	2	3	3	3	2	2	2.4
PEO7	3	2	2	2	2	3	3	3	3	2	2	2.4
PEO8	2	3	3	3	3	3	2	3	3	2	2	2.6
Mean Overall Score												2.5
Result												High

High – (2.1 – 3), Medium – (1.1 – 2), Low – (0 – 1)

XIII. PSO – PO Mapping

PSO	PO1	PO2	PO3	PO4	PO5	Mean Score
POS1	3	3	3	3	1	2.6
PSO2	3	3	3	3	1	2.6
POS3	3	3	2	3	1	2.4
PSO4	3	3	3	3	1	2.6
PSO5	3	3	2	2	1	2.2
Mean Overall Score						2.5
Result						High

High – (2.1 – 3), Medium – (1.1 – 2), Low – (0 – 1)

XIV. Preparatory course

The objective of the preparatory course is to teach the basic concepts of computer applications and prepare the students to undergo the MCA programme. The course aims to provide a common platform for learning/refreshing the concepts of computer programming for both the students from the Computer Science and Applications/Non-Computer Science disciplines.

DURATION: 15 Days for 60 hours



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S. No	Module	Topics
1	Programming in C	Basic Programming - Operators, decision making, branching, looping - Arrays, strings and functions - Structures, Unions
2	Object Oriented Programming with C++	Classes And Objects - Inheritances And Polymorphism
3	Web Design	Basic HTML Tags - CSS - Essentials of Xml
4	Digital Logic Fundamentals	Number System - Basic Sequential Circuit - Combinational Circuit - Design of ALU - Basic Architecture of Digital Computer.
5	Computer Network	Basic Network Topology - Network devices - OSI Layer Architecture - TCP & UDP.
6	Operating Systems	Process Scheduling - Memory Management - Linux and network commands
7	Computer Graphics	Random Scan and Raster Scan Systems
8	Data Structures	Stack and Queue - Linked List - Trees – Graphs
9	Database Management Systems	Database System Architecture - SQL - PL/SQL
10	Software Engineering	Software Methodology - Process Model

XV.Credit Distribution

S. No	Category of Courses	Credits	% of credits to total credits
1	Core Courses (CC)	11	12
2	Technical Courses (TC)	19	21
3	Practical Courses (PC)	15	17
4	Pure Practical Courses (PP)	7	8
5	Theory Combined Practical Courses (TCP)	8	9
6	Software Projects and Internships (SP)	14	16
7	Elective Courses (EC)	15	17
8	*Life and Employability Skills (LEC)	(Not	7 -



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	included for CGPA)		
9	*Certificate Courses (CC)	6	-
10	*Self -Learning Courses (SLC)	3	-
TOTAL CREDITS		105	

XVI. Scheme of courses

Sem	Code	Subject Name	L	T	TCP	P	IM	SM	TM	CD
I	MCA160T	Enterprise Applications with JAVA	4	1			50	50	100	4
	MCA161T	Scripting Technology	3	1			50	50	100	3
	MCA162T	Optimization Techniques	3	1			50	50	100	4
	MCA163T	Software Testing and Quality Assurance	4		1		50	50	100	4
	MCA164I	Pure Practical : Open Source Database Management System				4	100		100	4
	MCA165P	Practical : JAVA				4	50	50	100	3
	MCA166P	Practical : Scripting Technology				4	50	50	100	3
			14	3	1	12	400	300	700	25
II	MCA260T	Enterprise Applications with .Net	4				50	50	100	4
	MCA261T	Computer Graphics	4	1			50	50	100	4
	MCA262T	Design and Analysis of Algorithms	3	1			50	50	100	3
	MCA263#	Elective I	3				50	50	100	3
	MCA264I	Pure Practical : Android Application Development				4	100		100	3
	MCA265P	Practical : .Net				4	50	50	100	3
	MCA266P	Practical : Computer Graphics				4	50	50	100	3
	VE804	Human Rights in India	2				100		100	1
			16	2	0	12	450	350	800	24
	MCA360T	Python Programming	4				50	50	100	4
	MCA361T	Blockchain Technology	3	1			50	50	100	4



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III	MCA362T	Open Source Frameworks	3		1		50	50	100	4
	MCA363#	Elective II	3				50	50	100	3
	MCA364#	Elective III	3				50	50	100	3
	MCA365P	Practical : Python				6	50	50	100	3
	MCA366J	Software Project I				6	50	50	100	4
			16	1	1	12	350	350	700	25
IV	MCA466#	Elective IV	3				50	50	100	3
	MCA467#	Elective V	3				50	50	100	3
	MCA468J	Software Project II				24	50	50	100	10
			6	0	0	24	150	150	300	16
Total Credits										90

List of Theory Combined Practical Papers

Semester	Course Code	Course Title
I	MCA163T	Software Testing and Quality Assurance
III	MCA362T	Open Source Frameworks

List of Pure Practical Papers

Semester	Course Code	Course Title
I	MCA164I	Open Source Database Management System
II	MCA264I	Android Application Development

Note: Marks for the Internal Assessment will be given from the lab work for Pure Practical Papers. No End Semester Practical Examination will be held.

List of Elective Subjects

(Conducted in 2nd, 3rd and 4th Semesters, Students has to choose from the below course)

Semester	Course Code	Elective I
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II	MCA263A	Artificial Intelligence
	MCA263B	Internet of Things
	MCA263C	Research Domain I
Elective II		
III	MCA363A	Cloud Computing
	MCA363B	Social Network Analysis
	MCA363C	Research Domain II
	Elective III	
	MCA364A	Enterprise Resource Planning
	MCA364B	Big Data
Elective IV		
IV	MCA466A	Data Analytics with R Programming
	MCA466B	Data and Information Security
	Elective V	
	MCA467A	Data Mining Techniques
	MCA467B	Game Programming

CODING SCHEME

MCA	X	X	X	X
Programme Code	Semester Number 1-4	Curriculum Revision Number 0-9	Course Serial Number 0-9	Course Type*

*Course Type: T–Theory, P–Practical, J–Project, A to E – Electives, I – Internal Papers, S – Skill Papers.

ADDITIONAL COURSES

a) Life and Employability Skill Courses

Semester	Course Code	Course Title	Credits
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I		Soft Skills	2
II		Technical Aptitude	2
III		Quantitative Aptitude	2

Note: Life and Employability skill courses are organized by the Placement cell.

b) Certificate Courses

Semester	Course Title	Credits
I	Web Authoring Tools	2
II	Natural Language Processing	2
III	Smart Device Technologies	2

Note: These certificate courses are intended to be conducted through training and placement consultancies of high repute and each course will be conducted for a minimum period of 30 conduct hours including theory and practicals. The concept behind these certificate courses is to enable the students to craft themselves employable and avail placement. These courses need not require an end semester examination. The cost incurring to conduct these certificate courses will be borne by the students. The list of certificate courses are listed below, however can be considered for including new courses and revising the content of the courses according to the industry requirements which varies from time to time. The course can be conducted during the semesters or during the summer/winter vacation.

c) SELF LEARNING COURSE

Since the certificate courses involve cost, to enable the economically deprived students to provide a chance to acquire the additional technical skills required for employment. The students can take up a Self-learning course (1 credit each), they are expected to learn the technologies through self-learning based on the online tutorials and other related resources. However, they have to prove themselves to have undergone the mentioned syllabus through an end term examination, which the department will conduct.

The students are advised to take up three MOOC courses recognized by AICTE and UGC for credit transfer, such as NPTEL and SWAYAM.

A student has to acquire 90 credits by successfully undergoing the mandatory courses to get qualified for the M.C.A degree. The mandatory courses are compartmentalized into Theory, Practical, Theory Combined Practicals (TCP), Pure Practical and Project courses. However, further to cater to the needs of



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the advanced learners, flexibility is provided in the curriculum in the form of certificate courses in the semester I, II and III, the Life and Employability courses handled from first semester to third semester, and Self Learning courses. The minimum number of credits to be acquired to become eligible for the MCA degree, is 90, The Life and Employability skills, Certificate and Self learning courses add up the credits tally to a maximum of 105. The Life and Employability skills, Certificate and Self learning credits will not be included for the CGPA calculation.

d) PURE PRACTICAL PAPERS

To enable the students to have more practical experience, considering the limitation in number of practical sessions that can be conducted proportionate to the workload. A new type of paper is introduced which is named as Pure Practical paper in semester I and II. In these papers, the course teacher will demonstrate and teach the technical concepts required to complete a practical exercise, in the computer laboratory itself before students begin their work. The teacher will then guide the students to complete the laboratory sessions.



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XVII. SYLLABI IN DETAIL

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

Course Outcomes

At the end of this course, the students will be able to

CO. No.	CO- Statement	Cognitive Level
CO 1	Discover and Apply various components and technologies used in Java platform	K1,K3
CO 2	Describe, Understand and adapt the basics of JSTL tags and EJB.	K1,K2,K6
CO 3	Apply AWT and Swing components to design GUI	K3,K6
CO 4	Examine and develop Client-Server programs using Socket, RMI and Servlet.	K4,K6
CO 5	Distinguish and Choose the Struts 2 framework for building Java EE applications.	K2,K5
CO 6	Device and Construct a well-structured MVC web application using Servlet and JSP.	K4, K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)	Programme Specific Outcomes (PSO)	Mean
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	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Scores of COs
1	3	3	3	3	2	3	3	3	3	2	2.8
2	3	3	3	3	2	3	3	3	3	2	2.8
3	3	3	3	3	2	3	3	3	3	2	2.8
4	3	3	3	3	2	3	3	3	3	2	2.8
5	3	3	3	3	2	3	3	3	3	2	2.8
6	3	3	3	3	3	3	3	3	3	2	2.8
Mean Overall Score											2.8
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20
Understand	10	10	30
Apply	10	10	10
Analyze	10	10	10
Evaluate	5	5	10
Create	5	5	20

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

1. 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.

2. 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.



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3. 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.

4. 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

Course Designer Prof. S. Anthony Philomen Raj



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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

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO1	Learn and apply the basic HTML Tags.	K1,K3
CO2	Build and design a web page with the help of basic web components.	K3,K6
CO3	Classify, Choose and Build jQuery and JavaScript applications.	K2,K3,K6
CO4	Differentiate and Construct client and server side Scripting	K2,K3
CO5	Draft and Design a webpage using CSS.	K5,K6
CO6	Devise and Create sample static webpages	K4, K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	2	3	3	3	1	2	2.3
CO2	3	3	2	3	2	3	3	2	1	2	2.4
CO3	3	2	2	2	2	3	2	2	1	2	2.1



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CO4	3	3	2	3	2	3	1	1	1	2	2.1
CO5	3	3	3	2	2	3	1	1	1	2	2.1
CO6	3	2	2	3	2	3	2	1	1	2	2.1
Mean Overall Score											2.2
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20
Understand	10	10	15
Apply	10	10	30
Analyze	10	10	15
Evaluate	5	5	10
Create	5	5	10

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)



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Course Content

1. 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

2. 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.

3. 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.

4. 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.

5. 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.



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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.

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20



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Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45

Course Designer Prof. R.Veeraragavan

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.



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Course Outcomes

At the end of the course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO1	Generalize and Formulate linear programming problems.	K2,K6
CO2	Choose, Draft and Formulate transportation problems.	K3,K5,K6
CO3	Classify and Design assignment problems.	K3,K6
CO4	Devise , Build and Design inventory models.	K3,K5,K6
CO5	Elicit and Design queuing models	K3, K6
CO6	Define, Build and Formulate project management and Game theory problems.	K1,K2,K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	2	3	3	2	2	2	2.4
CO2	3	3	3	3	2	3	3	2	2	2	2.6
CO3	2	3	2	3	2	3	3	3	3	2	2.6
CO4	3	3	3	2	2	3	3	2	2	2	2.5
CO5	2	3	2	3	3	2	2	2	3	2	2.4
CO6	3	3	3	2	2	2	2	2	2	2	2.3
Mean Overall Score											2.5
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	15	15	30
Understand	15	15	30
Apply	10	10	20
Analyze	10	10	20
Evaluate	-	-	-
Create	-	-	-

Participatory Assessment



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- 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

1. LINEAR PROGRAMMING

Introduction – Concept of Linear Programming Model – Graphical Method – Linear Programming Methods (Simplex Method and Big M Method) – Duality.

2. TRANSPORTATION AND ASSIGNMENT PROBLEM



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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).

3. 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 Yaspian, 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>



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QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45



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Course Designer Dr. A. George Louis Raja

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)

Course Outcomes

At the end of the course, the students will be able to

CO. No.	CO - Statement	Cognitive Level
CO 1	Observe and Explain the significance of software testing and quality assurance	K1,K2
CO 2	Discuss and Elicit the basics of software testing, including objectives, process, criteria, strategies, and methodologies.	K1, K2
CO 3	Apply white box testing approach and Design the test cases.	K3,K6
CO 4	Devise and Design test cases from the given requirements using Black box testing techniques	K4,K6
CO 5	Observe, Recognize and do case studies on the need for System and user acceptance testing.	K2, K4,K6
CO 6	Discuss and Elicit importance of non-functional testing and the types of non-functional testing.	K2,K3

Mapping of CO with PO and PSO



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CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	1	3	1	3	3	2	2	1	2.2
2	3	2	1	3	1	3	2	2	2	1	2
3	3	2	1	2	1	3	2	2	1	1	1.8
4	3	2	1	2	1	3	3	2	1	1	1.9
5	3	2	1	2	1	3	2	2	2	1	1.9
6	3	3	1	2	1	3	2	2	1	1	1.9
Mean Overall Score											2
Result											Medium

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	05	05	10
Understand	05	05	10
Apply	20	20	30
Analyze	10	10	30
Evaluate	05	05	10
Create	05	05	10

Participatory Assessment

- Writing Test Scenario
- Creating Test Cases
 - Boundary Value Analysis
 - Equivalence Class Partitioning
- Preparing Test Plan
- Testing Tools
 - Selenium IDE
 - JUNIT



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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



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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 Gopalaswamy Ramesh, “Software Testing Principle and Practices”, Sixth Impression, 2008, ISBN: 978 – 81 – 7758 – 121 – 8.

REFERENCES

1. Illene Burnstien, “Practical Software Testing”, First Edition, Springer International Edition, 2004, ISBN: 81-8128-0 89-X.
2. William E Perry, “Effective Methods for Software Testing”, Second Edition, John Wiley & Sons, 2005, ISBN: 9971–51–345–5.
3. Sandeep Desai and Abhishek Srivastava, “Software Testing a Practical Approach”, PHI Learning, 2012, ISBN: 978-81-2034-534-8.
4. S.A. Kelkar, “Software Quality and Testing - A Concise Study”, PHI Learning Private Limited, 2012, ISBN: 978-81-203-4628-4.
5. 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.
6. Jason Germbi, “Developing Secure Software”, Cengage Learning India Private Limited, 2008, ISBN 13: 978-81-315-0888-6.

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:



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Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45

Course Designer Prof. A. John Martin.

SOFTWARE TESTING AND QUALITY ASSURANCE (TCP)



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1. Writing Test Scenario
2. Creating Test Cases
 - i. Boundary Value Analysis
 - ii. Equivalence Class Partitioning
3. Preparing Test Plan
4. Testing Tools
 - i. Selenium IDE
 - ii. JUNIT

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35



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Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45

Course Designer: Prof. A. John Martin.

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

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Discover the various SQL, PL/SQL and DBA statements.	K1
CO 2	Understand the basic concepts of relational database management system and design structure models.	K2
CO 3	Apply the normalization procedure to design a suitable structure for a given problem situation.	K3
CO 4	Extract, formulate and execute different SQL queries to interact with the database.	K4, K5
CO 5	Implement processing logic in the form of PL/SQL blocks routines like functions, procedures, cursors and triggers.	K5
CO 6	Understand the role play of the database administrator and	K2, K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	



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											of COs
1	3	3	3	3	2	3	3	3	3	2	2.8
2	3	3	3	3	2	3	3	3	3	2	2.8
3	3	3	3	3	2	3	3	3	3	2	2.8
4	3	3	3	3	2	3	3	3	3	2	2.8
5	3	3	3	3	2	3	3	3	3	2	2.8
6	3	3	3	3	3	3	3	3	3	2	2.8
Mean Overall Score											2.8
Result											High

Assessment Pattern

Bloom's Category	Continuous Assessment Marks Allotment (50)	Term End Exam (50)
Remember		
Understand	10	10
Apply	10	10
Analyze	10	10
Evaluate	10	10
Create	10	10

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



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Course Content

LIST OF PROGRAMS

1. Creating and Managing Tables
 - a) Constraints
2. SQL Statements – 1
 - a) Basic SQL SELECT Statements
 - b) Restricting and Sorting Data
 - c) Single-Row Functions
3. SQL Statements – 2
 - a) Displaying Data from Multiple Tables
 - b) Aggregating Data Using Group Functions
 - c) Subqueries
4. Manipulating Data
 - a) INSERT statement
 - b) DELETE statement
 - c) UPDATE statement
5. Creating and Managing Views



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- a) Creating Views
- b) Implementing DML Statements on views

6. Using SET operators, Date/Time Functions, GROUP BY clause (advanced features) and advanced subqueries

7. PL/SQL Basics

- a) Declaring Variables
- b) Writing Executable Statements
- c) Interacting with the Oracle Server
- d) Writing Control Structures

8. Composite data types, cursors and exceptions

- a) Working with Composite Data Types
- b) Writing Explicit Cursors
- c) Handling Exceptions

9. Procedures and Functions

- a) Creating Procedures
- b) Creating Functions
- c) Managing Subprograms
- d) Creating Packages

10. Triggers

- a) Creating Triggers
- b) Creating Triggers

11. DBA Commands

- a) Creating Database
- b) Users Creations and Privileges
- c) Grant and Revoke

REFERENCE

1. Shio Kumar Singh, "Database Systems Concepts, Designs and Applications", 2nd Edition, 2011, Dorling Kindersly (India) Pvt.Ltd.
2. Kogent Solutions, "Oracle 10g Administration in Simple Steps", First Edition, 2008, Dreamtech.

Evaluation Scheme



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- There will be no term-end semester examination. But the students will be evaluated at the end of semester for 50 marks.

Content	Internal Marks
Test	30 Marks
Viva Voce	20 Marks
Total	50 Marks

Course Designer Prof. S. Anthony Philomen Raj

MCA165T

PRACTICAL: JAVA

0-0-0-4:100

1. Java Collections
2. Applet, AWT
3. Swing Components
4. Socket programming, RMI
5. Servlet to manage http request and response, Servlet with JDBC
6. Handling Cookies, Session Tracking,



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7. JSP Scripting Elements
8. JSP tags, JSP with Bean
9. Integrating Servlet, JSP with MVC and JDBC
10. JSTL Tags
11. Creating Session Bean
12. Creating Entity Bean
13. Struts 2 actions
14. Struts 2 Tags
15. Struts 2 with Validation
16. Struts 2 with JDBC Connection

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

Time duration is 2 hrs. Each student will get a single question to be answered. The question will have two subdivisions. (2 x 25 = 50)

- First part, shall contain questions from the exercise list.
- Second part will present an unexplored problem to be solved.
- The problem should be addressed using at least 3 technical features of the respective technology stream.



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- No more than three candidates should get the same question in a batch.

End Semester Examinations

Max. Marks: 100

Time duration is 3 hrs. Each student will get a single question to be answered. The question will have two subdivisions. (2 x 50 = 100)

- First part, shall contain questions from the exercise list.
- Second part will present an unexplored problem to be solved.
- The problem should be addressed using at least 3 technical features of the respective technology stream.
- No more than three candidates should get the same question in a batch.

Course Designer Prof. S. Anthony Philomen Raj

MCA166T

PRACTICAL : SCRIPTING TECHNOLOGY

0-0-0-4:100



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1. Creation of interactive web sites - Design using HTML and authoring tools
 - a. basic HTML tags, different styles, links and with all Basic control elements.
2. 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.
3. Create a framed webpage with different frames.
4. Collect of Personal Information using forms.
5. Create a web page with all types of Cascading style sheets.
 - i. Inline
 - ii. Internal
 - iii. External
6. Handling multimedia content in websites.
7. Client-Side Scripts for Validating Web Form Controls using DHTML.
8. Create webpage with following using jQuery.
 - i. Selectors
 - ii. Events
 - iii. Hide and Show
 - iv. Fade
 - v. Slide
 - vi. Animate
9. Generate jQuery Programs using CSS.
10. Create Custom animations with jQuery.



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QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

Time duration is 2 hrs. Each student will get a single question to be answered. The question will have two subdivisions. (2 x 25 = 50)

- First part, shall contain questions from the exercise list.
- Second part will present an unexplored problem to be solved.
- The problem should be addressed using at least 3 technical features of the respective technology stream.
- No more than three candidates should get the same question in a batch.

End Semester Examinations

Max. Marks: 100

Time duration is 3 hrs. Each student will get a single question to be answered. The question will have two subdivisions. (2 x 50 = 100)

- First part, shall contain questions from the exercise list.
- Second part will present an unexplored problem to be solved.
- The problem should be addressed using at least 3 technical features of the respective technology stream.
- No more than three candidates should get the same question in a batch.



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Course Designer Prof. R. Veeraragvan

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



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- Scripting Language

COURSE OUTCOMES

At the end of the course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO1	Infer and Apply the basics of structured programming.	K1, K3
CO2	Use the basics of object oriented programming and design object oriented programs.	K3,K6
CO3	Device and Develop programs in structured programming model.	K4,K6
CO4	Device and Design solutions in object oriented programming paradigm.	K4,K6
CO5	Construct Develop stand-alone windows applications in the .NET framework.	K6
CO6	Construct, Device and Build applications with WPF control, styles and resources.	K3,K4,K6
CO7	Create web-based applications using ASP.NET.	K6
CO8	Build data aware standalone and web applications.	K3
CO9	Illustrate the usage and application of LINQ.	K2
CO10	Integrate solutions across console, windows and web frameworks.	K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	2	3	2	3	3	3	2	2	2.6
CO2	3	3	3	3	3	2	3	3	2	2	2.7
CO3	2	3	2	3	2	3	3	2	3	2	2.5
CO4	3	3	2	3	2	3	3	3	2	2	2.6
CO5	3	3	3	3	2	3	3	3	2	2	2.7
CO6	3	2	3	2	2	3	3	3	2	2	2.5
Mean Overall Score											2.6
Result											High



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Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	5	5	15
Understand	10	10	15
Apply	15	15	25
Analyze	5	5	10
Evaluate	5	5	10
Create	10	10	25

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



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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

1. 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

2. 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.

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50



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The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45

Course Designer Dr. A . George Louis Raja

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.



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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

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Understand and apply the core concepts and mathematical foundations of computer graphics.	K2, K3
CO 2	Analyze and apply 2D and 3D transformations on graphics objects and their applications in composite form.	K3, K4
CO 3	Extract scene with different clipping methods and correlate the clipping methods.	K3,K4
CO 4	Compare and correlate various projections and visible surface detection techniques for the display of 3D scene on 2D screen.	K4,K5
CO 5	Device and Develop programs for the 3D transformation, projection and visible surface methods in OpenGL.	K4,K6
CO 6	Model, Devise, Develop interactive 3D applications using DIRECTX software.	K3,K4, K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	2	2	2	3	1	2	2	2	2.2
CO2	3	3	3	3	2	3	2	3	2	2	2.6
CO3	3	2	2	3	3	3	2	2	3	2	2.5
CO4	3	3	3	2	3	3	2	2	3	3	2.7
CO5	2	1	1	2	1	3	2	3	2	2	1.9
CO6	3	3	3	3	3	3	2	3	3	3	2.9
Mean Overall Score											2.4
Result											High

Assessment Pattern



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Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	5	20
Understand	10	10	20
Apply	10	10	20
Analyze	5	10	15
Evaluate	10	5	5
Create	5	10	20

Participatory Assessment

- Problem solving ability in Line drawing, 2D and 3D transformations.
- Implementation of algorithms in OpenGL software.
- Create an application using DIRECTX software.



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Course Content

1. LINE-DRAWING ALGORITHMS

DDA, Bresenham Technique, Circle-Generating Algorithms: Properties of Circles, Midpoint Circle Algorithm–Filled Area Primitives: Boundary-Fill Algorithm, Flood-Fill Algorithm.

2. 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.

3. 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.

4. 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

1. 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.
2. Dave Shreiner, Mason Woo, Jackie Neider, Tom Davis, "OpenGL Programming Guide: The Official



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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.

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

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

question from each unit]

3 x 15 = 45

[Atleast one



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Course Designer Dr. K. Saravanapriya

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.

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
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CO 1	Observe and elicit the relevance of algorithms for computational problems solving and software engineering.	K2,K3
CO 2	Observe and Apply various algorithmic approaches, techniques and methods.	K1,K3
CO 3	List, Elicit and Apply design and analysis techniques to model and solve a problem.	K1,K2,K3
CO 4	Correlate and Evaluate the efficiency of an algorithm	K4,K5
CO 5	Differentiate and Compute the time and space complexities of an algorithm.	K2, K3
CO 6	Design and Evaluate any given problem with mathematical rigor to provide a scientific solution.	K5, K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	2	3	2	2	3	3	2	2	2	2.4
2	2	3	2	3	2	3	3	2	2	2	2.4
3	2	3	2	3	2	3	3	1	2	2	2.3
4	3	3	3	2	2	3	3	2	2	2	2.5
5	2	3	2	3	2	1	2	2	2	2	2.1
6	3	3	3	2	2	1	1	2	2	2	2.1
Mean Overall Score											2.3
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20
Understand	10	10	20
Apply	10	10	20
Analyze	10	10	20
Evaluate	10	10	20
Create	-	-	-

Participatory Assessment

- Implementation of Algorithms in a Programming Language of choice



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(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



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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

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Galgotia Publications Pvt.Ltd. NewDelhi, 2001.
2. Alfred Aho, John Hopcroft, Jeffrey Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, Delhi, 2003.
3. Thomas Cormen, Charles Leiserson, Ronald Rivest, "Introduction to Algorithms", Prentice Hall of India, New Delhi, 1998.

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20



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End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45

Course Designer

Dr. A. George Louis Raja

MCA263TA

ELECTIVE I: ARTIFICIAL INTELLIGENCE

3-0-0-0:100

Introduction



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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.

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Discover and Apply the various technologies used in Artificial Intelligence	K1,K3
CO 2	Observe and Discover the history of artificial intelligence (AI) and its foundations	K1, K2
CO 3	Observe and Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.	K1,K3
CO 4	Analyse and Evaluate various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.	K4.K5
CO 5	Ability to choose appropriate Knowledge based approach for problem solving.	K3,K5
CO 6	Draft, Design and create their own artificial intelligence applications for solving a real life problem	K4,K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	2	1	2	3	3	3	2	2	2.4
2	3	3	2	1	2	3	3	3	2	2	2.4
3	3	3	2	1	2	3	3	3	2	2	2.4
4	3	3	2	2	2	3	3	3	2	2	2.5
5	3	3	2	2	2	3	3	3	2	2	2.5



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6	3	3	2	2	2	3	3	3	2	2	2.5
Mean Overall Score											2.5
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20
Understand	10	10	30
Apply	10	10	10
Analyze	10	10	10
Evaluate	5	5	10
Create	5	5	20

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



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Course Content

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.



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TEXT

Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Pearson Education, 2nd Edition, 2015.

REFERENCE

1. Peter Jackson, "Introduction to Expert Systems", Third Edition, Pearson Education, 2007.
2. Stuart Russel and Peter Norvig, "AI – A Modern Approach", Second Edition, Pearson Education 2007.
3. Deepak Khemani, "Artificial Intelligence", Tata Mc Graw Hill Education 2013.

Course Designer Prof. V. Thomas Immunuel

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.

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Acquire and use the various objects or things handled in the connectivity	K1.K3



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CO 2	Learn and Practice to connect and activate the objects with procedure (domain specific).	K1,K3
CO 3	Compare and correlate the network layer model with Internet of Things layers.	K2,K4
CO 4	Observe and Apply analysis techniques on the constructed model (domain specific).	K1,K3
CO 5	Analyze and Assess IoT communication (connecting and passing data) using different architectures.	K4.K5
CO 6	Do Case study and build the Architecture and Use cases for the domain specific problems	K6, K3

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	2	3	2	3	3	2	2	2	2.5
2	3	3	2	3	2	3	3	2	2	2	2.5
3	3	3	1	2	2	3	3	1	2	2	2.2
4	3	3	1	1	2	3	3	2	2	2	2.2
5	3	3	2	2	2	3	3	2	2	2	2.4
6	2	2	2	2	2	3	3	2	2	2	2.2
Mean Overall Score											2.3
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100)
	I CA (50)	II CA (50)	
Remember	10	10	30
Understand	10	10	20
Apply	15	15	25
Analyze	5	5	10
Evaluate	5	5	5
Create	5	5	10

Participatory Assessment



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- 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

1. 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.

2. CONNECTIVITY

Communication Criteria – Access Technologies – IP as IoT Network Layer – Profiles and Compliances – Application Protocols – Transport Layer – Application Transport Methods.



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3. 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

1. Jan Ho'ller, VlasiosTsiatis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand, David Boyle, “From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence”, Elsevier, 2014.
2. Arshdeep Bahga, Vijay Madiseti, “Internet of Things- A hands-on-approach”, Universities Press, 2015.
3. Michael Miller, “The Internet of Things”, Pearson Education, 2015.

QUESTION PAPER PATTERN



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CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45



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Course Designer Prof. V. Thomas Immanuel

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.

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Recognize and recall the various tools and technologies used to develop mobile applications.	K1
CO 2	Install and interact android studio and related SDK and enabling emulator or mobile device	K2
CO 3	Apply various design components in the development of mobile applications	K3
CO 4	Identify the right user interface for mobile application	K4
CO 5	Discuss the various UI components with SQLite and establish	K5



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	database connection.	
CO 6	Develop mobile applications using various tools and platforms	K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	3	3	2	3	3	3	3	2	2.8
2	3	3	3	3	2	3	3	3	3	2	2.8
3	3	3	3	3	2	3	3	3	3	2	2.8
4	3	3	3	3	2	3	3	3	3	2	2.8
5	3	3	3	3	2	3	3	3	3	2	2.8
6	3	3	3	3	3	3	3	3	3	2	2.8
Mean Overall Score											2.8
Result											High

Assessment Pattern

Bloom's Category	Continuous Assessment Marks Allotment (50)	Term End Exam (50)
Remember	-	-
Understand	10	10
Apply	10	10
Analyze	10	10
Evaluate	10	10
Create	10	10

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, Alarm Clock and GPS.
- Design and develop application using SQLite.

Course Content



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LIST OF PROGRAMS

1. Develop an application that uses GUI components, Fonts, and Colours.
2. Develop an application that uses Layout Managers and Event Listeners.
3. Develop a native calculator application.
4. Develop an application that makes use of database.
5. Develop a native application that uses GPS location information.
6. Write an application that creates alarm clock.

REFERENCE

Reto Meier, "Professional Android 4 Application Development", Wiley Publication, 2012.

Course Designer Prof. S. Anthony Philomen Raj

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



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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

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

Time duration is 2 hrs. Each student will get a single question to be answered. The question will have two subdivisions. (2 x 25 = 50)

- First part, shall contain questions from the exercise list.
- Second part will present an unexplored problem to be solved.
- The problem should be addressed using at least 3 technical features of the respective technology stream.
- No more than three candidates should get the same question in a batch.



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End Semester Examinations

Max. Marks: 100

Time duration is 3 hrs. Each student will get a single question to be answered. The question will have two subdivisions.
(2 x 50 = 100)

- First part shall contain questions from the exercise list.
- Second part will present an unexplored problem to be solved.
- The problem should be addressed using at least 3 technical features of the respective technology stream.
- No more than three candidates should get the same question in a batch.

Course Designer Dr. A . George Louis Raja

MCA266P

PRACTICAL: COMPUTER GRAPHICS

0-0-0-4:100

OPENGL

1. Drawing Geometric Objects with Animation.
2. Viewing and Modeling Transformations.



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3. Using Colors for the Objects.
4. Using Flat Shading.
5. Using Smooth Shading.
6. Using Lighting Effect.
7. Using Material Properties.
8. Using Blending.
9. Using Antialiasing.
10. Using Fog Techniques.

DIRECTX

11. Mouse Activity.
12. Robot Example.



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QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

Time duration is 2 hrs. Each student will get a single question to be answered. The question will have two subdivisions. (2 x 25 = 50)

- First part, shall contain questions from the exercise list.
- Second part will present an unexplored problem to be solved.
- The problem should be addressed using at least 3 technical features of the respective technology stream.
- No more than three candidates should get the same question in a batch.

End Semester Examinations

Max. Marks: 100

Time duration is 3 hrs. Each student will get a single question to be answered. The question will have two subdivisions. (2 x 50 = 100)

- First part, shall contain questions from the exercise list.
- Second part will present an unexplored problem to be solved.
- The problem should be addressed using at least 3 technical features of the respective technology stream.
- No more than three candidates should get the same question in a batch.



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Course Designer Dr. K. Saravanapriya

III SEMESTER

MCA360T

PYTHON PROGRAMMING

4-0-0-100

Introduction

Python can be considered beginner-friendly, as it is a programming language that prioritizes readability, making it easier to understand and use (for novice programmers) its syntax to leap into the world of development. Python is less verbose than other programming languages, a little less wordy. Python is approachable and can be used for scripting, web scraping, and creating data sets. The code design emphasis on code readability and its syntax allows programmers to express their concepts in fewer lines of code.

The course makes to learn the scripting elements, handling various supporting methods/packages, exception handlers and different file concepts. The framework DJANGO and the database connectivity are also exposed in developing web application.

Prerequisite

- Basic knowledge in any programming language.
- Basic Database Management and Structure Query Language skills.

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Observe and practice the fundamentals of writing Python scripts and Python scripting elements.	K1,K3
CO 2	Express and Apply the concepts of file handling, exception handling and database connectivity.	K2,K3
CO 3	Apply and build the different dimensions of design and development.	K3,K6
CO 4	Devise and Design GUI applications.	K4,K6
CO 5	Draft and Create a dynamic web page using DJANGO.	K5,K6
CO 6	Devise and Develop domain based applications	K5,K6



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Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	2	3	2	3	3	2	2	2	2.5
2	3	3	2	3	2	3	3	2	2	2	2.5
3	3	3	3	2	2	3	3	1	2	2	2.4
4	3	3	2	2	2	3	3	2	2	2	2.4
5	3	3	2	1	2	3	3	2	2	2	2.3
6	3	3	2	2	2	3	3	2	2	2	2.4
Mean Overall Score											2.5
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100)
	I CA (50)	II CA (50)	
Remember	10	10	30
Understand	10	10	20
Apply	15	15	20
Analyze	5	5	10
Evaluate	5	5	10
Create	5	5	10

Participatory Assessment

- Constructing and demonstrating the program using of primitive and built-in data structures.
- Design and implement a program to solve a real world problem.
- Design and implement GUI application and how to handle exceptions and files.
- Make database connectivity in python programming language.

Course Content

1. PYTHON OBJECTS

Introduction to Python, Comparison, Comments, Operators, Variables, Classes, Modules Syntax and Style Statements, Variable Assignment, Identifiers, Basic Style Guidelines. 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.



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2. LISTS AND DICTIONARIES

Operators, Built-in Functions, List Type Built-in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples Introduction to Dictionaries, Operators, Built-in Functions, Built-in Methods, Dictionary Keys, Conditionals and Loops: if statement, else Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement, else Statement.

3. FILES, REGULAR EXPRESSION AND EXCEPTION HANDLING

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 Expression: Introduction/Motivation, Special Symbols and Characters for REs, REs and Python. What Are Exceptions? Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions.

4. DATABASE INTERACTION

SQL Database connection using python, creating and searching tables, Reading and storing config information on database, Programming using database connections, Python Multithreading: Understanding threads, Forking threads, synchronizing the threads, Programming using multithreading.

5. DJANGO: WEB DEVELOPMENT WITH PYTHON

Introduction, Creating a Django Project, Working with Templates, Working with Models, Getting a Model's Data with Querysets, Working with Django Forms.

TEXT

R. NageswaraRao, "Core Python Programming", Second Edition, Dreamtech Press, 2018

REFERENCE

1. Dr. M. Suresh Anand, Dr. R. Jothikumar, Dr. N. Vadivelan, "Python Programming", First Edition, Notion Press, 2020
2. Martin C. Brown, "The Complete Reference Python", Fourth Edition, McGraw Hill Education, 2018
3. Samuel Dauson, Aidas Bendoraitis, Arun Ravindran, "Django: Web Development with Python", Packt Publishing Ltd, 2016.
4. Allen B. Downey, "Think Python", O'Reilly Media, 2016.
5. Amit Ashok Kamthane, Ashok NamdevKamthane, "Programming and Problem Solving with Python", First Edition, McGraw Hill HED, 2017.
6. SakisKasampalis, Quan Nguyen, Dr Gabriele Lanaro, "Advanced Python Programming", Ingram short title, 2019.

QUESTION PAPER PATTERN



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CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45

Course Designer

Prof. V. Thomas Immanuel

MCA361T

BLOCK CHAIN TECHNOLOGY

3-1-0-0:100

Introduction

Blockchain is the backbone Technology of Digital CryptoCurrency BitCoin. The blockchain is a distributed database of records of all transactions or digital event that have been executed and shared among participating parties. Each transaction verified by the majority of participants of the system. One of the famous use of Blockchain is Bitcoin. The bitcoin is a cryptocurrency and is used to exchange digital assets online. Bitcoin uses cryptographic proof instead of third-party trust for two parties to execute transactions over the internet.

This course aims to deliver the basics of Blockchain technology with its architecture, outlines the security mechanisms applied in blockchains, describes the bitcoin technology infrastructure, illustrates the bitcoin payments and explain other applications of blockchain technology.



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Prerequisite

Basics on digital transaction, Internet Architecture, Security Protocols.

Course Outcomes

At the end of the course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO1	Observe and Explain the architecture of a blockchain network.	K1, K2
CO2	Observe and Apply the basics of decentralization.	K1,K3
CO3	Discuss and Practice the basics of security.	K1,K3
CO4	Differentiate and Use DES and AES algorithms in blockchain.	K1,K3
CO5	Correlate and Apply the bitcoin infrastructure with blockchain.	K3, K4
CO6	Demonstrate and Use the bitcoin transaction life cycle.	K2,K3
CO7	Observe, Elicit and Classify the bitcoin payment infrastructure.	K1,K2,K3
CO8	Correlate and Utilize the types of digital wallets.	K3,K4
CO9	Observe and Classify the application of blockchain in Internet of Things.	K1,K2
CO10	Discuss and Justify the application of blockchain in Government sector.	K2, K5

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	2	2	2	3	2	3	3	3	2	2	2.5
2	2	2	3	3	3	2	3	3	2	2	2.6
3	2	3	2	3	2	3	3	2	3	2	2.5
4	3	2	2	3	2	3	3	3	2	2	2.5
5	3	2	2	3	2	3	3	3	2	2	2.6
6	3	2	2	2	2	3	3	2	2	2	2.4
Mean Overall Score											2.5
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	



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Remember	20	20	30
Understand	20	20	30
Apply	5	5	25
Analyze	5	5	15
Evaluate	-	-	-
Create	-	-	-

Participatory Assessment

- Quiz on basics of Blockchain architecture
- Quiz on basics of Bitcoin architecture
- Problem Solving in Symmetric Ciphers
- Problem Solving in Asymmetric Ciphers
- Discussions on the types of bitcoin payments
- Discussions on Applications of Blockchain

Course Content

1.BLOCKCHAIN



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Introduction to Blockchain – Various technical definitions of blockchain- generic elements of a blockchain – features of a blockchain – types of blockchain – decentralization – decentralization using blockchain – methods of decentralization.

2. SYMMETRIC AND PUBLIC KEY CRYPTOGRAPHY

Cryptography – confidentiality – integrity – authentication – non-repudiation – cryptographic primitives- symmetric cryptography – stream cipher – block cipher – Data Encryption Standard (DES) – Asymmetric cryptography – public and private keys – RSA – Encryption and Decryption using RSA.

3. INTRODUCING BITCOIN

Bitcoin definition – Transaction – Transaction Life cycle – Transaction structure – Blockchain – structure of a block – structure of a block header – the Genesis Block – Mining.

4. BITCOIN NETWORK AND PAYMENTS

The Bitcoin network- wallets – wallet types - Bitcoin payments- bitcoin investments and buying and selling bitcoins.

5. BLOCKCHAIN-OUTSIDE OF CURRENCIES

Internet of Things – Physical object layer – Device layer – Network layer – Management layer – Application layer – Government – Border control – voting – Citizen identification – Health – Finance – Insurance – Financial Crime Prevention.

TEXT

Imran Bashir, “Mastering Blockchain”, Second Edition, PACKT Publication.

REFERENCE

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction”, Princeton University Press, 2016.
2. Roger Wattenhofer, “The Science of the Blockchain”, CreateSpace Independent Publishing Platform, 2016.
3. Melanie Swan, “Blockchain - Blueprint for a New Economy”, O’Reilly Media, Inc., 2015.
4. Abhijit Das and VeniMadhavan C. E., “Public-Key Cryptography: Theory and Practice”, Pearson Education India, 2009.



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QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45



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Course Designer Dr. A . George Louis Raja

MCA362T

OPEN SOURCE FRAMEWOKS

3-0-1-0:100

Introduction

This course will enable you to build real-world, dynamic web sites using PHP and AngularJS framework. This course will covers Spring's Core components, POJO class, Spring Web MVC, Annotation-based (@Component), AOP and Spring tags, . It also covers integration of Spring JDBC Templates with Java EE Web applications.

Prerequisite

- Familiarity with basics of PHP, JSP and Java Bean

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Describe and Discuss the necessity of open source framework in PHP and Java.	K1,K2
CO 2	Observe and Elicit the basics of MVC concepts in AngularJS, Laravel and Spring Web.	K1,K2
CO 3	Observe and practice the knowledge of frameworks in the development of web applications	K1,K3,K6
CO 4	Analyse and Evaluate the performance of web frameworks.	K4,K5
CO 5	Ability to choose appropriate framework and practice them in real time problem applications.	K3,K4



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CO 6	Draft and develop web application using open source framework.	K4,K6
------	--	-------

Mapping of CO with PO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	2	3	2	3	3	3	2	2	2.6
2	3	3	2	3	2	3	3	3	2	2	2.6
3	3	3	2	3	2	3	3	3	2	2	2.6
4	3	3	2	3	2	3	3	3	2	2	2.6
5	3	3	2	3	2	3	3	3	2	2	2.6
6	3	3	2	3	2	3	3	3	2	2	2.6
Mean Overall Score											2.6
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20
Understand	10	10	30
Apply	10	10	10
Analyze	10	10	10
Evaluate	5	5	10
Create	5	5	20

Participatory Assessment

- Application development using PHP and MySQL with AngularJS.
- Customize shopping cart web site and creating admin panel using Laravel Framework.
- Application development using Spring JDBC Template.
- Generating Jasper Reports



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Course Content

1. PHP WITH MYSQL AND ANGULAR JS

Accessing Your MySQL Database from the Web with PHP – Introduction to AngularJS - Angular Modules and Controllers - Input Validation - Data Binding and Templates - AngularJS Services - Interacting with Server - AngularJS, PHP and MySQL.

2. LARAVEL BASICS

Setting Up a Laravel Development Environment: System Requirements, Composer, Local Development Environments, Creating a New Laravel Project, Laravel's Directory Structure, Configuration An Introduction to Artisan, Basic Artisan commands .Router and Controllers: Route Definitions, Route



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Groups, Views, Controllers, Route Model Binding, Route Caching, Form Method Spoofing, CSRF Protection, Redirects, Aborting the Request, Custom Responses

3. ADVANCED LARAVEL AND API

Collecting and Validating User Data, Injecting a Request Object, Route Data, Uploaded Files, Validation, Form Requests, Eloquent Model Mass Assignment, versus Auth Controller Database Eloquent: configuration, Migration, Seeding, Query Builder, Advanced LARAVEL Request and Response: Laravel's Request Lifecycle, The Request Object, The Response Object, Laravel and Middleware Writing APIs : The Basics of REST - Like JSON APIs, Controller Organization and JSON Returns, Reading and Sending Headers, Eloquent Pagination, Sorting and Filtering, Transforming Results.

4. SPRING WITH MVC

Spring Framework Fundamentals: The Spring Framework, Dependency Injection, Application Context, Component-Scanning, Aspect-Oriented Programming (AOP) – Spring MVC Architecture: Simple Spring MVC Program – POJO Development - Implementing Controllers: Introducing Controllers, Interface-Based Controller, Annotation-Based Controller, Configuring View Controllers, Program using Controllers, ModelAttributes, PathVariable, Form Tags, Spring Tags, Type Conversion, Converter, Validating Model Attributes.

5. ADVANCED SPRING WITH MVC & REPORTING

Spring MVC with AJAX -Spring MVC with JDBC Template - Spring MVC with Hibernate -Jasper Report – Features – Reporting capabilities to java applications – Creating JRXML report – Creating Dynamic Database Report – Working Report Layout and Design Introduction to Junit.

TEXT

1. Luke Welling, Laura Thomson, "PHP and MySQL Web Development", Fourth Edition, 2010.
2. Agus Kurniawan, "AngularJS Programming by Example", Kindle Edition, 2014.

UNIT I

3. Matt Stauffer, "LARAVEL Up and Running, A framework for building modern PHP Apps", O'REILLY , Third Indian Reprint (ISBN: 978-93-5213-485-4).

UNIT II & III

4. Marten Deinum, Koen Serneels, "Pro Spring MVC: With Web Flow", 2012.

UNIT IV & V

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.
[Atleast four questions from each unit]

6 x 2 = 12



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Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45

Course Designer Prof. S. Anthony Philomen Raj



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MCA363A

ELECTIVE II: CLOUD COMPUTING

3-0-0-0:100

Introduction

Cloud computing is the on-demand availability of computer system resources, especially data storage and computing power, without direct active management by the user. Cloud computing technology gives users access to storage, files, software, and servers through their internet-connected devices: computers, smartphones, tablets, and wearables. Cloud computing providers store and process data in a location that's separate from end users.

This course introduces the core concepts of cloud computing. The course helps to gain the foundational knowledge required for understanding cloud computing and introduces some of the prominent service providers (e.g. AWS, Google, IBM, Microsoft, etc.) the services they offer, and discusses some case studies of cloud computing across industry verticals.

Prerequisite

Basic Knowledge in Computer Architecture and Networking

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Observe and Discuss the fundamental ideas behind Cloud Computing.	K1,K2
CO 2	List and Explain about cloud computing and the services that are available.	K1,K2
CO 3	Observe and Correlate the major three services IaaS, SaaS and PaaS.	K1,K4
CO 4	Observe the various storage services (like amazon S3) and able to practice them.	K1,K3
CO 5	Understand the benefits Cost Effectiveness of Cloud computing and Analyze the Cost Effectiveness.	K2,K4
CO 6	Analyze and Evaluate the performance of Cloud Computing	K4,K5

Mapping of CO with PO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	2	2	2	1	3	2	3	1	2	2.1
2	3	3	2	3	1	3	3	1	1	2	2.2



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3	3	2	2	2	1	3	2	1	1	1	1.8
4	3	3	2	3	1	3	2	1	2	2	2.2
5	3	3	3	2	1	3	2	1	1	2	2
6	3	2	2	3	1	3	2	1	2	1	2
Mean Overall Score											2.05
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20
Understand	10	10	30
Apply	10	10	20
Analyze	10	10	20
Evaluate	5	5	5
Create	5	5	5

Participatory Assessment

- Quiz on basics of Cloud Computing.
- Working on the free cloud service provider.
- Working on Free PaaS like IBM



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Course Content

1. CLOUD COMPUTING BASICS

Cloud computing Overview – Cloud components, Infrastructure, Services - Applications – Storage, Database services - Intranets and the cloud – components, Hypervisor applications - First Movers in the Cloud - Your Organization and Cloud Computing - When you can use Cloud computing, Benefits, Limitations, Security Concerns, Regulatory Issues.

2. CLOUD COMPUTING SERVICE PROVIDER

Cloud Computing with the Titans -Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM-The Business case for going to the Cloud -Cloud Computing services- Infrastructure as a Service, Platform as a Service, Software as a Service, Software plus services, How applications help your business, Deleting your data center.

3. CLOUD COMPUTING TECHNOLOGY I

Hardware and Infrastructure Clients – Mobile, thin, Thick – Security - Data leakage, Offloading work, Logging, Forensic, Development, Auditing - Network – Basic public Internet, The accelerated Internet, Optimized Internet overlays, Cloud providers, cloud consumers, Services - Accessing the Cloud-Platforms – Web Application framework, Web hosting service, Proprietary methods - Web Applications, Web APIs - What are APIs, How APIs work, API Creators - Web Browsers.

4. CLOUD COMPUTING TECHNOLOGY II

Cloud Storage – Overview - The Basics, storage as a service, Providers, security, Reliability, advantages, cautions, Outages, Theft - Cloud storage providers - Standards - Application – Communication, Security - Client – HTML, Dynamic HTML, JavaScript - Infrastructure – Virtualization, OVF - Service – Data, Web service.



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5. CLOUD COMPUTING AT WORK

Software as a Service -Overview -Advantages-Software Considerations-Vendor Advantages -Limitations - Driving Forces -Popularity -Virtualization Benefits -SaaS and SOA -Economic Impact-Company Offerings - Intuit -Google -Microsoft -IBM -Industries - Software plus Services-Overview-Pros -Cons -Vendors - Mobile Device Integration -Google Android -Providers-Adobe AIR -Apple iPhone SDK -Microsoft Online - Hybrid Model -Partnership -Active Directory.

TEXT

Anthony TVelte, Toby JVelteand Robert Elsenpeter, “Cloud Computing – A Practical Approach”, Tata McGraw Hill Education Pvt Ltd, 2010.

REFERENCE

1. Syed A.Ahson and Mohammed Ilyas, “Cloud Computing and Software Services: Theory and Techniques”, CRC Press, Taylor and Francis Group, 2010.
2. Judith Hurwitz, Robin Bloor, Marcia Kaufman and Fern Halper, “Cloud Computing for Dummies”.Wiley- India Edition, 2010.
3. Ronald L. Krutz and Russell Dean Vines, “Cloud Security: A Comprehensive Guide to Secure Cloud Computing”. Wiley Publishing, Inc., 2012.
4. Barrie Sosinky, “Cloud Computing: Bible”, First Edition, Wiley Publishing, Inc., 2011.

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20



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End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45

Course Designer Prof. R.Veeraragavan

MCA363B

ELECTIVE II: SOCIAL NETWORK ANALYSIS

3-0-0-100

Introduction

Social Network Analysis (SNA) has become a widely applied method in research and business for inquiring the web of relationships on the individual, organizational and societal level.

The course offers a comprehensive training in social network analysis, covering theories, methods and applications of social networks in social sciences. It provides the basics of social network analysis at the network level, node level and at the sub-graph. It enables the students to learn about how relationships between people, artifacts, and ideas within learning settings can be analyzed and interpreted through social network analysis.



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Prerequisites:

Basics of Networks and XML.

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Understand the basic concepts and theories of social network analysis.	K1, K2
CO 2	Observe and Explain about knowledge representation using ontology.	K2
CO 3	Observe and Apply the concepts of semantic web and related applications.	K1, K3
CO 4	Model, Evaluate and Analyse social network data.	K4,K5,K6
CO 5	Discuss and Determine the ways in which networks can contribute to the explanation of social, political, economic and cultural phenomena.	K2,K5
CO 6	Device and Create knowledge representation on semantic web.	K4,K6

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	1	2	2	2	3	1	2	2	2	2
CO2	3	2	3	3	3	3	2	3	2	2	2.6
CO3	3	3	3	3	3	3	2	2	3	2	2.7
CO4	3	2	3	2	2	3	2	2	3	3	2.5
CO5	3	2	3	2	2	3	2	3	2	2	2.4
CO6	3	2	2	3	3	3	2	3	3	3	2.7
Mean Overall Score											2.5
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20



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Understand	10	10	20
Apply	10	10	20
Analyze	10	10	20
Evaluate	5	5	10
Create	5	5	10

Participatory Assessment

- Problem Solving in network level, node level and subgraph level.
- Online Quiz
- Create a knowledge representation for a given problem.



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Course Content

1. INTRODUCTION TO SEMANTIC WEB

Limitations of current Web, Development of Semantic Web, Emergence of the Social Web.

2. SOCIAL NETWORK ANALYSIS

Development of Social Network Analysis - pythonKey concepts and measures in network analysis.

3. ELECTRONIC SOURCES FOR NETWORK ANALYSIS

Electronic discussion networks, Blogs and online communities - Web-based networks.

4. KNOWLEDGE REPRESENTATION ON THE SEMANTIC WEB

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation –Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language.

5. MODELLING AND AGGREGATING SOCIAL NETWORK DATA

State-of-the-art in network data representation - Ontological representation of social Individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data.

TEXT

Peter Mika, "Social Networks and the Semantic Web", First Edition, Springer 2007.

REFERENCE

1. Guandong Xu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
2. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.



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QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** the Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45



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Course Designer Dr. K. Saravanapriya

MCA364A ELECTIVE III: ENTERPRISE RESOURCE PLANNING 3-0-0-100

Introduction

An ERP is a system that conceptually integrates many traditional management functions and allows information to flow between them. It is designed to model and automate basic processes across the organization over a centralized database and eliminates the need of disparate systems maintained by various units of the organization.

This course gives a general understanding of Enterprise Resource Planning (ERP) software systems and their significance in businesses. It covers the fundamentals of technologies to be integrated into the system and discusses why they are beneficial to businesses. It also touches the business modules, approaches taken in ERP implementation, post implementation and the future enhancement. The case study would enable the learner to understand business process and the business benefit of ERP.

Prerequisite

Basic understanding on the business processes and how different company units operate.

Course Outcomes

At the end of the course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Observe and Comprehend the knowledge of business benefits of implementing the enterprise computing techniques in the industries.	K1,K2



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CO 2	Examine and Assess the ERP package's technology and how they help to streamline the company process.	K3, K5
CO 3	Analyse , Evaluate and integrate ERP into various business modules.	K4,K5,K6
CO 4	Evaluate and comprehend the ERP system's pre and post implementation phases.	K6, K2
CO 5	Draft and Design ERP with future e-commerce / internet and compare the benefits of re-engineered business process through a case study.	K5, K6
CO 6	Recognize and Observe the importance of ERP package through case studies	K1,K2

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	1	2	1	3	2	2	2	1	2
2	3	3	1	2	1	3	1	3	2	1	2
3	3	3	2	2	1	3	2	2	2	1	2.1
4	3	2	1	2	1	3	3	2	2	1	2
5	3	3	1	1	1	3	3	1	1	1	1.8
6	2	2	1	1	1	3	2	2	2	1	1.7
Mean Overall Score											2
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	15
Understand	10	10	20
Apply	10	10	15
Analyze	10	10	20
Evaluate	5	5	10
Create	5	5	20

Participatory Assessment

- Explore business Process and the need for ERP
- Identify the technologies that could be integrated into ERP and bring out the business benefits.



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- Explain the business modules of ERP and how they can assist the enterprise.
- Examine the ERP's pre- and post-integration of ERP with the business.
- Case study of re-engineered business process with ERP

Course Content

1. INTRODUCTION

Enterprise - An Overview – Introduction to ERP – Basic ERP Concepts – Justifying ERP Investments – Risks of ERP – Benefits of ERP.

2. ERP AND TECHNOLOGY

ERP and Related Technologies – Business Intelligence – E-Commerce and E-Business – Business Process Reengineering – Data Warehousing – Data Mining – On-line Analytical Processing – Product Life Cycle Management – Supply Chain Management – Customer Relationship Management – Advanced Technology and ERP Security.

3. BUSINESS MODULES AND ERP MARKET



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Business Modules of an ERP Package – Financials – Manufacturing (Production) – Human Resources – Plant Maintenance – Materials Management – Quality Management – Marketing – Sales, Distribution and Service – ERP Vendors: SAP AG – Oracle Corporation – JD Edwards - Microsoft Dynamics.

4. ERP IMPLEMENTATION AND POST IMPLEMENTATION

ERP Implementation Life Cycle – Implementation Methodologies – ERP Project Teams – Process Definition – Employee and Employee Resistance – Training and Education – Success & Failure Factors of an ERP Implementation – Operation and Maintenance of the ERP System – Measuring the Performance of the ERP System – Maximizing the ERP System.

5. ERP PRESENT AND FUTURE

Turbo Charge the ERP System – Enterprise Application Integration (EAI) – ERP and E-Business – ERP, Internet, and WWW – ERP II – ERP and Total Quality Management – Future Directions and Trends in ERP - ERP Case studies: SAP at Coca-Cola Hellenic Bottling Company S.A – SAP at TATA Iron and Steel Co Ltd (TISCO) – Oracle JD Edwards at OSPAP – Microsoft Dynamics at Godrej Infotech Ltd (GITL).

TEXT

1. Alexis Leon, "ERP Demystified", Third Edition Tata McGraw-Hill, 2014.

REFERENCES

1. Jagan Nathan Vaman, "ERP in Practice", Tata McGraw-Hill, 2008.
2. Alexis Leon, "Enterprise Resource Planning", Second Edition, Tata McGraw-Hill, 2008.
3. Vinod Kumar Grag and N.K. Venkitakrishnan, "ERP- Concepts and Practice", Prentice Hall of India, 2006.
4. Mahadeo Jaiswal and Ganesh Vanapalli, "ERP", Macmillan India, 2006.
5. Summer, "ERP", Pearson Education, 2008.

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.



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[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45



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Course Designer Prof. A. John Martin

MCA364B

ELECTIVE III: BIG DATA

3-0-0-0:100

Introduction

Big Data is for those who want to become conversant with the terminology and the core concepts behind big data problems, applications, and systems. It is for those who want to start thinking about how Big Data might be useful in their business or career.

This course provides an exposure to one of the most common frameworks Hadoop, NoSQL database MongoDB which has made big data analysis easier and more accessible and increasing the potential for data to transform in any processable form. Learning map-reducer concept brings openings in data analysis process.

Prerequisite

- Data Structures and Query Processing Techniques.
- Database representation such as RDBMS and XML form.

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Bring out and Classify the data grouping mechanism in structured, semi-structured, and unstructured form.	K1,K2
CO 2	Observe and Give examples for how big data are organized (framework/architecture) and made used by the enterprise's (domain specific).	K1, K2
CO 3	Observe and Practice the un-structural data representation using the NoSQL database MongoDB (domain specific).	K1,K2, K3
CO 4	Infer and Device the big data file structure format using the Map-Reducer architecture style.	K1, K4
CO 5	Generalize and Practice the Map-Reducer procedure on the specified problem.	K2,K3
CO 6	Analyze and Evaluate the real data samples using Map Reducer procedure	K4.K5

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)	Programme Specific Outcomes (PSO)	Mean
----	-------------------------	-----------------------------------	------



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	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Scores of COs
1	3	3	2	3	2	3	3	2	2	2	2.5
2	3	3	2	3	2	3	3	2	2	2	2.5
3	3	3	1	1	2	3	3	1	2	2	2.1
4	3	3	2	2	2	3	3	2	2	2	2.4
5	3	3	1	1	2	3	3	2	2	2	2.2
6	3	3	2	1	1	3	3	2	2	2	2.2
Mean Overall Score											2.3
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (50)
	I CA (50)	II CA (50)	
Remember	10	10	30
Understand	10	10	25
Apply	15	15	25
Analyze	5	5	10
Evaluate	5	5	10
Create	5	5	-

Participatory Assessment

- Making to practice the unstructured database MongoDB by forming the teams among the students. Each team will assign one domain specific problem.
- Developing the prototypes models on the domain specific problem using MongoDB.
- Map-Reduce procedure construction is get diagnosed and asked to construct the same on the assigned domain specific problem.



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Course Content

1. INTRODUCTION TO BIG DATA

Types of Digital Data – Introduction to Big Data: Characteristics of Data - Big data Analytics – Classification of Analytics – Top Challenges facing in Big Data – Data Sciences – Few Top Analytics Tools.

2. BIG DATA TECHNOLOGY

Basics of NoSQL – Basics of Hadoop – Introduction to MongoDB – Terms used in RDBMS and MongoDB – Data Types used MongoDB – MongoDB Query Language.

3. HADOOP

RDBMS versus Hadoop – Distributed Computing Challenges – Hadoop Overview – Use Case of Hadoop – Hadoop Distribution – HDFS – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN.

4. MAPREDUCE FRAMEWORKS

The Configuration API – Configuring the Development Environment – Writing a Unit Test – Running Locally on the Unit Test – Running a Cluster – Turning a Job – How MapReduce Works : Anatomy of a MapReduce Job Run – Failures – Job Scheduling – Shuffle and Sort –Task Execution.

5. MAPREDUCE TYPES, FORMATS AND FEATURES

MapReduce Types and Formats: MapReduce Types - Input Formats - Output Formats – Map Reduce Features – Counters – Sorting – Joins - Side Data Distribution – MapReduce Library Classes.



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TEXT

1. Seema Acharya and Subhashini Chellappan, "Big Data and Analytics", Wiley Publications, 2015.

UNIT 1 - Chapter 1 - 3

UNIT 2 - Chapter 4 and 6

UNIT 3 - Chapter 5

2. Tom White, "Hadoop the Definitive Guide", O'Reilly Publications, Second Edition. 2010.

UNIT 4 - Chapter 5 and 6

UNIT 5 - Chapter 7 and 8

REFERENCE

Vignesh Prajapati, "Big Data Analytics with R and Hadoop", Packt Publishing, 2013.

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:



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Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45

Course Designer Prof. V. Thomas Immanuel

PRACTICAL : PYTHON

0-0-0-6:100

1. Installation of Python, and learning interactively at command prompt and writing simple programs.
2. Learning the conditions and iterations in Python by writing and running simple programs.
3. Random number generations, and problems based on random numbers.
4. Handling tuples and exercises based on tuples.
5. Functions and files.
6. Linear and binary search.



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7. Handling tokens.
8. Finding unique, and duplicate items of a list.
9. Matrix addition, multiplications, and unity matrix.
10. Text processing using python.
11. Programs related to python libraries like Numpy, Pandas, Scipy etc.
12. Django with Templates and Forms.

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

Time duration is 2 hrs. Each student will get a single question to be answered. The question will have two subdivisions. (2 x 25 = 50)

- First part, shall contain questions from the exercise list.
- Second part will present an unexplored problem to be solved.
- The problem should be addressed using at least 3 technical features of the respective technology stream.
- No more than three candidates should get the same question in a batch.

End Semester Examinations

Max. Marks: 100

Time duration is 3 hrs. Each student will get a single question to be answered. The question will have two subdivisions. (2 x 50 = 100)

- First part, shall contain questions from the exercise list.
- Second part will present an unexplored problem to be solved.
- The problem should be addressed using at least 3 technical features of the respective technology stream.
- No more than three candidates should get the same question in a batch.

Course Designer Prof. V. Thomas Immanuel

IV SEMESTER

MCA466A ELECTIVE IV: DATA ANALYTICS WITH R PROGRAMMING 3-0-0-:100

Introduction



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This course is designed to cover the fundamentals of data analytics and how to apply them to real-time data analysis. The goal of the course is to impart how to use statistical approaches for data exploration. It also emphasizes the fundamentals of R programming and the available packages for data analytics.

Prerequisite

Fundamental concepts and understanding of any programming language.

Course Outcomes

On the successful completion of the course, students will be able to:

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Recognize and Explain the nature, source and the applications of data analytics	K1, K2
CO 2	Observe and Understand the basics on R programming language and apply suitable techniques for data analytics.	K1,K2
CO 3	Visualize and Report the data from different sources	K2,K3
CO 4	Draft and Develop proficiency with statistical analysis of data	K4,K5
CO 5	Demonstrate skill in data management and conclude with the result	K3, K6
CO 6	Create and Classify the data for analytics through active and reinforcement learning	K4, K5

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	2	1	3	1	3	3	1	1	1	1.9
2	3	3	1	3	1	3	3	2	1	1	2.1
3	3	2	1	2	1	3	3	2	2	1	2
4	3	2	1	2	1	3	3	2	1	1	1.9
5	3	3	1	2	1	3	3	2	1	1	2
6	3	3	1	2	1	3	3	3	1	1	2
Mean Overall Score											2



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	Result	High
--	--------	------

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20
Understand	10	10	20
Apply	10	10	10
Analyse	10	10	10
Evaluate	5	5	15
Create	5	5	25

Participatory Assessment

- Explain the nature, source and application of data analytics
- With suitable example demonstrate the fundamental building block of R programming
- Apply the techniques and packages required for handling data and visualize them.
- Apply various statistical / learning techniques for data analytics
- Identify the suitable technique to generate data set for "Departmental Store" and apply statistical methods to infer the future sale of the store.



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Course Content

1. INTRODUCTION TO DATA ANALYSIS

Overview of Data Analytics, Need of Data Analytics, Nature of Data, Classification of Data: Structured, Semi-Structured, Unstructured, Characteristics of Data, Applications of Data Analytics.

2. R PROGRAMMING BASICS

Overview of R programming, Environment setup with R Studio, R Commands, Variables and Data Types, Control Structures, Array, Matrix, Vectors, Factors, Functions, R packages.

3. DATA VISUALIZATION USING R

Reading and getting data into R (External Data): Using CSV files, XML files, Web Data, JSON files, Databases, Excel files. Working with R Charts and Graphs: Histograms, Boxplots, Bar Charts, Line Graphs, Scatterplots, Pie Charts

4. STATISTICS WITH R

Random Forest, Decision Tree, Normal and Binomial distributions, Time Series Analysis, Linear and Multiple Regression, Logistic Regression, Survival Analysis

5. PRESCRIPTIVE ANALYTICS

Creating data for analytics through designed experiments, Creating data for analytics through active learning, Creating data for analytics through reinforcement learning

TEXT

1. "An Introduction to R, Notes on R: A Programming Environment for Data Analysis and Graphics".
2. W. N. Venables, D.M. Smith and the R Development Core Team. Version 3.0.1 (2013-05-16). URL: <https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf> 5.



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REFERENCE

1. Jared P Lander, R for everyone: advanced analytics and graphics, Pearson Education, 2013
2. Dunlop, Dorothy D., and Ajit C. Tamhane. Statistics and data analysis: from elementary to intermediate. Prentice Hall, 2000.
3. G Casella and R.L. Berger, Statistical Inference, Thomson Learning 2002.
4. P. Dalgaard. Introductory Statistics with R, 2nd Edition. (Springer 2008)
5. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer
6. Hastie, Trevor, et al. The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.
7. Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for engineers. John Wiley & Sons, 2010
8. Joseph F Hair, William C Black et al , "Multivariate Data Analysis" , Pearson Education, 7th edition, 2013.
9. Mark Gardener, "Beginning R - The Statistical Programming Language", John Wiley & Sons, Inc., 2012.
10. W. N. Venables, D. M. Smith and the R Core Team, "An Introduction to R", 2013.

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:



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Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45

Course Designer: Prof. A. John Martin

MCA466B ELECTIVE IV: DATA AND INFORMATION SECURITY 3-0-0-0:100

Introduction

Data and Information Security refers to the technique to prevent unauthorized access, use, deletion or disruption of data or information. The concept of data and 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 data and information security, outlines on the four basic principles of data and 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.

Course Outcomes



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At the end of the course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO1	Observe and Discuss the basic principles of security.	K1,K2
CO2	Observe and Apply the substitution and transposition methods.	K1,K3
CO3	Recognize and Compute symmetric ciphers	K1,K3
CO4	Tabulate and Compute Asymmetric ciphers	K1,K3
CO5	Observe , Discuss and Correlate the concept of digital signatures with security	K1,K2,K4
CO6	Recognize and Express the structure of Public Key Interfaces.	K1,K2
CO7	Observe and Explain the basic concepts in Internet Security.	K1,K2
CO8	Observe and Use the Internet Security Protocols.	K1,K3
CO9	Recognize and Operate the User Authentication Methods.	K1,K3
CO10	Recognize and Assess the architecture of kerberos.	K1,K5

Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	2	2	3	2	3	3	3	2	2	2.4
2	3	2	3	3	3	2	3	3	2	2	2.5
3	2	3	2	3	2	3	3	2	3	2	2.5
4	3	2	2	3	2	3	3	3	2	2	2.5
5	3	2	3	3	2	3	3	3	2	2	2.5
6	3	2	3	2	2	3	3	2	2	2	2.3
Mean Overall Score											2.5
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	10	20
Understand	15	15	30
Apply	15	15	30
Analyze	5	5	10
Evaluate	5	5	10
Create	-	-	-



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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



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Algorithm Types and Modes, Data Encryption Standard (DES), RC4, RC5, Blowfish, - Asymmetric Key Algorithms: Brief History of Asymmetric Key Cryptography, Overview of Asymmetric Key Cryptography.

3. RSA, DIGITAL SIGNATURES AND PKI

The RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signatures, Attacks on Digital Signature - Public Key Infrastructure (PKI): Digital Certificates, Private Key Management, PKIX Model, Public Key Cryptography Standards (PKCS).

4. INTERNET SECURITY PROTOCOLS

Basic Concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP) , Secure Electronic Transaction (SET), SSL versus SET, 3-D Secure Protocol, Email Security.

5. USER AUTHENTICATION AND KERBEROS

Authentication Basics, Passwords, Authentication Tokens, Certificate-based Authentication, Key Distribution Center (KDC), Security Handshake Pitfalls, Single Sign on (SSO) Approaches.

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.

QUESTION PAPER PATTERN



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CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20

Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45



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Course Designer Dr. A . George Louis Raja

MCA467A

ELECTIVE V: DATA MINING TECHNIQUES

3-0-0-0:100

Introduction:

Data mining is the analysis of data and the use of software techniques for finding patterns and regularities in sets of data.

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.

Course Outcomes:

At the end of this course, the students will be able to

CO. No.	CO - Statement	Cognitive Level
CO 1	Understand the fundamentals of Data Warehouse and Data Mining	K1, K2
CO 2	Observe and Discuss the concepts of preprocessing, association mining, clustering, classification and Regression	K1,K2
CO 3	Recognize and Explore various tools and its uses for data analysis	K1,K2
CO 4	Apply and analyze the clustering and classification techniques for a specific problem.	K4, K5
CO 5	Recognize and Solve real-world problems in business and scientific information using data mining.	K1,K4
CO 6	Recognize, Device and Build statistical predictive models using various techniques such as neural networks, decision trees and logistic regression.	K1,K5,K6

Mapping of CO with PO



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CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	3	2	2	2	3	3	2.4
CO2	3	3	3	3	3	3	2	3	2	3	2.8
CO3	3	3	3	3	3	3	2	3	3	2	2.8
CO4	3	2	3	2	3	3	2	2	3	3	2.6
CO5	3	2	3	2	3	3	2	3	3	2	2.6
CO6	3	2	2	3	3	3	2	3	3	3	2.7
Mean Overall Score											2.6
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100) Marks Allotment
	I CA (50)	II CA (50)	
Remember	10	5	15
Understand	10	5	15
Apply	10	15	25
Analyze	10	15	20
Evaluate	5	5	15
Create	5	5	10

Participatory Assessment

- Problem Solving in Association, classification and Clustering algorithms.
- Online Quiz
- Apply the KDD process for a specific problem.



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Course Content

1. INTRODUCTION TO DATA WAREHOUSING AND DATA MINING

Data Warehouse – Definition – Multidimensional Data model – Data Cube – Dimensional Modelling – Lattice of Cuboids – Summary Measures – OLAP Operations – Slicing – Dicing – Drilling – Data Warehousing Architecture – 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.

2. ASSOCIATION RULES

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 A Priori – Partition Algorithm – Pincer-Search Algorithm – Dynamic Item-set counting algorithm.

3. CLUSTERING TECHNIQUES



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Introduction – Clustering Paradigms – Hierarchical vs Partitioning – Numeric vs Categorical – Partitioning Algorithms – k-Means Algorithms- PAM- Iterative Selection of Medoids – CLARA – CLARANS – Hierarchical Clustering – DBSCAN – BIRCH – CURE- Categorical Clustering Algorithms – STIR – ROCK.

4. CLASSIFICATION AND PREDICTION

Classification – Basic Concepts – Decision Tree Induction – Attribute Selection Measures – Tree Pruning – Scalability and Decision tree induction – Visual mining for decision tree induction – Bayes' Classification methods – bayes' theorem – Naïve bayes' classification – Rule Based Classification – Using IF_THEN rules for classification – Rule extraction from a decision tree- Rule induction using a sequential covering algorithm.

5. DATA MINING TRENDS

Mining Complex Data Types – Mining Sequence Data, Time series, symbolic sequences and Biological sequences – Other methodologies of Data mining – Statistical Data Mining – Views on Data mining foundations – Visual and Audio Data mining – Data Mining Applications – Data Mining for Financial Data Analysis – Retail and Telecommunication industries – Science and Engineering – Intrusion detection and Prevention – Recommender Systems – Data mining and society – Ubiquitous and invisible data mining – Privacy, Security and Social impacts of Data mining.

TEXT BOOKS

1. Data Mining Techniques, Arun K Pujari, University Press, 2001

UNIT 1: Chapter 2, 3

UNIT 2: Chapter 4

UNIT 3: Chapter 5

2. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2011.

UNIT 4 : Chapter 8.1, 8.2, 8.4, 8.4

UNIT 5: 13.1,13.2,13.3,13.4

REFERENCE BOOK

Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2003.



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QUESTION PAPER PATTERN

CA Tests

Max. Marks: 60

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **SIX** Questions out of EIGHT Questions.



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[At least four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** Questions

[At least three questions from each unit. Internal Choice, three questions] 3 x 8 = 24

Section C Answer **TWO** Questions out of THREE Questions.

[At least one question from each unit]

2 x 12 = 24

End-Semester Examinations

Theory

Max. Marks: 60

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **EIGHT** Questions out of TEN Questions.

[At least two question from each unit]

8 x 2 = 16

Section B Answer **ALL** Questions.

[Internal Choice, one question from each unit]

5 x 4 = 20

Section C Answer **THREE** Questions out of FIVE Questions.

[At least one question from each unit]

3 x 8 = 24

Course Designer

Dr. K. Saravanapriya



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MCA467B

ELECTIVE V: GAME PROGRAMMING

3-0-0-100

Introduction

Game programming is the software development of video games. Game programming requires substantial skill in software engineering and computer programming in a given language, as well as specialization in one or more of the following areas: simulation, computer graphics, artificial intelligence, physics, audio programming, and input. For massively multiplayer online games (MMOGs), knowledge of additional areas such as network programming and database programming are required.

The course explores principles of 2D and 3D graphics, animation, sound, and collision detection using torque game engine model/frameworks based on C language. Doing things by yourself is extremely fun and resourceful and gives you a great understanding of graphics programming.

OpenGL is a graphics API and not a platform of its own, it requires a language to operate in and it's the choice C++.

Prerequisite

- Graphics primitive type shapes, model and mathematical operation.
- Creative and artistic flair. Understanding of colour and form. Aptitude for drawing.
- Commitment to understanding and using new technology. Aptitude for computing. Able to work as part of a team.

Course Outcomes

At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Describe and Discuss the principles of 2D and 3D graph images and handling of shapes.	K1,K2
CO 2	Observe and Demonstrate the basics of game design and development.	K1,K2
CO 3	Analyze and Evaluate the simple games in internet and customized the same and get executed.	K4.K5
CO 4	Apply and develop simple game using C, C++, languages.	K3,K6
CO 5	Draft and Design a new game	K5,K6
CO 6	Observe, Recognise and Perceive to deploy the game in internet of as desktop publisher	K1,K2,K5



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Mapping of CO with PO and PSO

CO	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
1	3	3	2	3	2	3	3	2	2	2	2.5
2	3	3	2	3	2	3	3	2	2	2	2.5
3	3	3	3	2	2	3	3	1	2	2	2.4
4	3	3	2	2	2	3	3	2	2	2	2.4
5	3	3	2	1	1	3	3	2	2	2	2.2
6	3	3	2	2	2	3	3	2	2	2	2.4
Mean Overall Score											2.4
Result											High

Assessment Pattern

Bloom's Category	CA Tests (Marks Allotment)		Term End Exam (100)
	I CA (50)	II CA (50)	
Remember	15	10	30
Understand	10	10	20
Apply	15	15	30
Analyze	5	5	5
Evaluate	5	5	10
Create	-	5	5

Participatory Assessment

- Game problem-solving skills were designed based on instructional theories.
- A child-centered participatory evaluation approach was adopted.
- The three stages were play testing, heuristic evaluation and participatory design.
- Using storyboarding, the students built low-fidelity prototypes of the game.



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Course Content

1. INTRODUCTION TO 3D GAME DEVELOPMENT

The Computer Game Industry - 3D Game Genres and Styles - Game Platforms - Game Developer Roles - Publishing Your Game - Elements of a 3D Game - Game Engine – Scripts- Graphical User Interface – Models – Textures - Sound – Music - Support Infrastructure - The Torque Game Engine – Descriptions.

2. INTRODUCTION TO PROGRAMMING

Programming Concepts - Expressions - Variables - Operators – Loops – Functions - Conditional Expressions – Branching - Debugging and Problem Solving.

3. 3D PROGRAMMING CONCEPTS

3D Concepts - Coordinate Systems - 3D Models .- 3D Shapes - Displaying 3D Models- Transformation- Rendering - Scene Graphs - 3D Audio - 3D Programming - Programmed Translation - Programmed Rotation - Programmed Scaling - Programmed Animation - 3D Audio.

4. GAME PROGRAMMING

Torque Script – Strings - Objects - DataBlocks - Game Structure - Server versus Client Design Issues - Common Functionality - Preparation -Root Main -Control Main –Initialization –Client -Server -Player - Running Emaga4.

5. GAME PLAY

The Changes – Folders - Modules -Control Modules - control/main.cs - Client Control Modules - Server Control Modules
Case study - Running Emaga5.

TEXT



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Kenneth C. Finney, "3D Game Programming", Premier Press, 1st Edition, 2004

REFERENCE

Fletcher Dunn, "3D Math Primer for Graphics and Game Development", CRC Press, 2nd Edition, 2011, ISBN-13: 978-1568817231.

QUESTION PAPER PATTERN

CA Tests

Max. Marks: 50

The time duration for the examination is 2 Hrs. The question paper format is:

Section A Answer **ALL** the Questions.

[Atleast four questions from each unit]

6 x 2 = 12

Section B Answer **ALL** the Questions

[Atleast three questions from each unit. Either or Type]

3 x 6 = 18

Section C Answer **ANY TWO** Questions out of THREE Questions.

[Atleast one question from each unit]

2 x 10 = 20

End-Semester Examinations

Max. Marks: 100

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Section A Answer **ALL** the Questions.

[Atleast two questions from each unit]

10 x 2 = 20



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Section B Answer **ALL** Questions.

[Either or Type, atleast one question from each unit]

5 x 7 = 35

Section C Answer **ANY THREE** Questions out of FIVE Questions.

[Atleast one question from each unit]

3 x 15 = 45

Course Designer Prof. V. Thomas Immanuel

XVIII.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.



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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



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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

- a) *eLearning*
- b) *Data Quality Assurance*
- c) *Network and Security*
- d) *Data Analytics*
- e) *Software Metrics*
- f) *Cloud Computing*
- g) *Ontology and Semantics*
- h) *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



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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)

Technical Report (TR)	15 Marks
Research Survey (RS)	15 Marks
CA Tests	15 Marks
Regularity	5 Marks

Total 50 Marks

External Assessment

Technical Report (TR)	10 Marks
Research Survey (RS)	10 Marks
Paper Publication	15 Marks
Viva Voice	15 Marks

Total 50 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)



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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.

XIX. SOFTWARE PROJECT

a. SOFTWARE PROJECT [III SEMESTER]

- The Project work carried out by the students in the Third, and Fourth semester of MCA is individual work.
- Each student shall select a unique problem domain and develop and enhance the solution.
- Solution for the problem will be obtained by applying the technology they learnt in the previous semester.
- The solution is enhanced and stabilized by applying the technologies that they learn in the current semester.
- The solution for the problem should include DDL, DML, DCL, TCL, triggers, procedure, and function according to the need of their solution space.
- The solutions obtained in the Third, and Fourth will be considered as separate projects for evaluation. The report submitted at the end of each semester is an individual work and it has to be submitted as a PDF document.
- The student shall follow Team Software Process (TSP) model strictly for project development.
- Each student is assigned a faculty member as Project Mentor to monitor the progress of the project work.
- Different Phases of the Project work are Requirements, Analysis, Design, Implementation, Testing and Deployment
- Artifacts to be prepared during the Phases are:
 - Software Project Initiation Statement
 - User Requirement Specification (URS)
 - Software Requirement Specification (SRS)
 - Software Analysis and Design
 - Architecture Design
 - Database Design (Table Design, ER Diagram, Integrity Design)
 - Class Diagram
 - Use Case Diagram
 - Test Case Design
- Reviews shall be conducted after every phase of which two shall be mandatory.
- Thirty minutes will be allotted for each team for the review:
 - 20 minutes for Presentation.
 - 10 minutes for Queries.



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Evaluation Components

Internal Assessment (Project Mentor)	Total 50 Marks
Lab Preparation	20 Marks
Two Reviews	10 Marks
Artifacts Submission	20 Marks

External Assessment	Total 50 Marks
Product Demonstration	20 Marks
Project Report	20 Marks
Viva Voice	10 Marks

- The external assessment team comprises of an external examiner and an internal examiner.
- If a student fails in the in-house software project then the student has to perform the set of activities required for it outside the class hours. The student has to appear for the review fixed by the department and should also appear for the semester exam viva voce.

b. SOFTWARE PROJECT – FINAL SEMESTER

- The project work can be either carried out in a R&D section of any Industry/University / Institute.
- A Coordinator will be appointed by the Head of the Department to coordinate the Project Work.
- Internal guides from the department will be assigned to the students.
- On joining an institution for the project work, the student shall furnish the details required by the department
- The duration of the project should be at least four months
- Periodically (weekly) the students should be send project Task Report to their internal guide through mail
- Two Reviews will be conducted before the Final Viva-Voce.
- The Project work should be an independent one; if the project is a part of a bigger project, the student's work should have a few independent modules.
- If more than one student is working on parts of the same project (big enough to share) the report of each student should be different and not two copies of the same report.

Evaluation Scheme

- Internal Assessment **50 Marks**
 - First Review 20 Marks



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- Second Review 20 Marks
- Demo 10 Marks
- **External Assessment 50 Marks**
 - Project Report, Product Demonstration 30 Marks
 - Viva voce 20 Marks

- An External Examiner will conduct the Viva Voce along with the respective Internal Guide.
- If a student fails in final semester software project then the student has to redo the project. The student has to appear for the review fixed by the department and should also appear for the semester exam viva voce.

XX.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



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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



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- .NET MVC Framework
- Software Quality Assurance
- Software Testing
- Computer Network
- Linux
- PHP
- Python

QUANTITATIVE APTITUDE TECHNIQUES

2-0-0-0:100

OBJECTIVES



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- To obtain aptitude skills and to solve quantitative problems.

UNIT 1: Averages – Problems on numbers – Problems on ages – Percentage.

UNIT 2: Profit and loss – Ratio and proportion – Time and work – Pipes and cisterns.

UNIT 3: Partnership – Time and distance – Problems on trains.

UNIT 4: Boats and streams – Simple interest – Compound interest.

UNIT 5: Calendar – Clocks – Permutations and Combinations – Probability.

TEXT

R.S. Aggarwal, “Quantitative Aptitude for Competitive Examinations”, Revised Edition, S. Chand and Company Ltd., Ram Nagar, New Delhi, and Reprint 2015.

1. (Chapters – 6, 7, 8 and 10)
2. (Chapters – 11, 12, 15 and 16)
3. (Chapters – 13, 17 and 18)
4. (Chapters – 19, 21 and 22)
5. (Chapters – 27, 28, 30 and 31)

WEB REFERENCE

www.tcyonline.com/tests/mathematics-competitive-exam



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XXI. EVALUATION & CERTIFICATION

a. Continuous Assessment

S. No.	Course Type	Internal Components	Marks	Total
1	Theory	2 CA Tests	30	50
		Online Test / Quiz	5	
		*Other Components	15	
		Paper Work		
		Problem Solving / Group Discussion / Discussion Forum		
		Technical reports		
		Application Development		
		Seminar		
		Demonstration		
		Open Book Assignment		
2	Theory Combined Practical	2 CA Tests	30	50
		Online Test / Quiz	5	
		Paper Work	5	
		Demonstration/Technical Report		
		Lab Exercises	10	
3	Practicals	Assessment of Lab Exercises	30	50
		Record Work	10	
		Test	10	
4	Pure Practical	Assessment of Lab Exercises	30	50
		Application Development	20	

Note: *Other components can be fixed up by the course teacher with the endorsement of the HOD.

b. CA Tests



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i. Theory

The time duration for the examination is 2 Hrs. The question paper format is:

Max. Marks : 50

Section A

Answer ALL the Questions
[atleast 3 questions from each unit] 6 X 2 = 12 Marks

Section B

Answer ALL the Questions
[atleast 3 questions from each unit, Either or Type] 3 X 6 = 18 Marks

Section C

Answer ANY TWO Questions out of Three Questions
[atleast 1 question from each unit] 2 X 10 = 20 Marks

ii. Practical

Time: 2 Hrs.

Max. Marks: 50

Each student will get a single question to be answered. The question will have two subdivisions.

(2 x 25 = 50)

- First part, shall contain questions from the exercise list.
- Second part will present an unexplored problem to be solved.
- The problem should be addressed using at least 3 technical features of the respective technology stream.
- No more than three candidates should get the same question in a batch.

c. End-Semester Examinations

i. Theory

The time duration for the examination is 3 Hrs. The question paper format for the end-semester examination is:

Max. Marks : 100

Section A

Answer ALL the Questions
[atleast 2 questions from each unit] 10 X 2 = 20 Marks

Section B

Answer ALL the Questions
[Either or Type, atleast 1 question from each unit] 5 X 7 = 35 Marks

Section C

Answer ANY THREE Questions out of FIVE Questions
[atleast 1 question from each unit] 3 X 15 = 45 Marks



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ii. Practical

- For each practical course, a question bank is prepared at the introduction of the course by a committee of utmost three staff members.
- The Committee prepares the questions and reviews them through regular meetings in consultation with the Controller of Examinations. Utmost 3 meetings can be conducted for a single course.
- Office of the Controller of Examinations will provide sitting charges for the members of the committee.
- The Head of the Department will submit the Question Bank to the controller of Examinations within three months of the introduction of the course from the beginning of the new academic year.
- The Controller can select the questions for every batch of the practical examinations as per the number of candidates.
- Each question must be separated from the given questions provided by the Controller and must be pasted on the answer paper in such a way that, each answer paper is pasted with only one question.
- The answer paper pasted with question must be displayed, without showing the questions to the students. The students should select only one answer paper pasted with question and solve the problem.
- No question must be prescribed by the examiner, other than the questions provided by the Controller.
- All questions given for batch must be used for that batch only.

Practical Question Paper Pattern

Time: 3 Hrs.

Max. Marks: 100

Each student will get a single question to be answered. The question will have two subdivisions.

(2 x 50 = 100)

- First part shall contain questions from the exercise list.
- Second part will present an unexplored problem to be solved.
- The problem should be addressed using at least 3 technical features of the respective technology stream.
- No more than three candidates should get the same question in a batch.

iii. Pure Practical

Evaluation Scheme

- There will be no term-end semester examination. But the students will be evaluated at the end of semester for 50 marks.



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Content	Internal Marks
Test	30 Marks
Viva Voce	20 Marks
Total	50 Marks

iv. Research Domain

Refer Section 8 for the Evaluation scheme.

v. Software Project Work [III, IV]

Refer Section 9 for the Evaluation scheme.

vi. Certificate, Self Learning, Life and Employability courses

There will not be an end semester examination; however, the students will be evaluated internally to become eligible to acquire the credits.