Sadakathullah Appa College

(Autonomous)

.Reaccredited by NAAC at an A^{++} Grade with a CGPA of 3.56/4.0 in the IV Cycle

.An ISO 9001:2015 Certified Institution

Rahmath Nagar, Tirunelveli- 11.

Tamil Nadu.

DEPARTMENT OF COMPUTER SCIENCE

MY LORD
VOUCHSAFE ME WISDOM

CBCS SYLLABUS

For

M. Sc. COMPUTER SCIENCE

(Applicable for students admitted in June 2024 and onwards)

(As per the Resolution of the Academic Council Meetings held on 01.06.2024)

M.Sc. Computer Science

(Applicable for students admitted in June 2024 and onwards)

TITLE OF THE PAPERS, CREDITS & MARKS

Sem	Course Type	Title of the Course	Course Code	H/W	C	Marks		
						I	E	T
I	Core-I	Analysis and Design of Algorithms	24PCCS11	6	5	40	60	100
	Core-II	Object Oriented Analysis and Design using C++	24PCCS12	5	5	40	60	100
	Core- III	Python Programming	24PCCS13	5	4	40	60	100
	Core-P-I	Algorithm and OOPS Lab	24PCCS1P1	4	2	20	30	50
	Core-P-II	Python Programming Lab	24PCCS1P2	4	2	20	30	50
	EC-I	Advanced Software Engineering	24PECS11A	4	3	40	60	100
		Advanced Computer Networks	24PECS11B					
		Adhoc and Sensor Networks	24PECS11C					
	EC-II (IDC-I)	Digital Literacy	24PICS11	2	2	15	35	50
		SOP		-	-			
				30	**23**			**550**
II	Core-IV	Data Mining and Warehousing	24PCCS21	5	5	40	60	100
	Core-V	Advanced Operating Systems	24PCCS22	5	4	40	60	100
	Core-P-III	Data Mining Lab using R	24PCCS2P1	4	2	20	30	50
	Core-P-IV	Advanced Java Programming Lab	24PCCS2P2	4	2	20	30	50
	EC-III	Artificial Intelligence and Machine Learning	24PECS21A	4	3	40	60	100
		Robotic Process Automation for Business	24PECS21B					
		Multimedia and its Applications	24PECS21C					
	EC-IV (IDC-II)	Digital Technology	24PICS21	2	2	15	35	50
	SEC-I	Advanced Java Programming	24PSCS21	4	3	40	60	100
	SEC-II	Skill Enhancement Course-III NPTEL-SWAYAM Online Certification Course (or) Naan Muthalvan : (Choose any one course from the list of courses suggested by TANSCHE)	24PSCS22	2	2	-	-	50
		SOP		-	1			100
	Summer – Internship Industry Training during the 1st year vacation - credits be given in the third semester mark statement							
				30	**23+1**			**700**

PG Department of Computer Science
Programme : M.Sc. Computer Science
Programme Outcomes

PO	Upon completion of M.Sc. Degree Programmes, the graduates will be able to:
PO 1	**Disciplinary Knowledge** • Acquire in-depth scientific knowledge in the core areas of study.
PO 2	**Creative Thinking and Practical Skills / Problem Solving Skills** • Enrich skills of observation to draw logical inferences from scientific experiments/ programming and skills of creative thinking to develop novel ideas. • Hone problem solving skills in theoretical, experimental and computational areas and to apply them in real life situations.
PO 3	**Sense of inquiry and Skilled Communicator / Research, Innovation and Entrepreneurship** • Develop the capability for raising appropriate questions relating to the current/emerging issues encountered in the scientific field and to plan, execute and express the results of experiments / investigations through technical writings as well as through oral presentations. • Design innovations for exploring the unexplored areas in diverse fields to accomplish socially relevant and economically beneficial innovative research projects. • Become a skilled entrepreneur for launching start-up / business ventures to improve the economy of the nation.
PO 4	**Ethical Awareness / Team Work / Environmental Conservation and Sustainability** • Equip them for conducting work as an individual / as a member, or as a leader in diverse teams upholding values such as honesty and precision, and thus preventing unethical behaviours such as fabrication, falsification, misrepresentation of data, plagiarism etc. to ensure academic integrity. • Realise that environment and humans are dependent on one another and to know about the responsible management of our ecosystem for survival, and for the well-being of the future generation as well.
PO 5	**Digital Literacy/Self-Directed Learning/Usage of ICT/Lifelong Learning** • Get access to digital resources, to use them judiciously for updation of knowledge and also to engage in remote/ independent learning. • Inculcate the habit of learning continuously through the effective adoption of ICT to update knowledge in the emerging areas in Sciences for inventions/discoveries so that the knowledge transferred from laboratory to land would yield fruitful results for the betterment of global society.

Programme Specific Outcomes

PSO	Upon completion of M.Sc. Computer Science Degree Programmes, the students will be able to:	POs Mapped
PSO-1	**Placement** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.	PO1, PO2, PO3, PO4, PO5
PSO-2	**Entrepreneur** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.	PO2, PO3, PO4, PO5
PSO-3	**Research and Development** Design and implement HR systems and practices grounded in researches that comply with employment laws, leading the organization towards growth and development.	PO1, PO2, PO3
PSO-4	**Contribution to Business World** To produce employable, ethical and innovative professionals to sustain in the dynamic business world.	PO1, PO2, PO3, PO4, PO5
PSO-5	**Contribution to the Society** To contribute to the development of the society by collaborating with stakeholders for mutual benefit.	PO1, PO2, PO3, PO4

Semester - I	ANALYSIS AND DESIGN OF ALGORITHMS		24PCCS11			
Core – I			L	T	P	C
Hrs./Week: 6	Hrs./Semester : 90	Marks :100	5	1	-	5

General Objective:

To provide a thorough understanding of fundamental algorithmic concepts, design techniques, and efficiency analysis. It equips students with the skills to analyze, design, and implement algorithms to solve computational problems effectively.

Learning Objectives:

LO No.	The learners will be able to
LO-1	Develop a foundational understanding of algorithm definitions, complexity analysis, and basic data structures, enabling efficient problem-solving and implementation of sorting algorithms.
LO-2	Master the techniques for traversing and searching in binary trees and graphs, and apply divide and conquer strategies to efficiently solve search and sorting problems.
LO-3	Gain the ability to apply the greedy method to solve optimization problems such as the knapsack problem, minimum cost spanning tree, and single-source shortest path efficiently.
LO-4	Develop the skills to use dynamic programming for solving complex problems like multistage graphs, all-pair shortest path, optimal binary search trees, and the traveling salesman problem.
LO-5	Acquire the proficiency to implement backtracking techniques for solving combinatorial problems like the 8-queens problem, sum of subsets, graph coloring, Hamiltonian cycles, and traveling salesperson problems.

UNIT I: INTRODUCTION

Introduction: - Algorithm Definition and Specification – Space complexity-Time Complexity- Asymptotic Notations - Elementary Data Structure: Stacks and Queues – Binary Tree - Binary Search Tree - Heap – Heap sort - Graph.

UNIT II: TRAVERSAL AND SEARCH TECHNIQUES

Basic Traversal And Search Techniques: Techniques for Binary Trees- Techniques for Graphs - Divide and Conquer: - General Method – Binary Search – Merge Sort – Quick Sort.

UNIT III: GREEDY METHOD

The Greedy Method:-General Method–Knapsack Problem–Minimum Cost Spanning Tree– Single Source Shortest Path.

UNIT IV: DYNAMIC PROGRAMMING

Dynamic Programming-General Method–Multistage Graphs–All Pair Shortest Path–Optimal Binary Search Trees – 0/1 Knapsacks – Traveling Salesman Problem – Flow Shop Scheduling.

UNIT V: BACKTRACKING

Backtracking:-General Method–8-Queens Problem–Sum of Subsets– Graph Coloring– Hamiltonian Cycles – Branch And Bound: - The Method – Traveling Salesperson.

TEXTBOOKS:

1. Ellis Horowitz, “Computer Algorithms”, Galgotia Publications.
2. Alfred V. Aho, John E .Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms".

REFERENCE BOOKS:

1. Goodrich, “Data Structures& Algorithms in Java”, Wiley 3rd edition.
2. Skiena,”The Algorithm Design Manual”, Second Edition, Springer, 2008
3. Anany Levith, “Introduction to the Design and Analysis of algorithm”, Pearson Education Asia, 2003.
4. Robert Sedgewick, Phillipe Flajolet, ”An Introduction to the Analysis of Algorithms”, Addison-Wesley Publishing Company, 1996.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://nptel.ac.in/courses/106/106/106106131/
2. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
3. https://www.javatpoint.com/daa-tutorial

Course Outcomes:

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Get knowledge about algorithms and determines their time complexity.	1,2	K2
CO-2	Gain good understanding of Greedy method and its algorithm.	1,2,3	K3
CO-3	Describe about graphs using dynamic programming technique.	1,2,3	K4
CO-4	Demonstrate the concept of back tracking & branch and bound technique.	1,2,5	K5
CO-5	Explore the travers a land searching technique and apply it for trees and graphs.	1,2,3,4,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix:

Semester	Course Code	Title of the Course	Hours	Credit
I	24PCCS11	Analysis and Design Of Algorithms	90	5

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	1	2	3	3	3	1	2	1	1	1
CO-2	1	1	2	3	2	2	1	1	1	1
CO-3	1	1	2	3	2	1	2	1	1	1
CO-4	1	1	2	2	2	1	1	1	1	2
CO-5	1	1	2	2	1	1	1	1	1	1

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mr. K. A. Mohamed Riyazudeen

Signature:

Checked by

Head of the Department

Semester – II

Semester - I	OBJECT ORIENTED ANALYSIS AND DESIGN USING C++		24PCCS12			
Core – II			L	T	P	C
Hrs./Week: 5	Hrs./Semester : 75	Marks :100	5	-	-	5

General Objectives:

To equip students with both the theoretical foundations and practical skills necessary for designing and developing software using object-oriented methodologies and C++ programming.

Learning Objectives:

LONo.	The learners will be able to
LO-1	Describe the evolution of the object model, identify and explain the essential elements of the object model
LO-2	Demonstrate a deep understanding of the nature of classes and objects, analyze and establish relationships among classes
LO-3	Acquired proficiency in the fundamentals of C++ programming
LO-4	Proficient in utilizing inheritance and overloading concepts in C++ to establish hierarchical relationships among classes
LO-5	Demonstrate competency in advanced C++ topics such as memory management operators, implementing polymorphism through virtual functions

UNIT I: OBJECT MODEL

The Object Model: The Evolution of the Object Model–Elements of the Object Model–Applying the Object Model. Classes and Objects: The Nature of an Object–Relationship among Objects**.**

UNIT II: CLASSES AND OBJECTS

Classes and Object: Nature of Class – Relationship Among classes – The Interplay of classes and Objects. Classification: The importance of Proper Classification –identifying classes and objects –Key Abstractions and Mechanism.

UNIT III: C++ INTRODUCTION

Introduction to C++ - Input and output statements in C++- Declarations - Control structures – Functions in C++.

UNIT IV: INHERITANCE AND OVERLOADING

Classes and Objects – Constructors and Destructors – operators over loading – Type Conversion - Inheritance– Pointers and Arrays.

UNIT V: POLYMORPHISM AND FILES

Memory Management Operators – Polymorphism – Virtual functions – Files – Exception Handling –String Handling-Templates.

TEXTBOOKS:

1. "Object Oriented Analysis and Design with Applications", Grady Booch, Second Edition, Pearson Education.
2. "Object-Oriented Programming with ANSI & Turbo C++", Ashok N.Kamthane, First Indian Print-2003, Pearson Education.

REFERENCE BOOKS:

1. Balagurusamy, "Object Oriented Programming with C++", TMH, Second Edition, 2003.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://onlinecourses.nptel.ac.in/noc19_cs48/preview
2. https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/
3. https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.htm

Course Outcomes:

CONo.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the concept of Object-Oriented development and modeling techniques	1,2	K1
CO-2	Gain knowledge about the various steps performed during object design	1,2	K3
CO-3	Understand and utilize input/output statements, declarations, and control structures in C++.	1,2,4	K3
CO-4	Implement OOAD with C++ language	1,2,5	K3
CO-5	Apply the basic concept of OOPs and familiarize to write C++program	1,2,3,4,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix:

Semester	Course Code	Title of the Course	Hours	Credit
I	24PCCS12	Object Oriented Analysis and Design using C++	75	5

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	2	3	2	2	1	2	1	1	1	1
CO-2	1	2	2	2	1	1	1	1	1	1
CO-3	1	1	2	2	1	1	1	1	1	1
CO-4	1	2	2	2	1	1	2	1	1	1
CO-5	1	2	2	2	1	1	1	1	1	1

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by
Name: Dr. V. Roseline
Signature:

Checked by
Head of the Department

Semester - I	PYTHON PROGRAMMING		24PCCS13			
Core – III			L	T	P	C
Hrs./Week: 5	Hrs./Semester : 75	Marks :100	5	-	-	4

General Objective:

To master Python programming fundamentals, including web, network, and cloud application development, efficient program structuring with functions, handling diverse data structures, and advanced implementation of modules, packages, and classes.

Learning Objectives:

LONo.	The learners will be able to
LO – 1	Understand and apply basic Python concepts, including data types and comparisons.
LO - 2	Develop proficiency in Python control flow, loops, comprehensions, functions, generators, decorators, and error handling.
LO - 3	Implement and use Python modules, packages, and classes, including advanced features
LO - 4	Manipulate and store data, perform file I/O, interact with databases, and develop web applications.
LO– 5	Understand system operations, network programming, concurrency, and cloud services.

UNIT I: INTRODUCTION

Python:Introduction - Numbers - Strings - Variables - Lists - Tuples - Dictionaries - Sets - Comparison

UNIT II: CODESTRUCTURES

Code Structures: if, elseif, and else - Repeat with while - Iterate with for - Comprehensions - Functions - Generators - Decorators - Namespaces and Scope - Handle Errors with try and except - User Exceptions.

UNIT III:MODULES, PACKAGES AND CLASSES

Modules, Packages, and Programs: Standalone Programs - Command - Line Arguments - Modules and the import Statement - The Python Standard Library. Objects and Classes: Define a Class with class - Inheritance - Override a Method - Add a Method - Get Help from Parent with super – Inself Defense– Get and Set Attribute Values with Properties - Name Mangling for Privacy - Method Types - Duck Typing - Special Methods - Composition.

UNIT IV: DATA TYPES AND WEB

Data Types: Text Strings – Binary Data. Storing and Retrieving Data: File Input/Output - Structured Text Files - Structured Binary Files -

Relational Databases – NoS QL Data Stores. Web: Web Clients - Web Servers – Web Services and Automation

UNIT V: SYSTEMS AND NETWORKS

Systems: Files - Directories – Programs and Processes – Calendars and Clocks. Concurrency: Queues - Processes - Threads – Green Threads and gevent - twisted - Redis. Networks: Patterns - The Publish - Subscribe Model - TCP/IP - Sockets - ZeroMQ - Internet Services - Web Services and APIs - Remote Processing - Big Fat Data and Map Reduce - Working in the Clouds.

Text Book(s):

1. Bill Lubanovic, "Introducing Python", O'Reilly, First Edition – Second Release, 2014. Unit I [Chapter 1, 2 and 3], Unit II [Chapter 3]Unit III [Chapter 5 and 6], Unit IV [Chapter 7, 8 and 9], Unit V [Chapter 10 and 11]
2. Mark Lutz, "Learning Python", O'Reilly, Fifth Edition, 2013.

Reference(s):

1. David M. Beazley, "Python Essential Reference", Developer's Library, Fourth Edition, 2009
2. Sheetal Taneja, Naveen Kumar, "Python Programming - A Modular Approach", Pearson Publications

Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.programiz.com/python-programming/
2. https://www.tutorialspoint.com/python/index.htm
3. https://onlinecourses.swayam2.ac.in/aic20_sp33/preview

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO - 1	Understand the basic concepts of Python Programming	1,4	K2
CO – 2	Perform file operations and work with classes and objects.	1,3,4	K3
CO - 3	Develop object-oriented programming skills in Python.	1,3,4	K3
CO - 4	Develop web applications using Python	1,2,3,4,5	K6
CO - 5	Build client-server network applications.	1,2,3,4,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix:

Semester	Course Code	Title of the Course	Hours	Credit
I	24PCCS13	PYTHON PROGRAMMING	75	4

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	3	3	2	2	3	3	2	2	3	1
CO-2	3	3	2	2	3	3	2	3	3	1
CO-3	3	3	2	2	3	3	2	3	3	1
CO-4	3	3	3	2	3	3	3	3	3	2
CO-5	3	3	3	2	3	3	3	3	3	2

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mr. K. Ganesh Kumar

Signature:

Checked by

Head of the Department

Semester - I	ALGORITHM AND OOPS LAB		24PCCS1P1			
Core P– I			L	T	P	C
Hrs./Week: 4	Hrs./Semester : 60	Marks :50	-	-	4	2

General Objective:

To provide practical experience in implementing fundamental algorithmic techniques and object-oriented programming concepts using C++. It equips students with the ability to solve complex problems, understand data structures, and apply OOP principles in software development.

Learning Objectives:

LO No.	The learners will be able to:
LO-1	Implement and understand algorithms for sorting, searching, and classical problems like Tower of Hanoi.
LO-2	Manipulate key data structures (trees, stacks, queues) using various operations and strategies.
LO-3	Apply object-oriented programming principles including inheritance, polymorphism, and file handling.
LO-4	Use recursion, backtracking, and other advanced techniques to solve complex problems.

LIST OF PROGRAMS

1) Write a program to solve the tower of Hanoi using recursion.
2) Write a program to traverse through binary search tree using traversals.
3) Write a program to perform various operations on stack using linked list.
4) Write a program to perform various operation in circular queue.
5) Write a program to sort an array of an elements using quick sort.
6) Write a program to solve number of elements in ascending order using heap sort.
7) Write a program to solve the knapsack problem using greedy method
8) Write a program to search for an element in a tree using divide & conquer strategy.
9) Write a program to place the 8 queens on an 8X8 matrix so that not woqueens Attack.
10) Write a C++ program to perform Virtual Function

11) Write a C++ program to perform Parameterized constructor

12) Write a C++ program to perform Friend Function

13) Write a C++ program to perform Function Overloading

14) Write a C++program to perform Single Inheritance

15) Write a C++ program to perform Employee Details using files.

Course Outcomes:

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the concepts of object oriented with respect to C++	1	K2
CO-2	Understand and implement OOPS concepts	1,2,3	K3
CO-3	Implementation of data structures like Stack, Queue, Tree, List using C++	1,2,3,4	K4
CO-4	Application of the data structures for Sorting.	1,2,3,4,5	K6
CO-5	Application of the data structures for Searching using different techniques.	1,2,3,4,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix:

Semester	Course Code	Title of the Course	Hours	Credit
I	24PCCS1P1	ALGORITHM AND OOPS LAB	60	2

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	2	3	3	3	3	2	3	3	3	3
CO-2	2	3	3	3	3	2	3	3	3	3
CO-3	2	2	2	2	3	2	1	2	2	3
CO-4	2	2	2	2	2	2	2	2	2	3
CO-4	2	2	2	2	2	2	2	2	2	3

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mr. K.A. Mohamed Riyazudeen

Signature:

Checked by

Head of the Department

Semester - I	PYTHON PROGRAMMING LAB		24PCCS1P2			
Core P – II			L	T	P	C
Hrs./Week: 4	Hrs./Semester : 60	Marks :50	-	-	4	2

General Objective:

To impart practical skills and understanding of Python programming through hands - on exercises covering fundamental concepts such as data handling, control structures, functions, exception handling, object - oriented programming, file operations, module usage, and web development, enabling students to solve real - world problems efficiently.

Learning Objectives:

LO No.	The learners will be able to
LO – 1	Provide an introduction to fundamental data structures such as lists, dictionaries, sets, and tuples
LO - 2	Understand and write simple Python programs
LO - 3	Understand the OOPS concepts of Python
LO - 4	Develop web applications using Python
LO - 5	Implement file operations and utilize Python modules to create robust and efficient programs.

Implement the following in Python:

1. Programs using elementary data items, lists, dictionaries and tuples
2. Programs using conditional branches.
3. Programs using loops.
4. Programs using functions
5. Programs using except ion handling
6. Programs using inheritance
7. Programs using polymorphism
8. Programs to implement file operations.
9. Programs using modules.
10. Programs for creating dynamic and interactive webpages using forms.

Course Outcomes

CONo.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO – 1	Apply Object-Oriented Programming (OOP) principles to write Python programs proficiently.	1, 2,5	K3
CO - 2	Demonstrate comprehension of File operations and Modules in Python	1,2,5	K3
CO - 3	Implementation of lists, dictionaries, sets and tuples as programs	1,2,5	K6
CO - 4	Develop web applications using Python	1,2,3,5	K6
CO - 5	Apply exception handling techniques to develop resilient Python programs.	1,2,5	K3

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credit
I	24PCCS1P2	PYTHON PROGRAMMING LAB	60	4

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	3	3	2	2	3	3	3	2	2	3
CO-2	3	3	2	2	3	3	3	2	2	3
CO-3	3	3	2	2	3	3	3	2	2	3
CO-4	3	3	3	2	3	3	3	3	2	3
CO-5	3	3	2	2	3	3	3	2	2	3

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mr. K. Ganesh Kumar

Signature:

Checked by

Head of the Department

Semester - I	ADVANCED SOFTWARE ENGINEERING		24PECS11A			
Elective – IA			L	T	P	C
Hrs./Week: 4	Hrs./Semester : 60	Marks :100	3	1	-	3

General objective:

To ensure the software that has to be built should be consistent, correct, also on budget, on time, and within the required requirements.

Learning Objectives:

LO No.	The learners will be able to
LO-1	Introduce to Software Engineering, Design, Testing and Maintenance.
LO-2	Enable the students to learn the concepts of Software Engineering.
LO-3	Learn about Software Project Management, Software Design & Testing.
LO-4	Enable Practice for Software Design
LO-5	Learn about a Strategic approach to software testing

UNIT I: INTRODUCTION

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.

UNIT II: SOFTWARE REQUIREMENTS

Software Requirements Analysis and Specification : Requirement engineering – Type of Requirements – Feasibility Studies–Requirements Elicitation – Requirement Analysis–Requirement Documentation – Requirement Validation – Requirement Management – SRS -Formal System Specification – Axiomatic Specification – Algebraic Specification - Case study:Student Result management system. Software Quality Management – Software Quality, Software Quality Management System, ISO 9000, SEICMM.

UNIT III: PROJECT MANAGEMENT

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.

UNIT IV: SOFTWARE DESIGN

Software Design: Outcome of a Design process – Characteristics of a good software design –Cohesion and coupling- Strategy of Design–Function

Oriented Design– Object Oriented Design -Detailed Design- IEEE Recommended Practice for Software Design Descriptions.

UNIT V: SOFTWARE TESTING

Software Testing: A Strategic approach to software testing – Terminologies – Functional testing–Structural testing–Levels of testing– Validation testing-Regression testing–Art of Debugging – Testing tools - Metrics - Reliability Estimation. Software Maintenance- Maintenance Process- Reverse Engineering– Software Re-engineering-Configuration Management Activities.

TEXTBOOKS:

1. An Integrated Approach to Software Engineering – Pankaj Jalote, Narosa Publishing House, Delhi, 3rd Edition.
2. Fundamentals of Software Engineering– Rajib Mall, PHI Publication, 3rd Edition.

REFERENCE BOOKS:

1. Software Engineering– K.K. Aggarwal and Yogesh Singh, New Age International Publishers, 3rd edition.
2. APractitionersApproach-SoftwareEngineering,- R.S.Pressman,McGrawHill.
3. Fundamentals of Software Engineering –Carlo Ghezzi, M. Jarayeri, D.Manodrioli, PHI Publication.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.javatpoint.com/software-engineering-tutorial
2. https://onlinecourses.swayam2.ac.in/cec20_cs07/preview
3. https://onlinecourses.nptel.ac.in/noc19_cs69/preview

Course Outcomes:

CONo.	Upon completion of the course, the students will be able to	PSOs Addressed	Cognitive Level
CO-1	Get knowledge about Software Engineering, Design, Testing and Maintenance.	1,2	K2
CO-2	Gain good learn the concepts of Software Engineering.	1,2,3	K3
CO-3	Describe Software Project Management, Software Design & Testing.	1,2,3	K4
CO-4	Demonstrate the concept of Practice for Software Design.	1,2,5	K5
CO-5	Explore the Strategic approach to software testing	1,2,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix:

Semester	Course Code	Title of the Course	Hours	Credit
I	24PECS11A	Advanced Software Engineering	60	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	2	2	2	2	2	1	2	2
CO-2	2	2	1	1	1	1	2	1	2	1
CO-3	2	2	2	2	1	2	2	2	2	1
CO-4	1	2	2	1	1	2	2	2	3	2
CO-5	1	2	2	1	1	2	2	1	2	3

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mrs. R. Saranya

Signature:

Checked by

Head of the Department

Semester - I	ADVANCED COMPUTER NETWORKS		24PECS11B			
Elective-IB			L	T	P	C
Hrs./Week: 4	Hrs./Semester : 60	Marks :100	3	1	-	3

General Objective:

To provide a comprehensive understanding of modern network architectures, protocols, and standards, focusing on the OSI and TCP/IP models, data link and network layers, transport mechanisms, and application layer services. It equips students with the knowledge and skills to design, analyze, and manage complex computer networks.

Learning Objectives:

CO No.	The learners will be able to:
LO-1	Comprehend the basics of data communications, network models (OSI and TCP/IP), and various transmission media.
LO-2	Gain knowledge of switching techniques, error control, multiple access methods, and the functioning of wired and wireless LANs
LO-3	Learn about IP addressing (IPv4 and IPv6), network layer protocols (ICMP, IGMP), and routing protocols for unicast and multicast.
LO-4	Understand the principles of process-to-process delivery, transport layer protocols (UDP, TCP), congestion control, and key application layer services like DNS, email, and file transfer.

UNIT I: INTRODUCTION

Introduction- data communications–networks–The internet–Protocols and standards –OSI model –layers in OSI model –TCP/IP protocol suite – addressing–guided media –Unguided media.

UNIT II: DATA LINK LAYER

Switching–Circuit switched networks–data gram networks–virtual circuit networks–Framing–Flow and error control Multiple access– random access –wired Lan–wireless Lan–Cellular telephony– satellite networks

UNIT III: NETWORK LAYER

Network layer–IPV4 addressing–IPV 6 addressing– ICMP –IGMP– Network layer delivery–forwarding– unicast and multicast routing protocols.

UNIT IV: TRANSPORT LAYER

Transport layer–Process to process delivery–UDP -TCP -Congestion – congestion control–QOS –Techniques to improve QOS.

UNIT V: APPLICATION LAYER

Domain name system–name space–domain name space–distribution of name space–DNS in the internet–remote logging -email– file transfer-Network management system–SNMP Protocol.

TEXTBOOKS:

Data communications and networking–Behrouz A Forouzan Mc Graw Hill 4th Edition 2015 Reprint

REFERENCE BOOKS:

1. Computer Networks – Tenenbaum -Pearson -2022
2. Computer networking –Kurose James F, Ross Keith W -Pearson – 2017
3. Data and computer communications – William Stallings – Pearson 2017
4. Computer networks and Internet – Douglas E Comer – Pearson – 2018

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://nptel.ac.in/courses/106105080
2. https://www.tutorialspoint.com/computer-networks/index.asp
3. https://www.javatpoint.com/computer-network-tutorial

Course Outcomes:

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand fundamental underlying principles of computer networking.	2,5	K1
CO-2	Understand details and functionality of layered network architecture.	2,5	K2
CO-3	Apply mathematical foundations to solve computational problems in computer networking.	2,3,4,5	K3
CO-4	Analyze and evaluate performance of various communication protocols.	2,3,4,5	K4
CO-5	Compare and create new routing algorithms.	1,2,3,4,5	K5

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credit
I	24PECS11B	Advanced Computer Networks	60	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO-1	3	1	3	3	1	3	1	3	3	1
CO-2	3	1	3	3	1	3	1	3	3	1
CO-3	3	1	2	2	1	3	1	2	2	1
CO-4	3	1	1	1	1	3	1	1	1	1
CO-5	1	1	1	1	1	1	1	1	1	1

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by — Checked by

Name: Mr. K. A. Mohamed Riyazudeen — Head of the Department

Signature:

Semester - I	ADHOC AND SENSOR NETWORKS		24PECS11C			
Elective – IC			L	T	P	C
Hrs./Week: 4	Hrs./Semester : 60	Marks :100	3	1	-	3

General objective:

To study about the various protocols at various layers and its differences with traditional protocols and also to understand the issues pertaining to sensor networks and the challenges involved in managing a sensor network.

Learning Objectives:

LO No.	The learners will be able to:
LO-1	Understand WLANs and IEEE 802.11 architecture.
LO -2	Compare and analyze proactive, reactive, and hybrid routing protocols in ad-hoc networks.
LO -3	Understand architectural principles and design considerations for energy-efficient wireless sensor networks.
LO -4	Manage sensor network operations using advanced management techniques.
LO -5	Evaluate and develop strategies to address security challenges in ad-hoc and sensor networks.

UNIT I ADHOC NETWORKS & COMMUNICATION PROTOCOLS

Fundamentals pf WLANs – IEEE 802.11 Architecture - Self Configuration and Auto Configuration - issues in Ad-Hoc Wireless Networks – MAC Protocols for Ad-Hoc Wireless Networks – Contention Based Protocols.

UNIT II ADHOC NETWORK ROUTING AND MANAGEMENT

Routing in Ad-Hoc Networks- Introduction -Topology based versus Position based Approaches – Proactive Routing - DSDV, WRP, TBRPF Reactive Routing – DSR, AODV, Hybrid Routing Approach ZRP, CBRP.

UNIT III SENSOR NETWORK COMMUNICATION PROTOCOLS

Introduction – Architecture - Single Node Architecture – Sensor Network Design Considerations – Energy Efficient Design Principles for WSN‟ s – Protocols for WSN – Physical Layer - Transceiver Design Considerations – MAC Protocols for wireless sensor network – IEEE 802.15.4 Zigbee– Link Layer and Error Control Issues.

UNIT IV SENSOR NETWORK MANAGEMENT AND PROGRAMMING

Sensor Management - Topology Control Protocols and Sensing Mode Selection Protocols - Time Synchronization - Localization and Positioning – Operating Systems and Sensor Network Programming – Sensor Network Simulators.

UNIT V ADHOC AND SENSOR NETWORK SECURITY

Security in Ad-Hoc and Sensor Networks – Key Distribution and Management – Software based Anti-tamper Techniques – Water Marking techniques – Defense against Routing Attacks - Secure Adhoc Routing Protocols.

TEXTBOOK(S):

1. Amiya Nayak, Ivan Stojmenovic, : Wireless Sensor and Actuator Networks : Algorithm and Protocols for Scalable Coordination and Data communication John Wiley & Sons 2010
2. C.Siva Ram Murthy and B.S.Manoj, “Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education, 2011.

REFERENCE(S):

1. Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006.
2. Carlos De MoraisCordeiro, Dharma Prakash Agrawal, “Ad Hoc and Sensor Networks: Theory and Applications”, Second Edition, World Scientific Publishing, 2011.
3. C.K.Toh, “Ad Hoc Mobile Wireless Networks”, Pearson Education,

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand IEEE 802.11 architecture, MAC protocols, and their applications in ad-hoc wireless networks.	1,2	K2
CO-2	Analyze and differentiate between proactive, reactive, and hybrid routing protocols in ad-hoc networks.	1,2,3	K3
CO-3	Understand architectural principles and design considerations for energy-efficient wireless sensor networks.	1,2,3	K4
CO-4	Gain proficiency in sensor network management techniques, including topology control and time synchronization.	1,2,5	K5
CO-5	Evaluate security challenges in ad-hoc and sensor networks, and develop strategies for secure routing and key management.	1,2,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix:

Semester	Course Code	Title of the Course	Hours	Credit
I	24PECS11C	Adhoc and Sensor Networks	60	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	2	1	2	3	2	3	2	2
CO-2	2	3	2	1	2	2	3	2	3	3
CO-3	3	2	2	2	2	2	2	2	2	3
CO-4	2	3	2	2	2	2	2	3	2	2
CO-5	2	2	3	2	2	2	2	2	2	2

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mrs. R. Saranya

Signature:

Checked by

Head of the Department

Semester - I	DIGITAL LITERACY		24PICS11			
Elective–II-IDC			L	T	P	C
Hrs./Week: 2	Hrs./Semester : 30	Marks :50	2	-	-	2

General Objective:

To acquire knowledge about Digital India, engage with e - learning platforms, conduct secure digital transactions, explore Indian digital services, and foster digital awareness within communities.

Learning Objectives:

LONo.	The learners will be able to:
LO - 1	Extend their knowledge, skills and attitudes towards Digital India.
LO - 2	Choose e - learning platforms for life time learning.
LO - 3	Perform digital transactions over the web.
LO - 4	Check Digital Services of India.
LO - 5	Make digital awareness among people.

UNIT I: (Digital India)

Digital India: Agencies Enabling Digital India - Digital India Services - Electronic Payment and Receipt (EPR) - The Government policy statement on EPR states as follows - Overview of Payments and Receipts in Government Departments - Digital Locker - Benefits of Digital Locker.

UNIT II: (Digital Learning)

SWAYAM - SWAYAM PRABHA - e - PG Pathshala – Shodh Gangotri - VIDWAN - E - CBSC - National Digital Library of India - Virtual Labs - Talk to a Teacher Program - FOSEE (Free / Libre and Open Source Software in Education) - Spoken Tutorial.

UNIT III: (Digital Transaction)

SBI Pay app - SBI Pay - Download and install - Benefits of SBI Pay app - One time registration process - Adding bank accounts to the SBI Pay app - Create Virtual Payment Address - Set App Password - Set UPI pin - Create OTP and MPIN - Transfer money - Keep track of all our transactions - Validation of Payee.

Train Ticket Booking: Registration of an account for online train ticket booking - Activating user account and changing the password - Buy a train ticket - Manage a train ticket - check the status of tickets - Print a ticket - Cancellation and an automated Email of refund.

UNIT IV: (Digital Services)

PMJJBY: About PradhanMantriJeevanJyotiBimaYojana - PMJJBY premium, benefits and claim amount - become a member of PMJJBY - Debit our Savings Bank account towards the payment of annual premium. PMSBY: About PradhanMantriSurakshaBimaYojana - PMSBY premium,

benefits and claim amount - become a member of PMSBY - Debit our Savings bank account towards the payment of annual premium.

PAN Card: About PAN card - Structure and Validation of PAN card - Need for a PAN card and to know your PAN card - apply for PAN Card - Documents needed for proof of identity - Tracking the status of the application.

UNIT V: (Digital Awareness)

Privacy: Introduction - Data Privacy versus Data Protection - Involved parties in data protection - Functional Components of Data Protection - Data Privacy Principles - Data Security domains - Data Subject's rights - Strategy for Data Protection Implementation.

Responsible Social Media and Social Networking: Social Media Overview - Benefits of Social Media - Risks of Social Media - Social Media Best Practices - Social Media Principles - Applying Best Practices.

TEXT BOOK(S):

1. Digital Literacy, PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

REFERENCE(S):

1. www.digitalindia.gov.in
2. www.swayam.gov.in
3. www.epgp.inflibnet.ac.in
4. www.digitaltransaction.net
5. www.cashlessindia.gov.in

Course Outcomes:

CONo.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO - 1	Understand the digital India concept	2,4,5	K2
CO - 2	Carry out the learning through digital mode	1,2,5	K3
CO - 3	Use digital transaction for money transfer	2,4,5	K3
CO - 4	Assess government schemes and services	2,4,5	K5
CO - 5	Create digital awareness about privacy and social media.	2,3,4,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix:

Semester	Course Code	Title of the Course	Hours	Credit
I	24PICS11	Digital Literacy	30	2

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	3	3	2	2	2	3	2	3	1	1
CO-2	2	3	2	2	2	2	3	2	3	2
CO-3	2	2	3	3	3	3	2	2	3	2
CO-4	3	3	3	3	3	3	3	3	3	3
CO-5	3	3	2	3	2	2	2	3	3	3

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mr. K. Ganesh Kumar

Signature:

Checked by

Head of the Department

Semester – II	DATA MINING AND WAREHOUSING		24PCCS21			
Core – IV			L	T	P	C
Hrs./Week: 5	Hrs./Semester : 75	Marks :100	4	1	-	5

General Objective:

To design and implement data warehousing solutions, apply data mining techniques to extract valuable insights from data, and effectively communicate their findings to support strategic decision - making.

Learning Objectives:

LONo.	The learners will be able to:
LO - 1	Enable the students to learn the concepts of Mining tasks, classification, clustering and Data Warehousing.
LO - 2	Develop skills of using recent data mining software for solving practical problems.
LO - 3	Develop and apply critical thinking, problem - solving, and decision – making skills.
LO – 4	Evaluate the performance of different data mining models and select appropriate techniques for various data-driven applications.
LO - 5	Apply data warehousing concepts and methodologies, and utilize large-scale data repositories effectively.

UNIT I: BASICS AND TECHNIQUES

Basic data mining tasks - 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.

UNIT II: CLASSIFICATION

Classification: Introduction - Statistical - based algorithms - distance - based algorithms - decision tree - based algorithms - neural network - based algorithms - rule - based algorithms - combining techniques.

UNIT III: CLUSTERING AND ASSOCIATION

Clustering: 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.

UNIT IV: DATA WAREHOUSING AND MODELING

Data warehousing: 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.

UNIT V: APPLICATIONS OF DATA WAREHOUSE

Developing a Data Warehouse: 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.

TEXT BOOK(S):

1. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson education, 2003. Unit I [CHAPTER 1,3], Unit II [Chapter 4] Unit III [Chapter 5 and 6]
2. C.S.R. Prabhu, "Data Warehousing Concepts, Techniques, Products and Applications", PHI, Second Edition. Unit IV [Chapter 1 and 2], Unit V [Chapter 4 and 5]

REFERENCE(S):

1. Arun K. Pujari, "Data Mining Techniques", Universities Press (India) Pvt. Ltd.,2003.
2. Alex Berson, Stephen J. Smith, "Data Warehousing, Data Mining and OLAP", TMCH, 2001.
3. Jiawei Han & Micheline Kamber, "Data Mining Concepts & Techniques ", Academic press 2001
4. https://nptel.ac.in/noc/courses/noc20/SEM1/noc20 - cs12/

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.javatpoint.com/data-warehouse
2. https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/
3. https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html

Course Outcomes:

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO - 1	Understand the basic datamining techniques and algorithms	1,3,4	K4
CO - 2	Understand the Association rules, Clustering techniques and Data warehousing contents	1,2,3,4	K5
CO - 3	Compare and evaluate different data mining techniques like classification, prediction, Clustering and association rule mining	1,2,3,4	K3
CO - 4	Design data ware house with dimensional modeling and apply OLAP operations	1,2,3,4	K6
CO - 5	Identify appropriate datamining algorithms to solve real world problems	1,2,3,4,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix:

Semester	Course Code	Title of the Course	Hours	Credit
II	24PCCS21	Data Mining and Warehousing	75	5

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	3	3	2	1	1	3	2	2	2	1
CO-2	3	3	3	2	2	3	2	2	2	1
CO-3	2	3	3	2	2	3	2	2	2	1
CO-4	2	3	3	3	2	2	3	2	2	1
CO-5	3	3	3	3	3	2	2	3	2	3

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mr. K. Ganesh Kumar

Signature:

Checked by

Head of the Department

Semester - II	ADVANCED OPERATING SYSTEMS		24PCCS22			
Core – V			L	T	P	C
Hrs./Week: 5	Hrs./Semester : 75	Marks :100	4	1	-	4

General objective

To make computers and other devices easier for us to use with greater convenience, productivity, and ease of use by providing a user interface that allows us to interact with our hardware and software.

Learning Objectives:

LO No.	The learners will be able to:
LO-1	Enable the students to learn the different types of operating systems and their functioning.
LO-2	Gain knowledge on Distributed Operating Systems
LO-3	Gain insight into the components and management aspects of real time and mobile operating systems.
LO-4	Gain knowledge to Learn Operating Systems for Hand held Systems
LO-5	Learn case studies in Linux Operating Systems

UNIT I: BASICS OF OPERATING SYSTEMS

Basics of Operating Systems: What is an Operating System? – Main frame Systems –Desktop Systems–Multiprocessor Systems–Distributed Systems–Clustered Systems–Real-Time Systems–Hand held Systems– Feature Migration–Computing Environments-Process Scheduling – Cooperating Processes – Inter Process Communication- Dead locks – Prevention –Avoidance– Detection–Recovery.

UNIT II: DISTRIBUTED OPERATING SYSTEMS

Distributed Operating Systems: Issues – Communication Primitives – Lamports Logical Clocks –Dead lock handling strategies–Issues indead lock detection and resolution-distributed file systems–design issues–Case studies – The Sun Network File System-Coda.

UNIT III: REAL TIME OPERATING SYSTEM

Real time Operating Systems : Introduction – Applications of Real Time Systems– Basic Model of Real Time System–Characteristics–Safety and Reliability-Real Time Task Scheduling

UNIT IV: HANDHELD SYSTEM

Operating Systems for Handheld Systems: Requirements–Technology Overview–Hand held Operating Systems–Palm OS-Symbian Operating System-Android–Architecture of android– Securing hand held systems.

UNIT V: CASE STUDIES

Case Studies : Linux System: Introduction– Memory Management – Process Scheduling –Scheduling Policy - ManagingI/O devices–Accessing Files- iOS :Architecture and SDK Framework-Media Layer –Services Layer – Core OS Layer-File System.

TEXTBOOKS:

1. Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, "Operating System Concepts", Seventh Edition, John Wiley & Sons, 2004.
2. Mukesh Singhal and Niranjan G. Shivaratri, "Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems", Tata McGraw-Hill, 2001.

REFERENCE BOOKS:

1. Rajib Mall, "Real-Time Systems: Theory and Practice ",Pearson Education India,2006.
2. Pramod Chandra P. Bhatt, An introduction to operating systems, concept and practice, PHI, Third edition, 2010.
3. Daniel.P.Bovet & Marco Cesati, "Understanding the Linux kernel", 3rd edition, O"Reilly, 2005
4. Neil Smyth, "iPhone iOS 4Development Essentials–Xcode", Fourth Edition, Payload media, 2011.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://onlinecourses.nptel.ac.in/noc20_cs04/preview
2. https://www.udacity.com/course/advanced-operating-systems--ud189
3. https://minnie.tuhs.org/CompArch/Resources/os-notes.pdf

Course Outcomes

CONo.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the design issues associated with operating systems	1,2	K2
CO-2	Master various process management concepts including scheduling, deadlocks and distributed file systems	1,2,3	K3
CO-3	Prepare Real Time Task Scheduling	1,2,3	K3
CO-4	Analyze Operating Systems for Hand held Systems	1,2,5	K5
CO-5	Analyze Operating Systems like LINUX and IOS	1,2,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix:

Semester	Course Code	Title of the Course	Hours	Credit
II	24PCCS22	Advanced Operating Systems	75	4

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	2	1	2	2	1	2	2	1
CO-2	3	3	2	2	2	2	2	3	3	2
CO-3	2	3	2	1	2	2	3	2	2	2
CO-4	2	2	3	1	2	2	2	3	2	2
CO-5	3	2	2	1	3	2	2	2	3	2

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mrs. R. Saranya

Signature:

Checked by

Head of the Department

Semester - II	DATA MINING LAB USING R		24PCCS2P1			
Core P– III			L	T	P	C
Hrs./Week: 4	Hrs./Semester : 60	Marks :50	-	-	4	2

General Objective:

To develop practical skills in data mining using R programming language by implementing various algorithms and techniques for association rule mining, clustering, classification, decision trees, linear regression, and data visualization.

Learning Objectives:

LONo.	The learners will be able to:
LO - 1	Learn the concepts of Data Mining algorithms namely classification, clustering, regression.
LO - 2	Comprehend and write programs implementing Data Mining algorithms.
LO - 3	Apply statistical interpretations to analyze and evaluate solutions
LO - 4	Use visualizations techniques for interpretations of results.
LO - 5	Implement Linear Regression using R programming language to analyze the relationship between variables and predict outcomes based on input data.

Write following programs using R

1. Implement Apriori algorithm to extract association rule of datamining.
2. Implement k - means clustering technique.
3. Implement any one Hierarchal Clustering.
4. Implement Classification algorithm.
5. Implement Decision Tree.
6. Linear Regression.
7. Data Visualization.

Course Outcomes

CONo.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO - 1	Proficient in programming using R for executing Association rules and Clustering techniques.	1,2,3	K3
CO - 2	Skilled in implementing data mining methods such as classification and prediction using R.	1,2,3,4	K3
CO - 3	Competent in employing various visualization techniques in R.	1,2,3,4	K3
CO - 4	Capable of applying diverse data mining algorithms in R to address real-world applications.	1,2,3,4,5	K6
CO - 5	Predict outcomes based on input data using the implemented Linear Regression models.	1,2,3,4	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credit
II	24PCCS2P1	Data Mining Lab using R	60	2

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	3	3	3	2	1	3	3	3	1	2
CO-2	3	3	3	3	1	3	3	3	3	2
CO-3	3	3	3	2	1	3	3	3	3	2
CO-4	3	3	3	3	2	3	3	3	3	3
CO-5	3	3	3	3	2	3	3	3	3	2

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mr. K. Ganesh Kumar

Signature:

Checked by

Head of the Department

Semester - II	ADVANCED JAVA PROGRAMMING LAB		24PCCS2P1			
Core P– IV			L	T	P	C
Hrs./Week: 4	Hrs./Semester : 60	Marks :50	-	-	4	2

General Objective:

To give practical experience of the concepts of Applet, Database connectivity using JDBC, Servlets and JSP, and apply them to write the solution for real world applications.

Learning Objectives:

LO No.	The learners will be able to:
LO-1	Enable the students to implement the simple programs using JSP, JAR
LO-2	Provide knowledge on using Servlets, Applets
LO-3	Introduce JDBC and navigation of records
LO-4	Understand RMI & its implementation
LO-5	Introduce to Socket programming

LIST OF PROGRAMS

1. Display a welcome message using Servlet.
2. Design a Purchase Order form using Html form and Servlet.
3. Develop a program for calculating the percentage of marks of a student using JSP.
4. Design a Purchase Order form using Html form and JSP.
5. Prepare a Employee pay slip using JSP.
6. Write a program using JDBC for creating a table, Inserting, Deleting records and list out the records.
7. Write a program using Java servlet to handle form data.
8. Write a simple Servlet program to create a table of all the headers it receives along with their associated values.
9. Write a program in JSP by using session object.
10. Write a program to build a simple Client Server application using RMI.
11. Create an applet for a calculator application.
12. Program to send at extmessage to another system and receive the text message from the system (use socket programming).

Course Outcomes

CO No.	Upon completion of the course, the students will be able to	PSOs Addressed	Cognitive Level
CO-1	Demonstrate the web programming, using Java Applets	1,2	K1
CO-2	Prepare database connectivity using JDBC.	1,2,3	K3
CO-3	Experiment with TCP/IP communication to design network applications.	1,2,3,4	K5
CO-4	Create dynamic web pages, using Servlets.	1,2,3,4,5	K6
CO-5	Create dynamic web pages, using JSP.	1,2,3,4,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credit
II	24PCCS2P1	Advanced Java Programming Lab	60	2

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	3	3	2	2	3	2	2	2	2
CO-2	3	3	3	2	2	3	2	2	2	2
CO-3	2	2	3	2	2	3	2	2	2	2
CO-4	3	3	3	2	2	3	2	2	2	2
CO-5	3	3	3	2	2	3	2	2	2	2

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Dr. V. Roseline

Signature:

Checked by

Head of the Department

Semester - II	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING		24PECS21A			
Elective – IIIA			L	T	P	C
Hrs./Week: 4	Hrs./Semester : 60	Marks :100	3	1	-	3

General Objective:

To provide a strong foundation of fundamental concepts in Artificial intelligence, Natural Language Processing and machine learning.

Learning Objectives:

LO No.	The learners will be able to:
LO-1	Gain an understanding of AI problems, techniques, and the criteria for successful AI implementations, as well as the concepts of state space search and production systems.
LO-2	Learn heuristic search techniques, knowledge representation issues, and different approaches to representing and mapping knowledge.
LO-3	Understand how to represent facts, relationships, and rules using predicate logic, and differentiate between procedural and declarative knowledge, as well as forward and backward reasoning.
LO-4	Comprehend the fundamentals of machine learning, the role of big data, the machine learning cycle, and the impact of machine learning on various applications.

UNIT I: INTRODUCTION

Introduction: AI Problems - Al techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics - Issues in design of Search.

UNIT II: SEARCH TECHNIQUES

Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings - Approaches to Knowledge representations -Issues in Knowledge representations –Frame Problem.

UNIT III: PREDICATE LOGIC

Using Predicate logic: Representing simple facts in logic-Representing Instance and Is a relationships- Computable functions and predicates-Resolution-Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge- Logic programming – Forward Vs Backward reasoning-Matching-Control knowledge.

UNIT IV: MACHINE LEARNING

Understanding Machine Learning: What Is Machine Learning? - Defining Big Data - Big Data in Context with Machine Learning - The Importance of the Hybrid Cloud - Leveraging the Power of Machine Learning - The Roles of Statistics and Data Mining with Machine Learning-Putting Machine Learning in Context-Approaches to Machine Learning.

UNIT V: APPLICATIONS OF MACHINE LEARNING

Looking Inside Machine Learning: The Impact of Machine Learning on Applications-Data Preparation-The Machine Learning Cycle.

TEXTBOOKS:

1. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991.
2. George F Luger, "Artificial Intelligence", 4th Edition, Pearson Education Publ, 2002.

REFERENCE BOOKS:

Machine Learning For Dummies ®, IBM Limited Edition by Judith Hurwitz, Daniel Kirsch.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.ibm.com/downloads/cas/GB8ZMQZ3
2. https://www.javatpoint.com/artificial-intelligence-tutorial
3. https://nptel.ac.in/courses/106/105/106105077/

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Demon strate AI problems and techniques	1,2	K1
CO-2	Understand machine learning concepts	1,2	K2
CO-3	Apply basic principles of AIin solutions that require problem solving, inference, perception, knowledge representation, and learning	1,2,3,4	K3
CO-4	Analyze the impact of machine learning on applications	1,2,3,4,5	K4
CO-5	Analyze and design are all world problem for implementation and understand the dynamic behavior of a system	1,2,3,4,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix:

Semester	Course Code	Title of the Course	Hours	Credit
II	24PECS21A	Artificial Intelligence and Machine Learning	60	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO3	PSO4	PSO5
CO-1	1	2	3	3	3	1	2	3	3	3
CO-2	1	2	3	3	3	1	2	3	3	3
CO-3	1	1	2	2	3	1	1	2	2	3
CO-4	1	1	1	1	2	1	1	1	1	2
CO-5	1	1	1	1	1	1	1	1	1	1

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mr. K. A. Mohamed Riyazudeen

Signature:

Checked by

Head of the Department

Semester - II	ROBOTIC PROCESS AUTOMATION FOR BUSINESS		24PECS21B			
Elective – IIIB			L	T	P	C
Hrs./Week: 4	Hrs./Semester : 60	Marks :100	3	1	-	3

General Objective:

To develop proficiency in designing, deploying, and refining RPA solutions to optimize business processes, align with organizational goals, and enhance overall efficiency.

Learning Objectives:

LONo.	The learners will be able to:
LO-1	Learn the concepts of RPA, its benefits, types and models.
LO-2	Gain the knowledge in application of RPA in Business Scenarios.
LO-3	Identify measures and skills required for RPA.
LO-4	Design, build, and deploy RPA bots for business process automation
LO-5	Assess and refine RPA solutions to align with organizational objectives and improve overall efficiency.

UNIT I: INTRODUCTION

Introduction to RPA -Overview of RPA -Benefits of RPA in a business environment –Industries & domains fit for RPA - Identification of process for automation - Types of Robots - Ethics of RPA & Best Practices-Automation and RPA Concepts-Different business models for implementing RPA-Centre of Excellence –Types and their applications – Building an RPA team – Approach for implementing RPA initiatives.

UNIT II: AUTOMATION

Role of a Business Manager in Automation initiatives - Skills required by a Business Manager for successful automation-The importance of a Business Manager in automation-Analyzing different business processes - Process Mapping frameworks - Role of a Business Manager in successful implementation – Part 1 - Understanding the Automation cycle – First 3 automations tages and activities performed by different people.

UNIT III: AUTOMATION IMPLEMENTATION

Evaluating the Automation Implementation Detailed description of last 3 stages and activities performed by different people - Role of a Business Manager in successful completion – Part 2 -Activities to be performed post-implementation - Guidelines for tracking the implementation success - Metrics/Parameters to be considered for gauging success - Choosing the right licensing option-Sending emails-Publishing and Running Workflows.

UNIT IV: ROBOT

Ability to process information through scopes/systems- Understand the skill of information processing and its use in business - Leveraging

automation - Creating a Robot - New Processes.Establish causality by variable behavior-Understand the skill of drawing inference or establishing causality by tracking the behavior of a variable as it varies across time/referenced variable-Leveraging automation for this skill-Robot &new process creation.

UNIT V: ROBOT SKILL

Inference from snapshots of curated terms– Omni-source data curation - Multisource trend tracking - Understand the skill of drawing inference from the behavior of curated terms by taking snapshots across systems in reference to time/variable(s) - Leveraging automation for this skill –Robot creation and new process creation for this skill.

TEXTBOOKS:

1. Alok Mani Tripathi" Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool" Packt Publishing Limited March 2018.
2. Tom Taulli "The Robotic Process Automation Handbook" Apress, February 2020.

REFERENCE BOOKS:

1. Steve Kaelble "Robotic Process Automation" John Wiley & Sons, Ltd., 2018

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.tutorialspoint.com/uipath/uipath_robotic_process_automation_introduction.htm
2. https://www.javatpoint.com/rpa
3. https://onlinecourses.nptel.ac.in/noc19_me74/preview

Course Outcomes

CONo.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Demonstrate the benefits and ethics of RPA	1,2,4	K2
CO-2	Understand the Automation cycle and its techniques	1,2,4	K2
CO-3	Draw inferences and information processing of RPA	1,2,3,4	K4
CO-4	Implement & Apply RPA in Business Scenarios	1,2,34	K3
CO-5	Analyze on Robots & leveraging automation	1,2,3,4	K5

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix

Semester	Course Code	Title of the Course					Hours			Credit
II	24PECS21B	Robotic Process Automation for Business					60			3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	2	2	3	3	2	3	3	1	3	2
CO-2	3	3	3	2	2	3	3	1	3	2
CO-3	3	3	3	3	2	3	3	3	3	2
CO-4	3	3	2	2	3	3	3	3	3	3
CO-5	3	3	3	2	3	3	3	3	3	3

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mr. K. Ganesh Kumar

Signature:

Checked by

Head of the Department

Semester - II	MULTIMEDIA AND ITS APPLICATIONS		24PECS21C			
Elective-IIIC			L	T	P	C
Hrs./Week: 4	Hrs./Semester : 60	Marks :100	3	1	-	3

General objective:

To provide an interaction between users and digital information where multimedia as is used extensively are education, training, reference material, business presentations, advertising and documentaries.

Learning Objectives:

LO No.	The learners will be able to:
LO-1	Introduce the students the concepts of Multimedia, Images & Animation.
LO-2	Introduce Multimedia authoring tools
LO-3	Understand the role of Multimedia in Internet
LO-4	Know about High-Definition Television and Desktop Computing and Knowledge based Multimedia systems
LO-5	Know high definition multimedia systems

UNIT I: INTRODUCTION

What is Multimedia?–Introduction to making Multimedia–Macintosh and Windows Production plat forms– Basic Software tools.

UNIT II: MULTIMEDIA TOOLS

Making Instant Multimedia–Multimedia authoring tools–Multimedia building blocks–Text–Sound

UNIT III: ANIMATION

Images – Animation – Video.

UNIT IV: INTERNET

Multimedia and the Internet – The Internet and how it works – Tools for World Wide Web –Designing for the World Wide Web.

UNIT V: MULTIMEDIA SYSTEMS

High Definition Television and Desktop Computing–Knowledge based Multimedia systems.

TEXTBOOKS:

1. Tay Vaughan, “Multimedia making it work”, Fifth Edition, Tata McGraw Hill.
2. John F. Koegel Bufford, “Multimedia Systems”, Pearson Education.

REFERENCE BOOKS:

Judith Jeffloate,“Multimedia in Practice (Technology and Applications)”, PHI,2003.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.tutorialspoint.com/multimedia/index.htm
2. https://www.tutorialspoint.com/basics_of_computer_science/basics_of_computer_science_mult imedia.htm
3. https://nptel.ac.in/courses/117/105/117105083/

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the basic concepts of Multimedia	1,2	K2
CO-2	Demonstrate Multimedia authoring tools	2,3	K3
CO-3	Analyze the concepts of Sound, Images, Video & Animation	1,2,4	K5
CO-4	Apply and Analyze the role of Multimedia in Internet and real time applications	1,2,3,4,5	K6
CO-5	Create multimedia applications using HDTV	1,2,3,4,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 – Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credit
II	24PECS21C	Multimedia and its Applications	60	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	2	1	3	3	2	2	1
CO-2	3	3	2	2	2	3	1	3	2	1
CO-3	2	3	2	3	1	3	2	3	3	3
CO-4	1	2	2	2	1	2	3	3	3	2
CO-5	2	2	3	2	1	2	2	3	3	2

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name: Mrs. R. Saranya

Signature:

Checked by

Head of the Department

Semester - II	DIGITAL TECHNOLOGY		24PICS21			
Elective-IV-IDC			L	T	P	C
Hrs./Week: 2	Hrs./Semester : 30	Marks :50	2	-	-	2

General Objective:

To provide a better understanding of the orientation in the current development of the modern network technologies which are used in E-Commerce.

Learning Objectives:

LO No.	The learners will be able to:
LO-1	Understand the different types of e-commerce (B2C, B2B, C2C, and M-commerce) and their unique features.
LO-2	Learn the fundamentals of internet technology, including packet switching, TCP/IP, IP addresses, and domain names.
LO-3	Gain knowledge about the systematic approach to building an e-commerce presence, including choosing appropriate software and hardware.
LO-4	Understand the e-commerce security environment, including security threats and technology solutions.
LO-5	Explore basic ethical concepts and intellectual property rights related to e-commerce.

UNIT I: INTRODUCTION

Introduction to E-commerce – Features of E-commerce Technology - Types of E-commerce: Business-to-Consumer (B2C) E-commerce - Business-to-Business (B2B) E-commerce - Consumer-to-Consumer (C2C) E-commerce - Mobile E-commerce (M-commerce) - E-commerce: A Brief History - Understanding E-commerce: Organizing Themes

UNIT II: E-COMMERCE INFRASTRUCTURE

The Internet: Technology Background: Packet Switching, TCP/IP, IP Addresses, Domain Names and URLs, Client/Server Computing - The Web:Markup Languages, Web Servers and Clients, Web Browsers - The Internet and the Web: Features and Services: Communication Tools, Search Engines, Web 2.0 Applications and Services - Mobile Apps.

UNIT III: **BUILDING AN E-COMMERCE PRESENCE**

Building an E-commerce Presence: A Systematic Approach - Choosing Software - Choosing Hardware - Other E-commerce Site Tools: Website Design: Basic Business Considerations, Tools for Interactivity and Active Content, Personalization Tools - Developing a Mobile Website and Building Mobile Applications.

UNIT IV: **E-COMMERCE SECURITY AND PAYMENT SYSTEMS**

The E-commerce Security Environment - Security Threats in the E-commerce Environment - Technology Solutions - Management Policies, Business Procedures, and Public Laws - E-commerce Payment Systems.

UNIT V: ETHICAL, SOCIAL, AND POLITICAL ISSUES IN E-COMMERCE

Understanding Ethical, Social, and Political Issues in E-commerce: Basic Ethical Concepts - Responsibility, Accountability, and Liability-Analyzing Ethical Dilemmas, Candidate Ethical Principles - Intellectual Property Rights: Types of Intellectual Property Protection, Copyright: the Problem of Perfect Copies and Encryption.

TEXTBOOK(S):

1. Kenneth C.Laudon, Carlo Guercio Traver, “E- Commerce-business, Technology, Society," Pearson Education 2017. Unit I –(Chapter 1), Unit II –(Chapter 3), Unit III –(Chapter 4), Unit IV –(Chapter 5), Unit V –(Chapter 8)
2. Mike Papazologn, "E-Business, Organizational and Technical Foundations," Wiley India Pvt Ltd, 2008.

REFERENCE(S):

1. Elias M. Awad, "Electronic Commerce", Prentice-Hall of India, 2008.

Course Outcomes

CONo.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the concept of E-Commerce	1,2,5	K2
CO-2	Carry out the business through online technology	1,2,3,5	K3
CO-3	Select tools to build an e-commerce website.	1,2,3,4,5	K4
CO-4	Predict the key security threats in the e-commerce environment and identify the secure payment system.	1,2,3,5	K5
CO-5	Solve the problem of intellectual property rights and online privacy.	1,2,3,4,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix

Semester	Course Code			Title of the Course				Hours	Credit
II	24PICS21			Digital Technology				30	2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	1	1	3	3	2	1	1	3	3	2
CO-2	1	1	2	3	2	1	1	2	3	2
CO-3	1	1	2	2	2	1	1	2	2	2
CO-4	1	1	2	3	2	1	1	2	3	2
CO-5	1	1	2	2	2	1	1	2	2	2

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by

Name :Mr. K. A. Mohamed Riyazudeen

Signature :

Checked by

Head of the Department

Semester - II	ADVANCED JAVA PROGRAMMING		24PSCS21			
SEC-I			L	T	P	C
Hrs./Week: 4	Hrs./Semester : 60	Marks :100	4	-	-	3

General Objective:

To understand the knowledge of Advanced Java Programming such as JDBC, Servlet and JSP.

Learning Objectives:

LONo.	The learners will be able to
LO-1	Demonstrate proficiency in Java basics
LO-2	Comprehend the principles of Remote Method Invocation (RMI)
LO-3	Acquire the knowledge and skills necessary to interact with databases using Java Database Connectivity (JDBC)
LO-4	Proficient in developing Java Servlets for server-side programming
LO-5	Demonstrate advanced Java programming skills by creating JAR file formats for application packaging

UNIT I: BASICS OF JAVA

Java Basics Review: Components and event handling – Threading concepts – Networking features- Media techniques**.**

UNIT II: REMOTE METHOD INVOCATION

Remote Method Invocation - Distributed Application Architecture - Creating stubs and skeletons –Defining Remote objects –Remote Object Activation - Object Serialization – Java Spaces.

UNIT III: DATABASE

Java in Databases - JDBC principles – database access – Interacting - database search – Creating multimedia databases–Database support in web applications.

UNIT IV: SERVLETS

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 – Scriptlets – Directives – Declarations – A complete example.

UNIT V: ADVANCED TECHNIQUES

JAR file form at creation – Internationalization – Swing Programming – Advanced java Techniques.

TEXTBOOKS:

1. Jamie Jaworski, “Java Unleashed”, SAMS Tech media Publications, 1999.
2. Campione, Walrath and Huml, “The Java Tutorial”, Addison Wesley, 1999.

REFERENCE BOOKS:

1. Jim Keogh, ”The Complete Reference J2EE”,Tata McGrawHill Publishing Company Ltd, 2010.
2. David Sawyer McFarland, “JavaScript And JQuery-The Missing Manual”, Oreilly Publications, 3rd Edition, 2011.
3. Deitel and Deitel, “Java How to Program”, Third Edition, PHI/Pearson Education Asia.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.javatpoint.com/servlet-tutorial
2. https://www.tutorialspoint.com/java/index.htm
3. https://onlinecourses.nptel.ac.in/noc19_cs84/preview

Course Outcomes

CONo.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Understand the advanced concepts of Java Programming	1,2	K1
CO-2	Understand JDBC and RMI concepts	1,2	K1
CO-3	Apply and analyze Java in Database	1,2,5	K3
CO-4	Handle different event in java using the delegation event model, event listener and class	1,2,5	K4
CO-5	Design interactive applications using Java Servlet, JSP and JDBC	1,2,3,4,5	K6

K1-Remembering; K2 – Understanding; K3 - Applying; K4 - Analyzing; K5 – Evaluating; K6 - Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credit
II	24PSCS21	Advanced Java Programming	60	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	2	3	2	1	1	1	1	1	1	1
CO-2	1	2	2	1	1	1	1	1	1	1
CO-3	2	2	3	1	1	1	1	2	1	1
CO-4	1	2	2	2	1	1	1	2	1	1
CO-5	1	2	3	1	2	2	2	2	1	2

STRONG (3), MEDIUM (2) and LOW (1)

Prepared by
Name: Dr. V. Roseline
Signature:

Checked by
Head of the Department