



# HAJEE KARUTHA ROWTHER HOWDIA COLLEGE

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai.)

Re-Accredited with A++ Grade by NAAC (3<sup>rd</sup> Cycle)

Uthamapalayam - 625 533.

## DEPARTMENT OF INFORMATION TECHNOLOGY

MASTER OF SCIENCE – COMPUTER SCIENCE

SYLLABUS

Choice Based Credit System – CBCS

With

Outcome Based Education (OBE)

(Academic Year 2026 - 2027 onwards)

# **HAJEE KARUTHA ROWTHER HOWDIA COLLEGE**

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai.)

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**Uthamapalayam - 625 533.**

## **College Vision and Mission**

### **Vision**

Our vision is to provide the best type of higher education to all, especially to students hailing from minority Muslim community, rural agricultural families and other deprived, under privileged sections of the society, inculcating the sense of social responsibility in them. Our college is committed to produce talented, duty- bound citizens to take up the challenges of the changing times.

### **Mission**

Our mission is to impart and inculcate social values, spirit of service and religious tolerance as envisioned by our beloved Founder President Hajee Karutha Rowther.

The Vision beckons ..... the Mission continues forever.

# **HAJEE KARUTHA ROWTHER HOWDIA COLLEGE**

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai.)

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**Uthamapalayam, 625 533.**

## **Department Vision and Mission**

### **Vision**

To transform the students into good citizens and develop them to lead the country as IT professionals

### **Mission**

- To provide the practical skill in developing the simple applications.
- To enrich the student's knowledge in the recent trends that the industry is seeking for.
- To impart comprehensive knowledge with equal emphasis on theory and practices.
- To enhance the employability, the students are to be stimulated to work in a team

### Programme Educational Objectives (PEO)

Our graduates will be progressive, efficient, value based, academically excellent, creative, collaborative, empowered and globally competent literates with the skills required for societal change.

They will demonstrate

<b>PEO1</b>	Comprehensive knowledge and expertise, employability, the acumen of creative and critical thinking, the spirit of enquiry and professional attitude required for a successful career
<b>PEO2</b>	Accountability, linguistic competence and communication skills in the work environment and beyond
<b>PEO3</b>	Perseverance, effective collaboration, team spirit, leadership and problem solving skills
<b>PEO4</b>	Keen sense of civility, professional ethics, receptivity and moral righteousness
<b>PEO5</b>	Commitment to address social and environmental threats and to act as responsible service-minded, duty-bound global citizens

### Programme Outcomes (PO)

On the successful completion of M. Sc., Computer Science programme, the students will be able to

<b>P01</b>	Provide technology-oriented students with the knowledge and ability to develop creative solutions.
<b>P02</b>	Develop skill to learn new technology.
<b>P03</b>	Apply computer science theory and software development concept to construct computing-based solutions.
<b>P04</b>	Design and develop computer programs/computer-based system in areas related to algorithms, networking, web design cloud computing Mobile applications.
<b>P05</b>	Engage independent and life-long learning for continued professional development.

### Program Specific Outcomes (PSO)

A graduate of M. Sc. Computer Science after two years will

<b>PSO1</b>	Graduates are prepared to acquire broad knowledge of Computer Science and a focused understanding of their area of interest.
<b>PSO2</b>	Graduates will gain the ability to work effectively as a team member and/or leader in dynamic professional environment;
<b>PSO3</b>	Graduates will be capable to take up research programmes
<b>PSO4</b>	Graduates are prepared to survive in rapidly changing technology and engage in life-long learning.
<b>PSO5</b>	Graduates work effectively in multi-disciplinary and multi-cultural environments by respecting professionalism and ethical practices within organization and society at national and international level.

## Programme Scheme

### Eligibility

A candidate who has passed B.Sc., Computer Science/ IT/B.C.A., or any other equivalent degree is eligible for the Master of Science – Computer Science.

### For Programme Completion

A Candidate shall complete:

- Part III - Core papers in semesters I, II, III and IV respectively
- Part III - Generic Elective papers in semesters I and II respectively
- Part III - Discipline Elective Papers in semesters III and IV respectively
- Part IV - Skill Enhancement Course (NME) Paper in Semester III respectively
- Part IV - Summer Internship/Industrial Training Paper in semester III respectively
- Part IV - Skill Enhancement Course (Professional Competency Skill) Paper in Semester IV respectively
- Part V - Extension activity in semester IV

### Scheme of Examinations under Choice Based Credit System

Term End Examinations (TEE)	- 75 Marks
Continuous Internal Assessment Examinations (CIAE)	- 25 Marks
Total	- 100 Marks

### Pattern of Continuous Internal Assessment Examinations (CIAE)

Average of Two Internal Tests (each 20 marks)	- 20 Marks
Assignment	- 05 Marks
Total	- 25 Marks

### Pattern of Term End Examinations

(Max. Marks: 75 / Time: 3 Hours)

### External Examinations Question Paper Pattern for Part III and Part IV (Non- Major Elective & Skill based Subject)

#### Section – A (10 X 2 = 20 Marks)

Answer ALL questions.

- Questions 1 - 10
- One question from each unit
- Short answer questions

#### Section – B (5 X 5 = 25 Marks)

Answer ALL questions (Choose either a or b).

- Questions 11 - 15
- One question from each unit
- Paragraph

#### Section – C (3 X 10 = 30 Marks)

Answer any THREE out of five questions.

- Questions 16 - 20
- One question from each unit
- Essay type

### Part V (Extension Activities)

- Internal Evaluation only

### Passing Marks

Minimum 34 for External Exam

Eligibility for the degree – passing minimum is **50%**

### Practical Examination

Internal	- 40 marks
External	- 60 marks (minimum 27 marks)
Total	- 100 marks
Passing minimum is <b>50%</b>	

**Weightage**

Weightage for Bloom's Taxonomy	Percentage	Marks	
		CIAE	TEE
Knowledge (Remembering) – K1	8	2	6
Understanding – K2	9	2	7
Applying – K3	12	3	9
Analyzing – K4	12	3	9
Evaluate – K5	40	10	30
Create – K6	19	5(Seminar)	14
<b>Gross Total</b>	<b>100</b>	<b>25</b>	<b>75</b>

**Assessment**

**Distribution of questions and marks for Continuous Internal Assessment Examinations**

Bloom's Taxonomy	Section A	Section B	Section C	Total
Knowledge(K1)	1(2)	-	-	<b>Total 25 marks</b>
Understanding(K2)	1(2)	-	-	
Apply(K3)	-	1(3)	-	
Analyzing (K4)	-	1(3)	-	
Evaluate (K5)	-	-	2(10)	
Create (K6)	<b>Seminar (5)</b>			

**Distribution of questions and marks for Term End Examinations**

Bloom's Taxonomy	Section A	Section B	Section C	Total
Knowledge(K1)	3(6)	-	-	<b>Total 75 Marks</b>
Understanding(K2)	1(2)	1(5)	-	
Apply(K3)	2(4)	1(5)	-	
Analyzing (K4)	2(4)	1(5)	-	
Evaluate (K5)	-	-	3(30)	
Create (K6)	2(4)	2(10)	-	

**Note: Figures in parenthesis are Marks**

**Credits Distribution**

S.No	Part	Category	No of Courses	No of Credits
1	Part - III	Core (Theory / Practical / Project)	15	72
		Discipline Elective (Theory / Practical)	2	6
		Generic Elective (Theory / Practical )	2	6
2	Part - IV	NME	1	2
		Professional Competency	1	2
		Internship	1	2
3	Part - V	Extension Activity	1	1
<b>Total</b>			<b>23</b>	<b>91</b>

**M.Sc., COMPUTER SCIENCE**

**Details of Course Category, Code, Credits & Title**

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max. Marks	Credits
<b>Semester - I</b>							
<b>Part - III</b>							
Core - I	26PCSCC11	Analysis and Design of Algorithms	6	25	75	100	5
Core - II	26PCSCC12	Advanced Java Programming	6	25	75	100	5
Core - III	26PCSCC1P	Java Programming using Data Structures Lab	6	40	60	100	5
Core - IV	26PCSCC1Q	■.NET Programming Lab	6	40	60	100	4
Generic Elective - I	26PCSGE11	Data Communications and Networking	6	25	75	100	3
<b>TOTAL</b>			<b>30</b>				<b>22</b>

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max. Marks	Credits
<b>Semester - II</b>							
<b>Part - III</b>							
Core - V	26PCSCC21	Data Mining and Warehousing	6	25	75	100	5
Core - VI	26PCSCC22	Advanced Operating Systems	6	25	75	100	5
Core - VII	26PCSCC23	Advanced Software Engineering	6	25	75	100	5
Core - VIII	26PCSCC2P	Data Mining Lab using R	6	40	60	100	4
Generic Elective - II	26PCSGE2P	Web Application Development Lab	6	40	60	100	3
<b>TOTAL</b>			<b>30</b>				<b>22</b>

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26PCSCC11	ANALYSIS AND DESIGN OF ALGORITHMS	Core - I	6	5	25	75	100

Course Objectives		
Desire for continuous and independent learning analyzing and using data, Appreciation for the dynamic role of solving problems and algorithms.		
UNIT	Contents	No. of Hours
I	<b>Introduction and Overview</b> - Definition - Concept of Data Structure - Overview -Implementation - Arrays - Definition - One Dimensional Array - Multidimensional Array - Pointer Array. Linked List: Definition - Singly Linked List - Double Linked List - Circular Linked List - Circular Double Linked List - Application - Memory Representation.	18
II	<b>Stack:</b> Definition - Representation - Operations - Applications. <b>Queues:</b> Definition - Representation - Various Queue Structures - Applications. <b>Trees:</b> Definition - Representation - Operation - Types.	18
III	<b>Divide and Conquer:</b> General Method - Binary Search - Finding the Maximum and Minimum - Merge Sort - Quick Sort - Selection sort	18
IV	<b>Greedy Method:</b> General Method -Optimal Storage on Tapes - Knapsack Problem - Job Sequencing with Deadlines - Optimal Merge Patterns - Minimum Spanning Trees - Single Source Shortest Paths	18
V	<b>Dynamic Programming:</b> General Method - Multistage Graphs - All Pair Shortest Path - Optimal Binary Search Trees - 0/1 Knapsack - Reliability Design - Traveling Salesperson Problem - Backtracking : General method, 8 Queens Problem.	18
<b>Total</b>		<b>90</b>
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Get knowledge about algorithms and determines their time complexity.	K1,K2,K3,K4,K5
2	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations	K1,K2,K3,K4,K5
3	Demonstrate specific search and sort algorithms using divide and conquer technique.	K1,K2,K3,K4,K5,K6
4	Gain good understanding of Greedy method and its algorithm.	K1,K2,K3,K4,K5,K6
5	Able to describe about graphs using dynamic programming technique and Demonstrate the concept of backtracking.	K1,K2,K3,K4,K5,K6

K1-Knowledge K2-Understand K3-Apply K4- Analyse K5- Evaluate K6- Creating Textbooks	
1.	D. Samantha, <i>Classic Data Structures</i> , PHI, 2008.
2.	Ellis Horowitz, " <i>Computer Algorithms</i> ", Galgotia Publications. Alfred V.Aho, John E.Hopcroft, Jeffrey D.Ullman, "Data Structures and Algorithms".
Reference Books	
1.	Skiena, " <i>The Algorithm Design Manual</i> ", Second Edition, Springer, 2008
2.	Anany Levith, " <i>Introduction to the Design and Analysis of algorithm</i> ", Pearson Education Asia, 2003.
e-Resources	
1	<a href="https://nptel.ac.in/courses/106/106/106106131/">https://nptel.ac.in/courses/106/106/106106131/</a>
2	<a href="https://www.javatpoint.com/daa-tutorial">https://www.javatpoint.com/daa-tutorial</a>

### Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	2	1	3	1
C02	1	3	1	3	2
C03	3	3	2	3	3
C04	3	3	2	3	3
C05	3	3	2	3	3

Strong-3      Medium-2      Low-1

### Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	2	2	3	1
C02	1	3	1	3	2
C03	3	3	2	3	3
C04	3	3	3	3	3
C05	3	3	1	3	3

Strong-3      Medium-2      Low-1

### COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
<b>UNIT - I</b>		
1.1	Introduction and Overview	1
1.2	Definition	1
1.3	Concept of Data Structure	1
1.4	Overview	1
1.5	Implementation	1
1.6	Arrays – Definition	1
1.7	One Dimensional Array	1

1.8	Multidimensional Array	1
1.9	Pointer Array	1
1.10	Linked List: Definition	2
1.11	Singly Linked List	1
1.12	Double Linked List	1
1.13	Circular Linked List	1
1.14	Circular Double Linked List	2
1.15	Application	1
1.16	Memory Representation	1
<b>UNIT - II</b>		
2.1	Stack: Definition	1
2.2	Representation	2
2.3	Operations	1
2.4	Applications	1
2.5	Queues: Definition	1
2.6	Representation	2
2.7	Various Queue Structures	2
2.8	Applications	2
2.9	Trees: Definition	1
2.10	Representation	2
2.11	Operation	2
2.12	Types	1
<b>UNIT - III</b>		
3.1	Divide and Conquer	1
3.2	General Method	2
3.3	Binary Search	2
3.4	Finding the Maximum and Minimum	3
3.5	Merge Sort	4
3.6	Quick Sort	4
3.7	Selection Sort	2
<b>UNIT - IV</b>		
4.1	Greedy Method	1
4.2	General Method	2
4.3	Optimal Storage on Tapes	2
4.4	Knapsack Problem	3
4.5	Job Sequencing with Deadlines	2
4.6	Optimal Merge Patterns	2
4.7	Minimum Spanning Trees	3
4.8	Single Source Shortest Paths	3
<b>UNIT - V</b>		
5.1	Dynamic Programming	1
5.2	General Method	1
5.3	Multistage Graphs	2

5.4	All Pair Shortest Path	2
5.5	Optimal Binary Search Trees	2
5.7	0/1 Knapsack	2
5.8	Reliability Design	3
5.9	Traveling Salesperson Problem	2
5.10	BackTracking	1
5.11	8 Queens Problem	2
<b>Total</b>		<b>90</b>

**Course Designer**

**Name: Dr. J. Thasleen Fathima**

Associate Professor & Head of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26PCSCC12	ADVANCED JAVA PROGRAMMING	Core - II	6	5	25	75	100

Course Objectives		
Advanced Java Programming deals with advanced Java concepts for developing distributed, networked, and enterprise-level applications.		
UNIT	Contents	No. of Hours
I	<b>BASICS OF JAVA</b> Java Basics Review: Components and Event handling–Threading concepts–Networking features – Media techniques.	18
II	<b>REMOTE METHOD INVOCATION</b> Remote Method Invocation-Distributed Application Architecture- Creating stubs and skeletons- Defining Remote objects- Remote Object Activation-Object Serialization-Java Spaces.	18
III	<b>DATABASE</b> Java in Databases-JDBC principles–database access-Interacting database search–Creating multimedia databases – Database support in web applications.	18
IV	<b>SERVLETS</b> Java Servlets: Java Servlet and CGI programming- A simple java Servlet-Anatomy of a java Servlet-Reading data from a client Reading http request header-sending data to a client and writing the http response header-working with cookies Java Server Pages: JSP Overview-Installation-JSP tags Components of a JSP page-Expressions- Script lets-Directives Declarations-A complete example.	18
V	<b>ADVANCED TECHNIQUES</b> JAR file format creation – Internationalization – Swing Programming–Advanced java Techniques.	18
<b>Total</b>		<b>90</b>
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Understand the advanced concepts of Java Programming	K1,K2,K3,K4,K5
2	Understand RMI concepts	K1,K2,K3,K4,K5
3	Understand JDBC concepts	K1,K2,K3,K4,K5
4	Develop dynamic web applications using Java Servlets and JSP	K1,K2,K3,K4,K5,K6
5	Apply advanced Java techniques using JAR creation. internationalization, and Swing programming.	K1,K2,K3,K4,K5
<b>K1-Knowledge K2-Understand K3-Apply K4- Analyse K5- Evaluate K6- Creating</b>		
<b>Textbooks</b>		
1.	<b>Advanced Java Programming</b> , Utham.K.Roy, Oxford University Press 2015	
2.	Jamie Jaworski,“ <b>Java Unleashed</b> ”,SAMSTechmediaPublications,1999.	

3.	Campione, Walrath and Huml, " <b>The JavaTutorial</b> ", AddisonWesley, 1999.
<b>Reference Books</b>	
1.	Deitel and Deitel, " <b>Java How to Program</b> ", Third Edition, PHI/Pearson Education Asia.
2.	Jim Keogh, " <b>The Complete Reference J2EE</b> ", Tata McGraw Hill Publishing Company Ltd, 2010.
<b>e-Resources</b>	
1	<a href="https://www.javatpoint.com/servlet-tutorial">https://www.javatpoint.com/servlet-tutorial</a>
2	<a href="https://www.tutorialspoint.com/java/index.htm">https://www.tutorialspoint.com/java/index.htm</a>

### Mapping with Programme Outcomes:

CO /PO	PO1	PO2	PO3	PO4	PO5
C01	3	3	2	3	3
C02	2	3	3	2	3
C03	3	3	3	3	3
C04	2	3	3	2	3
C05	2	3	2	2	3

**Strong-3      Medium-2      Low-1**

### Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	2	3	2	3
C02	2	3	3	2	3
C03	3	3	3	2	3
C04	2	3	3	2	3
C05	2	3	2	2	3

**Strong-3      Medium-2      Low-1**

### COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
<b>UNIT - I</b>		
1.1	Java Basics Review	3
1.2	Components	3
1.3	Event handling	3
1.4	Threading	3
1.5	Networking features	3
1.6	Media techniques	3
<b>UNIT - II</b>		
2.1	Remote Method Invocation	2
2.2	Distributed Application Architecture	2
2.3	Creating stubs and skeletons	2

2.4	Defining Remote objects	3
2.5	Remote Object Activation	3
2.6	Object Serialization	3
2.7	Java Spaces	3
<b>UNIT - III</b>		
3.1	Java in Databases	3
3.2	JDBC principles	3
3.3	Database access	3
3.4	Interacting database search	3
3.5	Creating multimedia databases	3
3.6	Database support in web applications	3
<b>UNIT - IV</b>		
4.1	Java Servlets and CGI programming- A Pages Java Server	1
4.2	simple java Servlet	2
4.3	Anatomy of a java Servlet	2
4.4	Reading data from a client	1
4.5	Reading http request header	2
4.6	sending data to a client and writing the http response header	1
4.7	working with cookies	2
4.8	JSP Overview-Installation	2
4.9	JSP tags	1
4.10	Components of a JSP page, Expressions	1
4.11	Scriptlets-Directives	2
4.12	Declarations-A complete example	1
<b>UNIT - V</b>		
5.1	JAR file format creation	5
5.2	Internationalization	4
5.3	Swing Programming	4
5.4	Advanced java Techniques	5
<b>Total</b>		<b>90</b>

### Course Designer

**Name: A.K. JENARTHANAN**

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26PCSCC1P	JAVA PROGRAMMING USING DATA STRUCTURES LAB	Core - III	6	5	40	60	100

**Course Objectives**

Advanced Java Programming Using Data Structures lab trains students to implement fundamental Data Structures and Algorithms in Java for efficient problem-solving.

UNIT	Contents	No. of Hours
I	Program to implement Merge sort and Quick sort algorithm. Program to implement binary search tree with insertion and traversal. Program to implement singly and Double linked list with operations.	18
II	Program to implement stack and Queue using linked list. Program to implement the General Method of Dynamic Programming. Program to solve the knapsack problem using greedy method	18
III	Java program to Demonstrate Multithreading Java program to Implement the Event Handling Java program to Implement the Exception Handling	18
IV	Java program to Demonstrate Layout Concept Program to demonstrate JDBC connectivity with database. Java program to implement Socket Programming (TCP & UDP).	18
V	Program to create and use Remote Method Invocation (RMI). Program for servlet-JSP communication Program to develop a simple web application using servlet & JSP	18
	<b>Total</b>	<b>90</b>

**Course Outcomes**

CO	On completion of this course, students will	Knowledge Level
		K1,K2,K3,K4,K5,K6
1	Implement, and analyze fundamental data structures and algorithms to solve computational problems efficiently.	K1,K2,K3,K4,K5,K6
2	To implement and analyze-based stack and queue operations	K1,K2,K3,K4,K5,K6
3	To develop robust and interactive Java applications by implementing multithreading, event handling, and exception handling techniques.	K1,K2,K3,K4,K5,K6
4	To introduce to Socket programming	K1,K2,K3,K4,K5,K6
5	To provide knowledge on using Servlets, Applets	K1,K2,K3,K4,K5

**K1-Knowledge K2-Understand K3-Apply K4- Analyse K5- Evaluate K6- Creating**

**Textbooks**

1.	Ellis Horowitz, " <i>Computer Algorithms</i> ", Galgotia Publications.
2.	<i>Advanced Java Programming</i> , Utham.K.Roy, Oxford University Press 2015

**Reference Books**

1.	Alfred V.Aho, John E.Hopcroft, Jeffrey D.Ullman, " <b>Data Structures and Algorithms</b> "
2.	Deitel and Deitel, " <b>Java How to Program</b> ", Third Edition, PHI/Pearson
<b>e-Resources</b>	
1	<a href="https://www.javatpoint.com/servlet-tutorial">https://www.javatpoint.com/servlet-tutorial</a>
2	<a href="https://www.tutorialspoint.com/java/index.htm">https://www.tutorialspoint.com/java/index.htm</a>

**Mapping with Programme Outcomes:**

CO /PO	PO1	PO2	PO3	PO4	PO5
<b>C01</b>	3	3	3	3	2
<b>C02</b>	3	2	3	3	3
<b>C03</b>	2	2	3	3	3
<b>C04</b>	3	3	2	3	3
<b>C05</b>	2	2	3	2	3

**Strong-3      Medium-2      Low-1**

**Level of Correlation between PSO's and CO's**

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>C01</b>	2	3	3	3	3
<b>C02</b>	3	2	3	2	3
<b>C03</b>	3	3	3	2	3
<b>C04</b>	3	3	23	3	3
<b>C05</b>	3	3	3	3	2

**Strong-3      Medium-2      Low-1**

**COURSE CONTENTS AND LAB SCHEDULE**

Module No.	Topic	No. of Hours
<b>UNIT - I</b>		
1.1	Program to implement Merge sort and Quick sort algorithm.	6
1.2	Program to implement binary search tree with insertion and traversal.	6
1.3	Program to implement singly and Double linked list with operations	6
<b>UNIT - II</b>		
2.1	Program to implement stack and Queue using linked list.	6
2.2	Program to implement the General Method of Dynamic Programming.	6
2.3	Program to solve the knapsack problem using greedy method	6
<b>UNIT - III</b>		

3.1	Java program to Demonstrate Multithreading	6
3.2	Java program to Implement the Event Handling	6
3.3	Java program to Implement the Exception Handling	6
<b>UNIT - IV</b>		
4.1	Java program to Demonstrate Layout Concept	6
4.2	Program to demonstrate JDBC connectivity with database.	6
4.3	Java program to implement Socket Programming (TCP & UDP).	6
<b>UNIT - V</b>		
5.1	Program to create and use Remote Method Invocation (RMI)	6
5.2	Program for servlet-JSP communication	6
5.3	Program to develop a simple web application using servlet & JSP	6
<b>Total</b>		<b>90</b>

**Course Designer**

**Name: A.K. JENARTHANAN**

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26PCSCC1Q	.NET PROGRAMMING LAB	Core - IV	6	4	40	60	100

### Course Objectives

Students will gain the ability to implement the algorithms in **C#.net**, **VB.net** and **ASP.net**.  
Pre-requisite.

UNIT	Contents	No. of Hours
I	<b>HTML</b> To Write a Time Table Program by using Html Tags. To Create a E-Mail Registration Form by using Html Tags. <b>VB .NET</b> To Write a Constructor & Destructor Program by using Console Application in VB.net. To Write a Inheritance Program by using Console Application in Vb.net.	20
II	<b>VB .NET</b> To Create a Procedure by using Windows Application in Vb.net. To Write a Exception Handling Program by using Windows Application in Vb.net. To Create a Validation Form by using Windows Application in Vb.net. To write a String Handling Program by using Windows Application in Vb.net.	20
III	<b>ASP .NET</b> To Write a Validation Control Program by using Asp.net. To Create a Calendar Control by using Asp.net. To Create a Ad rotator Control by using Asp.net.	15
IV	<b>ASP .NET</b> To Create a Web Service by using Asp.net. To Create a Database Connectivity by using ADO <b>C#:</b> To create a Polymorphism by using C#.	20
V	<b>C#:</b> To create a Abstraction and Encapsulation by using C#. To create a Matrix Multiplication by using C#. To create a Reverse Number by using C#.	15
<b>Total</b>		<b>90</b>
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Problem solving skills-to analyze real life problem, find and develop algorithmic step to solve it.	K2,K4&K5

2	Set up an programming environment in VB .NET.	K3,K4 & K5
3	Developing Tools in ASP .NET.	K2,K3 & K4
4	Experience with developing and debugging software in ASP .NET,C#.	K4 & K5,K6
5	Configure an C# application.	K3,K4 & K5,K6
<b>K1-Knowledge K2-Understand K3-Apply K4- Analyse K5- Evaluate K6- Creating Textbook</b>		
1.	ASP.NET 4.5(Covers c# and VB codes), <b>Black Book and DOT NET TECHNOLOGY</b> , Daminni Crover.	
<b>Reference Books</b>		
1.	Beginning Database Programming Using ASP.NET Core3,Bipin Joshi.	
2.	Murachi's ASP.NET Core MVC, Joel Murach, Mary Delamater.	
<b>e-Resources</b>		
1	www.dotnettutorials.net	

### Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
<b>C01</b>	3	3	2	3	3
<b>C02</b>	2	3	1	3	1
<b>C03</b>	3	2	2	2	3
<b>C04</b>	2	3	3	3	3
<b>C05</b>	3	3	2	3	1

**Strong-3      Medium-2      Low-1**

### Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>C01</b>	3	3	2	3	3
<b>C02</b>	2	3	1	3	1
<b>C03</b>	3	2	2	2	3
<b>C04</b>	2	3	3	3	3
<b>C05</b>	3	3	2	3	1

**Strong-3      Medium-2      Low-1**

### COURSE CONTENTS AND LAB SCHEDULE

Module No.	Topic	No. of Hours
<b>UNIT - I</b>		
1.1	Write a Time Table Program using Html Tags.	5
1.2	To Create a E-Mail Registration Form by using Html Tags.	5
1.3	To Write a Constructor & Destructor Program by using Console Application in VB .Net.	5

1.4	To Write a Inheritance Program by using Console Application in VB .Net.	5
<b>UNIT - II</b>		
2.1	To Create a Procedure by using Windows Application in VB .Net.	5
2.2	To Write a Exception Handling Program by using Windows Application in VB .Net.	5
2.3	To Create a Validation Form by using Windows Application in VB .Net.	5
2.4	To write a String Handling Program by using Windows Application in VB .Net.	5
<b>UNIT - III</b>		
3.1	To Write a Validation Control Program by using Asp .Net.	5
3.2	To Create a Calendar Control by using asp .Net.	5
3.3	To Create a Ad rotator Control by using asp .Net.	5
<b>UNIT - IV</b>		
4.1	To Create a Web Service by using Asp .Net.	6
4.2	To Create a Database Connectivity by using ADO	7
4.3	To create a Polymorphism by using C#	7
<b>UNIT - V</b>		
5.1	To create a Abstraction and Encapsulation	5
5.2	To create a Matrix Multiplication by using C#	5
3.5	To create a Reverse Number by using C#	5
<b>Total</b>		<b>90</b>

**Course Designer**

**Name: Ms. G. Manonmani**

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26PCSGE11	DATA COMMUNICATIONS AND NETWORKING	Generic Elective-I	6	3	25	75	100

### Course Objectives

Objective of the computer network is Resource Sharing, high Reliability, increase System Performance and Security.

UNIT	Contents	No. of Hours
I	<p><b>Introduction:</b> A Brief History – Applications – Computer Networks – Categories of Networks – Standard and Standards Organization – Network Architecture – Open systems and OSI Model – TCP/IP Architecture.</p> <p><b>Communication Media and Data Transmission:</b> Fourier Analysis – Analog and Digital Data Transmission – Modulation and Demodulation – Transmission Media – Wireless Communications – Data Transmission Basics – Transmission Mode – Interfacing – Multiplexing.</p> <p><b>Data Link Control and Protocol Concepts:</b> Flow Control – Error Control – Asynchronous Protocols – Synchronous Protocol – High level Data Link Control (HDLC)</p>	15
II	<p><b>Local Area Networks:</b> Types of Networks and Topology – LAN Transmission Equipment – LAN Installation and performance.</p> <p><b>Ethernet:</b> IEEE Standard 802.3– Fibre Distributed Data Interface(FDDI) .</p> <p><b>Distributed Queue Dual Bus (DQDB):</b> IEEE Standard 802.6 – LAN Operating Systems and Protocols – Ethernet Technologies.</p> <p><b>Wide Area Networks:</b> WAN Transmission Methods – WAN Carrier Types – WAN Transmission Equipments – WAN Design and Multicast Consideration – WAN Protocols.</p>	15
III	<p><b>Integrated Services and Routing Protocols:</b> Integrating Services – ISDN Topology – ISDN Protocols – Broadband ISDN – Asynchronous Transfer Mode (ATM) – Principal Characteristics of ATM – Frame Relay – Comparison of ISDN, ATM and Frame Relay. <b>Wireless LANs:</b> WLAN Applications – Wireless LAN Requirements – Planning for Wireless LANs – Wireless LAN Architecture – IEEE 802.11 Protocol Layer – IEEE 802.11 Physical Layer – Designing the Wireless LAN Layout – WAP Service.</p>	20
IV	<p><b>OSI Internetworking:</b> Principles of Internetworking – Routing Principles – Internetwork Protocols (IP) – Shortcomings of IPv4 – IP Next Generation.</p> <p><b>TCP Reliable Transport Service:</b> Transport Protocols – The Service TCP Provides to Applications – End-to-End Service and Datagram – Transmission Control Protocol – User Datagram Protocol.</p>	20

V	<b>Network Applications:</b> Client – Server Model – Domain Name System (DNS) – Telnet – File Transfer and Remote File access – Electronic Mail – World Wide Web (WWW).	20
	<b>Network Management:</b> Goal of Network Management – Network Management Standards – Network Management Model – Infrastructure for Network Management – Simple Network Management Protocol(SNMP).	
<b>Total</b>		<b>90</b>
<b>Course Outcomes</b>		<b>Knowledge Level</b>
<b>CO</b>	<b>On completion of this course, students will</b>	
1	Describe the components and infrastructure that form the basis for most computer networks.	K2 , K3
2	Detect and correct the errors in the Data Link Layer.	K2 , K3,K4
3	Implement a suitable Routing strategies for a given Network.	K3 , K4
4	Use suitable Transport/Application Layer Protocol based on application requirements.	K3 ,K6
5	Examine the performance analysis for a network using tools.	K2,K3,K5,K6
<b>K1-Knowledge K2-Understand K3-Apply K4- Analyse K5- Evaluate K6- Creating</b>		
<b>Textbook</b>		
1.	<b>“Data Communications and Computer Networks”</b> – 2 <sup>nd</sup> Edition Brijendra Singh, PHI,2006 <b>UNIT I</b> : Chapter 1, 2, 5 <b>UNIT II</b> : Chapter 6, 7 <b>UNIT III</b> : Chapter 8, 9 <b>UNIT IV</b> : Chapter 10, 11 <b>UNIT V</b> : Chapter 12, 13	
<b>Reference Books</b>		
1.	<b>“Computer Network”</b> , Andrew S. Tanenbaum, 4 <sup>th</sup> Ed, PHI, 2006	
2.	<b>“Data Communications and Computer Networks”</b> –Prakash. C.Gupat, PHI , 2005.	

### Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
<b>C01</b>	3	3	2	3	3
<b>C02</b>	2	3	1	3	1
<b>C03</b>	3	2	2	2	3
<b>C04</b>	2	3	3	3	3
<b>C05</b>	3	3	2	3	1

**Strong-3      Medium-2      Low-1**

### Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	2	3	3
C02	2	3	1	3	1
C03	3	2	2	2	3
C04	2	3	3	3	3
C05	3	3	2	3	1

Strong-3      Medium-2      Low-1

### COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
<b>UNIT - I</b>		
1.1	<b>Introduction:</b> A brief History – Applications – Computer Networks – Categories of networks – Standard and Standards Organization	3
1.2	Network Architecture – Open systems and OSI Model – TCP/IP Architecture.	3
1.3	<b>Communication Media and Data Transmission:</b> Fourier Analysis – Analog and Digital Data Transmission – Modulation and Demodulation	3
1.4	Transmission Media – Wireless Communications – Data Transmission Basics – Transmission Mode – Interfacing – Multiplexing.	3
1.5	<b>Data Link Control and Protocol Concepts:</b> Flow Control – Error Control – Asynchronous Protocols – Synchronous Protocol – High level Data Link Control (HDLC)	3
<b>UNIT - II</b>		
2.1	<b>Local Area Networks:</b> Types of Networks and Topology – LAN Transmission Equipment – LAN Installation and performance.	3
2.2	<b>Ethernet:</b> IEEE Standard 802.3– Fibre Distributed Data Interface(FDDI)	4
2.3	<b>Distributed Queue Dual Bus (DQDB):</b> IEEE Standard 802.6 – LAN Operating Systems and Protocols – Ethernet Technologies	4
2.4	<b>Wide Area Networks:</b> WAN Transmission Methods – WAN Carrier Types – WAN Transmission Equipments – WAN Design and Multicast Consideration – WAN Protocols.	4
<b>UNIT - III</b>		
3.1	<b>Integrated Services and Routing Protocols:</b> Integrating Services – ISDN Topology – ISDN Protocols – Broadband ISDN	5
3.2	Asynchronous Transfer Mode (ATM) – Principal Characteristics of ATM – Frame Relay – Comparison of ISDN,	5

	ATM and Frame Relay.	
3.3	<b>Wireless LANs:</b> WLAN Applications – Wireless LAN Requirements – Planning for Wireless LANs – Wireless LAN Architecture	5
3.4	IEEE 802.11 Protocol Layer – IEEE 802.11 Physical Layer – Designing the Wireless LAN Layout – WAP Service	5
<b>UNIT - IV</b>		
4.1	<b>OSI Internetworking:</b> Principles of Internetworking – Routing Principles – Internetwork Protocols (IP)	5
4.2	Shortcomings of IPv4 – IP Next Generation.	5
4.3	<b>TCP Reliable Transport Service:</b> Transport Protocols – The Service TCP Provides to Applications	5
4.4	End-to-End Service and Datagram – Transmission Control Protocol – User Datagram Protocol.	5
<b>UNIT - V</b>		
5.1	<b>Network Applications:</b> Client – Server Model – Domain Name System (DNS) – Telnet	5
5.2	File Transfer and Remote File access – Electronic Mail – World Wide Web (WWW)	5
3.5	<b>Network Management:</b> Goal of Network Management – Network Management Standards – Network Management Model	5
5.4	Infrastructure for Network Management –(SNMP).	5
<b>Total</b>		<b>90</b>

**Course Designer**

**Name: Ms. G. Manonmani**

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26PCSCC21	DATA MINING AND WAREHOUSING	Core - V	6	5	25	75	100

Course Objectives		
Enable the students to learn the concepts of Mining tasks, classification, clustering and Data Warehousing. Develop skills of using recent data mining software for solving practical problems.		
UNIT	Contents	No. of Hours
I	<b>Basic data mining tasks</b> – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective. Data mining techniques: Introduction – a statistical perspective on data mining – similarity measures – decision trees – neural networks – genetic algorithms.	18
II	<b>Classification:</b> Introduction – Statistical-based algorithms -distance-based algorithms – decision tree-based algorithms-neural network-based algorithms – rule-based algorithms-combining techniques.	18
III	<b>Clustering:</b> Introduction – Similarity and Distance Measures-Outliers – Hierarchical Algorithms –Partitional Algorithms. Association rules: Introduction - large item sets - basic algorithms – parallel & distributed algorithms – comparing approaches- incremental rules – advanced association rules techniques – measuring the quality of rules.	18
IV	<b>Data warehousing:</b> introduction-characteristics of a data warehouse – data marts – other aspects of data mart. Online analytical processing: introduction – OLTP & OLAP systems Data modeling –star schema for multidimensional view –data modeling – multi fact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.	18
V	<b>Developing a DATA WAREHOUSE:</b> why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations – crucial decisions in designing a data warehouse. Applications of data warehousing and data mining in government: Introduction - national data warehouses – other areas for data warehousing and data mining.	18
<b>Total</b>		<b>90</b>
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Understand the basic data mining techniques and algorithms	K1,K2

2	Understand the Association rules, Clustering techniques and Data warehousing contents	K2,K3
3	Compare and evaluate different data mining techniques like classification, prediction, Clustering and association rule mining	K1,K2,K3, K4
4	Design data ware house with dimension al modeling and apply OLAP operations	K1,K2,K3, K4, K5,K6
5	Identify appropriate data mining algorithms to solve real world problems	K1,K2,K3, K4, K5,K6
<b>K1-Knowledge K2-Understand K3-Apply K4- Analyse K5- Evaluate K6- Creating</b>		
<b>Textbooks</b>		
1.	Margaret H. Dunham, " <i>Data Mining: Introductory and Advanced Topics</i> ", Pearson education,2003	
2.	C.S.R. Prabhu, " <i>Data Warehousing Concepts, Techniques, Products and Applications</i> ", PHI, Second Edition.	
<b>Reference Books</b>		
1.	Arun K.Pujari, " <i>Data Mining Techniques</i> ", Universities Press (India) Pvt. Ltd.,2003.	
2.	JiaweiHan & Micheline Kamber, " <i>Data Mining Concepts &amp; Techniques</i> ", 2001, Academic press.	
<b>e-Resources</b>		
1	<a href="https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/">https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/</a>	

**Mapping with Programme Outcomes:**

CO /PO	P01	P02	P03	P04	P05
C01	2	3	2	3	3
C02	2	3	3	3	2
C03	3	2	2	2	2
C04	3	2	3	2	2
C05	2	3	2	2	3

Strong-3    Medium-2    Low-1

**Level of Correlation between PSO's and CO's**

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	2	3	2	3	3
C02	2	3	3	3	2
C03	3	2	2	2	2
C04	3	2	3	2	2
C05	2	3	2	2	3

Strong-3    Medium-2    Low-1

**COURSE CONTENTS AND LECTURE SCHEDULE**

Module No.	Topic	No. of Lectures
<b>UNIT - I</b>		
1.1	Basic data mining tasks – data mining versus knowledge discovery in databases	4

1.2	Data mining issues – data mining metrics – social implications of data mining	5
1.3	Data mining techniques: Introduction – a statistical perspective on data mining	4
1.4	Similarity measures – decision trees – neural networks – genetic algorithms.	5
<b>UNIT - II</b>		
2.1	Classification: Introduction – Statistical-based algorithms	4
2.2	Distance-based algorithms - decision tree-based algorithms	5
2.3	Neural network-based algorithms – rule-based algorithms	5
2.4	Combining techniques.	4
<b>UNIT - III</b>		
3.1	Clustering: Introduction – Similarity and Distance Measures– Outliers	5
3.2	Hierarchical Algorithms – Partitional Algorithms.	5
3.3	Association rules: Introduction - large item sets - basic algorithms – parallel & distributed algorithms – comparing approaches	4
3.4	Incremental rules – advanced association rules techniques – measuring the quality of rules.	4
<b>UNIT - IV</b>		
4.1	Data warehousing: introduction-characteristics of a data warehouse	4
4.2	Data marts – other aspects of data mart	3
4.3	Online analytical processing: introduction – OLTP & OLAP systems	3
4.4	Data modeling –star schema for multidimensional view – data modeling – multi fact star schema or snow flake schema	5
4.5	OLAP TOOLS – State of the market – OLAP TOOLS and the internet.	3
<b>UNIT - V</b>		
5.1	Developing a DATA WAREHOUSE: why and how to build a data warehouse –data warehouse architectural strategies and organization issues	3
5.2	Design consideration – data content – metadata distribution of data – tools for data warehousing	5
5.3	Performance considerations – crucial decisions in designing a data warehouse.	4
5.4	Applications of data warehousing and data mining in government: Introduction - national data warehouses	3
5.5	Other areas for data warehousing and data mining.	3
<b>Total</b>		<b>90</b>

**Course Designer:**

**Name: K. ISCAQFAIZAL**

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26PCSCC22	ADVANCED OPERATING SYSTEMS	Core - VI	6	5	25	75	100

Course Objectives		
<ul style="list-style-type: none"> <li>To get a comprehensive knowledge of the architecture of distributed systems.</li> <li>To understand the deadlock and shared memory issues and their solutions in distributed environments.</li> <li>To know the security issues and protection mechanisms for distributed environments.</li> </ul>		
UNIT	Contents	No. of Hours
I	<b>INTRODUCTION:</b> Architectures of Distributed Systems – System Architecture types – issues in distributed operating systems – communication networks – communication primitives. Theoretical Foundations – inherent limitations of a distributed system – lamport’s logical clocks – vector clocks – causal ordering of messages – global state – cuts of a distributed computation – termination detection. Distributed Mutual Exclusion – introduction – the classification of mutual exclusion and associated algorithms – a comparative performance analysis.	18
II	<b>DISTRIBUTED DEADLOCK DETECTION AND RESOURCE MANAGEMENT:</b> Distributed Deadlock Detection -Introduction – deadlock handling strategies in distributed systems – issues in deadlock detection and resolution – control organizations for distributed deadlock detection – centralized and distributed deadlock detection algorithms –hierarchical deadlock detection algorithms. Agreement protocols – introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture – mechanism for building distributed file systems – design issues – log structured file systems.	18
III	<b>DISTRIBUTED SHARED MEMORY AND SCHEDULING:</b> Distributed shared memory-Architecture– algorithms for implementing DSM – memory coherence and protocols – design issues. Distributed Scheduling – introduction – issues in load distributing – components of a load distributing algorithm – stability – load distributing algorithms – performance comparison – selecting a suitable load sharing algorithm – requirements for load distributing -task migration and associated issues. Failure Recovery and Fault tolerance: introduction– basic concepts – classification of failures – backward and forward error recovery, backward error recovery- recovery in concurrent systems – consistent set of checkpoints – synchronous and asynchronous check pointing and recovery – check pointing for distributed database systems recovery in replicated distributed databases.	18

<b>IV</b>	<b>STRUCTURE OF UNIX OPERATING SYSTEM</b> : Overview of UNIX, Internal architecture of UNIX, Classification of UNIX command Handling files, Handling directories, File – Memory – I/O – Process management in UNIX, Administration of UNIX system, Shell Programming environment.	18
<b>V</b>	<b>INTER PROCESS COMMUNICATION</b> - Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pipes-creation, IPC between related processes using unnamed pipes, FIFOs-creation, IPC between unrelated processes using FIFOs (Named pipes), differences between unnamed and named pipes, popen and pclose library functions. Shell programming with Bourne again shell(bash) - Introduction, shell responsibilities, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts	18
<b>Total</b>		<b>90</b>
<b>Course Outcomes</b>		<b>Knowledge Level</b>
<b>CO</b>	<b>On completion of this course, students will</b>	
1	Understand and explore the working of Theoretical Foundations of OS.	K1,K2,K3
2	Analyse the working principles of Distributed Deadlock Detection and resource management	K2,K3,K4,K5
3	Understand the concepts of distributed shared memory and scheduling mechanisms	K2,K3,K4,K5
4	Understand the concepts of Unix Operating Systems	K2,K3,K5,K6
5	To understand and make effective use of Unix utilities and shell scripting language to solve problems	K1,K2,K3,K4
<b>K1-Knowledge K2-Understand K3-Apply K4- Analyse K5- Evaluate K6- Creating</b>		
<b>Textbooks</b>		
1.	MukeshSinghal, NiranjanaG.Shivaratri, " <b>Advanced concepts in operating systems</b> : Distributed, Database and multiprocessor operating systems", TMH, 2001	
2.	<b>Linux System Programming</b> , Robert Love, O'Reilly, SPD, rp-2007.	
<b>Reference Books</b>		
1.	Pradeep K.Sinha, " <b>Distributed operating system-Concepts and design</b> ", PHI, 2003.	
2.	Andrew S.Tanenbaum, " <b>Distributed operating system</b> ", Pearson education, 2003	
<b>e-Resources</b>		
1	<a href="https://onlinecourses.nptel.ac.in/noc20_cs04/preview">https://onlinecourses.nptel.ac.in/noc20_cs04/preview</a>	

### Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	3	2	2	3
C02	3	2	2	3	2
C03	3	2	2	3	3
C04	3	2	2	3	2
C05	3	3	2	2	2

**Strong-3      Medium-2      Low-1**

### Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	2	2	3
C02	3	2	2	3	2
C03	3	2	2	3	3
C04	3	2	2	3	2
C05	3	3	2	2	2

**Strong-3      Medium-2      Low-1**

### COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
<b>UNIT - I</b>		
1.1	Architectures of Distributed Systems – System Architecture types	3
1.2	Issues in distributed operating systems	3
1.3	Communication networks – communication primitives.	2
1.4	Theoretical Foundations – inherent limitations of a distributed system	2
1.5	Lamport's logical clocks	2
1.6	Vector clocks – causal ordering of messages	2
1.7	Global state – cuts of a distributed computation	2
1.8	Termination detection	1
1.9	The classification of mutual exclusion and associated algorithms	1
<b>UNIT - II</b>		
2.1	Deadlock handling strategies in distributed systems	2
2.2	Issues in deadlock detection and resolution	2
2.3	Control organizations for distributed deadlock detection	2
2.4	Centralized and distributed deadlock detection algorithms –	2

	hierarchical deadlock detection algorithms.	
2.5	The system model, a classification of agreement problems	2
2.6	Solutions to the Byzantine agreement problem, applications of agreement algorithms	2
2.7	Mechanism for building distributed file systems	2
2.8	Design issues	2
2.9	Log structured file systems	2
<b>UNIT - III</b>		
3.1	Distributed shared memory-Architecture	2
3.2	Algorithms for implementing DSM – memory coherence and protocols	2
3.3	Design issues.– issues in load distributing	2
3.4	Components of a load distributing algorithm – stability – load distributing algorithms – performance comparison.	2
3.5	Selecting a suitable load sharing algorithm – requirements for load distributing -task migration and associated issues	2
3.6	Basic concepts – classification of failures	2
3.7	Backward and forward error recovery, backward error recovery	2
3.8	Recovery in concurrent systems – consistent set of checkpoints	2
3.9	Synchronous and asynchronous check pointing and recovery	2
<b>UNIT - IV</b>		
4.1	Overview of UNIX, Internal architecture of UNIX,	3
4.2	Classification of UNIX command Handling files	3
4.3	Handling directories, File	3
4.4	Memory – I/O – Process management in UNIX	3
4.5	Administration of UNIX system,	3
4.6	Shell Programming environment.	3
<b>UNIT - V</b>		
5.1	IPC between processes on a single computer system, IPC between processes on different systems, pipes-creation.	3
5.2	IPC between related processes using unnamed pipes, FIFOs-creation.	3
5.3	IPC between unrelated processes using FIFOs (Named pipes),differences between unnamed and named pipes, popen and pclose library functions.	3
5.4	Shell programming with Bourne again shell(bash) - Introduction, shell responsibilities, pipes and Redirection, here documents, running a shell scrip.	3
5.5	The shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands.	3
5.6	The environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt	3

	processing, functions, debugging shell scripts	
<b>Total</b>		<b>90</b>

**Course Designer**

**Name: R. Karthigai Chelvi**

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26PCSCC23	ADVANCED SOFTWARE ENGINEERING	Core - VII	6	5	25	75	100

### Course Objectives

This course introduces the fundamental concepts of Software Engineering, including software design, testing, and maintenance. It enables students to understand core principles and practices of Software Engineering and provides knowledge of Software Project Management, Software Design, and Software Testing techniques.

UNIT	Contents	No. of Hours
I	<b>INTRODUCTION</b> Introduction: The Problem Domain – Software Engineering Challenges - Software Engineering Approach – Software Processes: Software Process – Characteristics of a Software Process – Software Development Process Models – Other software processes.	17
II	<b>SOFTWARE REQUIREMENTS</b> Software Requirements Analysis and Specification: Software Requirements – Problem Analysis - Requirement Specification Functional Specification with Use Cases – Validation – Metrics. Software Architecture: Role of Software Architecture – Architecture View – Components and Connector View - Architecture Styles for C&C view.	20
III	<b>PROJECT MANAGEMENT</b> Software Project Management: Responsibilities of a software project manager – Project planning – Metrics for Project size estimation – Project Estimation Techniques – Empirical Estimation Techniques – COCOMO – Halstead’s software science – Staffing level estimation – Scheduling– Organization and Team Structures – Staffing – Risk management – Software Configuration Management – Miscellaneous Plan.	18
IV	<b>SOFTWARE DESIGN</b> Software Design: Outcome of a Design process – Characteristics of a good software design – Cohesion and coupling - Neat Arrangement – Software Design Approaches: Function Oriented Design – Object Oriented Design -Detailed Design.	18
V	<b>SOFTWARE TESTING</b> Software Testing: Testing Process –Some Terminologies – Functional testing– Structural testing – Levels of testing– Debugging–Testing tools. Software Maintenance: Maintenance Process – Reverse Engineering – Software Re-engineering – Configuration Management Activities.	17

		Total	90
Course Outcomes		Knowledge Level	
CO	On completion of this course, students will		
1	Understand about Software Engineering process	K1,K2,K3,K4,K5	
2	Understand about Software project management skills, design and quality management	K1,K2,K3,K4,K5	
3	Analyze on Software Requirements and Specification	K1,K2,K3,K4,K5,K6	
4	Analyze on Software Testing, Maintenance and Software Re-Engineering	K1,K2,K3,K4,K5,K6	
5	Design and conduct various types and levels of software quality for a software project	K1,K2,K3,K4,K5,K6	
<b>K1-Knowledge K2-Understand K3-Apply K4- Analyse K5- Evaluate K6- Creating</b>			
<b>Textbooks</b>			
1.	<i>An Integrated Approach to Software Engineering</i> - PankajJalote, Narosa Publishing House, Delhi, 3rd Edition.		
2.	<i>Fundamentals of Software Engineering</i> –RajibMall,PHIPublication,3rdEdition.		
3.	<i>Software Engineering</i> –K.K.Aggarwa land Yogesh Singh, New Age International Publishers, 3 rd edition.		
<b>Reference Books</b>			
1.	<i>Software Engineering</i> –K.K. Aggarwal and Yogesh Singh, New Age International Publishers, 3 rd edition.		
2.	A Practitioners Approach- <i>Software Engineering</i> , -R.S.Pressman, McGraw Hill.		
<b>e-Resources(Google Books)</b>			
1.	<a href="https://www.google.co.in/books/edition/An_Integrated_/Approach_to_Software_Engin pJc3xKQfD-MC?hl=en&amp;gbpv=1">https://www.google.co.in/books/edition/An_Integrated_/Approach_to_Software_Engin pJc3xKQfD-MC?hl=en&amp;gbpv=1</a>		
2.	<a href="https://www.google.co.in/books/edition/Software_Engineering/dx2C9Zkez5YC?hl=en&amp;gbpv=1">https://www.google.co.in/books/edition/Software_Engineering/dx2C9Zkez5YC?hl=en&amp;gbpv=1</a>		

### Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
<b>CO1</b>	3	3	2	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	2	3	3	3	3
<b>CO4</b>	3	2	3	2	3
<b>CO5</b>	3	3	3	3	3

**Strong-3      Medium-2      Low-1**

**Level of Correlation between PSO's and CO's**

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	2	3	3
C02	3	3	3	3	3
C03	2	3	3	3	3
C04	3	2	3	2	3
C05	3	3	3	3	3

**Strong-3      Medium-2      Low-1**

**COURSE CONTENTS AND LECTURE SCHEDULE**

Module No.	Topic	No. of Lectures
<b>UNIT - I</b>		
1.1	Introduction	2
1.2	The Problem Domain	1
1.3	Software Engineering Challenges	2
1.4	Software Engineering Approach	2
1.5	Software Processes: Software Process	3
1.6	Characteristics of a Software Process	3
1.7	Software Development Process Models	3
1.8	Other software processes	1
<b>UNIT - II</b>		
2.1	Software Requirements Analysis and Specification:	1
2.2	Software Requirements	2
2.3	Problem Analysis	2
2.4	Requirement Specification	2
2.5	Functional Specification with Use Cases	2
2.6	Validation – Metrics.	1
2.7	Software Architecture	2
2.8	Role of Software Architecture	2
2.9	Architecture View	2
2.10	Components and Connector View	2
2.11	Architecture Styles for C&C view	2
<b>UNIT - III</b>		
3.1	Software Project Management	1
3.2	Responsibilities of a software project manager	1
3.3	Project planning	1
3.4	Metrics for Project size estimation	1
3.5	Project Estimation Techniques	1
3.6	Empirical Estimation Techniques	1
3.7	COCOMO	2
3.8	Halstead's software science	2
3.9	Staffing level estimation	1

3.10	Scheduling	2
3.11	Organization and Team Structures	1
3.12	Staffing – Risk management	2
3.13	Software Configuration Management	1
3.14	Miscellaneous Plan.	1
<b>UNIT - IV</b>		
4.1	Software Design:	2
4.2	Outcome of a Design process	3
4.3	Characteristics of a good software design	2
4.4	Cohesion and coupling	3
4.5	Neat Arrangement	2
4.6	Software Design Approaches	3
4.7	Function Oriented Design - Object Oriented Design	3
<b>UNIT - V</b>		
5.1	Software Testing: Testing Process	2
5.2	Some Terminologies	2
5.3	Functional testing - Structural testing	2
5.4	Levels of testing	2
5.5	Debugging–Testing tools	2
5.6	Software Maintenance	1
5.7	Maintenance Process	2
5.8	Reverse Engineering	1
5.9	Software Re-engineering	2
5.10	Configuration Management Activities.	1
<b>Total</b>		<b>90</b>

**Course Designer**

**Name: Mr. Z. Abdul Basith**

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26PCSCC2P	DATA MINING LAB USING R	Core - VIII	6	4	40	60	100

### Course Objectives

This course is designed to enable students to learn the fundamental concepts of Data Mining algorithms such as classification, clustering, and regression. It helps students understand and implement data mining algorithms through programming. The course also emphasizes the application of statistical interpretations to analyze and validate solutions.

UNIT	Contents	No. of Hours
I	1. Implement the Apriori algorithm to extract association rules in data mining. 2. Implement the K-means clustering technique.	20
II	3. Implement any one Hierarchical Clustering method. 4. Implement Naïve Bayes Classifier using R.	20
III	5. Implement Support Vector Machine (SVM) using R 6. Implement a Decision Tree algorithm.	20
IV	7. Implement Linear Regression using R. 8. Perform Data Visualization using R.	15
V	9. Implement Data Preprocessing techniques in R. 10. Perform Exploratory Data Analysis (EDA) using R.	15
<b>Total</b>		<b>90</b>

### Course Outcomes

### Knowledge Level

CO	On completion of this course, students will	Knowledge Level
1	Able to write programs using R for Association rules, Clustering techniques	K1,K2,K3,K4,K5
2	To implement data mining techniques like classification, prediction	K1,K2,K3,K4,K5
3	Able to use different visualizations techniques using R	K1,K2,K3,K4,K5,K6
4	To apply different datamining algorithms to solve real world applications	K1,K2,K3,K4,K5,K6
5	Able to apply statistical interpretations for the solutions	K1,K2,K3,K4,K5,K6

**K1-Knowledge K2-Understand K3-Apply K4- Analyse K5- Evaluate K6- Creating**

### Textbooks

1.	Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson education, 2003.
2.	C.S.R. Prabhu, "Data Warehousing Concepts, Techniques, Products and Applications", PHI, Second Edition

### Reference Books

1.	Arun K. Pujari, "Data Mining Techniques", Universities Press(India) Pvt.
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	Ltd.,2003.
2.	Alex Berson, Stephen J .Smith, “Data Warehousing, Data Mining and OLAP”, TMCH, 2001.
<b>e-Resources</b>	
1	<a href="https://www.javatpoint.com/data-warehouse">https://www.javatpoint.com/data-warehouse</a>
2	<a href="https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/">https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/</a>
3	<a href="https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html">https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html</a>

### Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	3	3	3	3
C02	3	3	3	2	3
C03	3	3	2	3	2
C04	3	3	3	3	3
C05	3	3	2	3	2

**Strong-3      Medium-2      Low-1**

### Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	3	3	3
C02	3	3	3	2	3
C03	3	3	2	2	1
C04	3	2	3	2	2
C05	3	3	2	3	1

**Strong-3      Medium-2      Low-1**

### COURSE CONTENTS AND LAB SCHEDULE

ModuleNo.	Topic	No. of Hours
<b>UNIT - I</b>		
1.1	Implement Apriori algorithm to extract association rule of datamining.	10
1.2	Implement the K- means clustering technique.	10
<b>UNIT - II</b>		
2.1	Implement any one Hierarchal Clustering.	10
2.2	Implement Naïve Bayes Classifier using R.	10
<b>UNIT - III</b>		
3.1	Implement Support Vector Machine (SVM) using R	10
3.2	Implement Decision Tree algorithm	10
<b>UNIT - IV</b>		

4.1	Linear Regression	7
4.2	Data Visualization	8
<b>UNIT - V</b>		
5.1	Implement Data Preprocessing techniques in R.	8
5.2	Perform Exploratory Data Analysis (EDA) using R.	7
<b>Total</b>		<b>90</b>

**Course Designer**

**Name: Z. ABDUL BASITH**

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26PCSGE2P	WEB APPLICATION DEVELOPMENT LAB	Generic Elective - II	6	3	40	60	100

Course Objectives		
Demonstrate the role of languages like HTML, DHTML, CSS, XML, Java script, ASP and protocols in the workings of the web and web applications.		
UNIT	Contents	No. of Hours
I	1. Create a HTML page, which has properly aligned paragraphs with image along with it. 2. Write a program to display list of items in different styles. 3. Create both client side and server side image maps.	18
II	1. Create your own style sheets and use them in your web page. 2. Create a form with various fields and appropriate front and validations using any one of the scripting languages. 3. Write a program to store the form fields in a database, use any appropriate Server Side Scripting.	18
III	1. Create a web page using XML. 2. Write a program to connect a XML web page to any database engine. 3. Write an XML file to display the Book information which includes the following: a) Title of the book b) Author Name c) ISBN number d) Publisher name e) Edition f) Price	18
IV	1. Design a web page to implement upload and download files functionality using File Upload Control. 2. Develop a web page to implement the concept of state management using Cookies 3. Develop a web page to implement the concept of state management using Session and Application	18
V	1. Write a program to represent basic arithmetic functions using JSP. 2. Write a program to display a string using JSP. 3. Write a program to create checkboxes using JSP.	18
<b>Total</b>		<b>90</b>
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Create web pages using HTML and Cascading Styles sheets	K1,K2
2	Create XML documents and XML Schema	K1,K2
3	Have a Good grounding of Web Application Terminologies, Internet Tools,E – Commerce and other web services	K1,K2,K3
4	Use request and response objects provided to a servlet to read parameters and to produce an HTML response.	K1,K5,K6

5	Develop JSP applications implementing Session management and Data base Connectivity.	K4,K5,K6
<b>K1-Knowledge K2-Understand K3-Apply K4- Analyse K5- Evaluate K6- Creating Textbooks</b>		
1.	Web Portfolio Design And Applications, 1st Edition by <u>John Dimarco</u> / 2006	
<b>Reference Books</b>		
1.	W3Schools Online Web Tutorials	
2.	Web Development Tutorials - Learn Web Development Online	

### Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	3	2	2	3
C02	3	2	2	3	2
C03	3	2	2	3	3
C04	3	2	2	3	2
C05	3	3	2	2	2

**Strong-3    Medium-2    Low-1**

### Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	2	2	3
C02	3	2	2	3	2
C03	3	2	2	3	3
C04	3	2	2	3	2
C05	3	3	2	2	2

**Strong-3    Medium-2    Low-1**

### COURSE CONTENTS AND LAB SCHEDULE

Module No.	Topic	No. of Hours
<b>UNIT - I</b>		
1.1	Create a HTML page, which has properly aligned paragraphs with image along with it.	6
1.2	Write a program to display list of items in different styles.	6
1.3	Create both client side and server side image maps.	6
<b>UNIT - II</b>		
2.1	Create your own style sheets and use them in your web page.	5
2.2	Create a form with various fields and appropriate front and validations using any one of the scripting languages.	6
2.3	Write a program to store the form fields in a database, use any appropriate Server Side Scripting.	7
<b>UNIT - III</b>		
3.1	Create a web page using XML.	5

3.2	Write a program to connect a XML web page to any database engine.	5
3.3	Write an XML file to display the Book information which includes the following: a) Title of the book b) Author Name c) ISBN number d) Publisher name e) Edition f) Price	8
<b>UNIT - IV</b>		
4.1	Design a web page to implement upload and download files functionality using File Upload Control.	6
4.2	Develop a web page to implement the concept of state management using Cookie	8
4.3	Develop a web page to implement the concept of state management using Session and Application	4
<b>UNIT - V</b>		
5.1	Write a program to represent basic arithmetic functions using JSP.	6
5.2	Write a program to display a string using JSP.	6
5.3	Write a program to create checkboxes using JSP.	6
<b>Total</b>		<b>90</b>

**Course Designer**

**Name: R. Karthigai Chelvi**

Assistant Professor of Information Technology