



MARUDHAR KESARI JAIN COLLEGE FOR WOMEN (AUTONOMOUS)

Vaniyambadi – 635 751

PG Department & Research Department of Computer Science

for

Postgraduate Programme in Computer Science

From the Academic Year 2024-25

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1. Preamble

Master of Science (M.Sc.) programme in Computer Science is established in the year 1999 is a 2 year Postgraduate programme spread over four semester. Master of Philosophy established in the year 2012 and Doctor of Philosophy established in the year 2021 is a dynamic and comprehensive academic journey designed to equip students with a strong foundation in the principles and practices of computing. The course is designed to achieve high degree of technical skills in problem solving and application development. The course develops requisite professional skills and problem-solving abilities for pursuing a successful career in software industry and forms the required basics for pursuing higher studies in computer science.

PROGRAMME OUTCOMES (PO)

Programme	M.Sc. Computer Science
Programme Code	PS03
Duration	2 years [PG]
Programme Outcomes	<p>PO1: Acquire knowledge in Computer Science to apply the knowledge in their day-to-day life for betterment of self and society.</p> <p>PO2: Develop critical, analytical thinking and problem-solving skills.</p> <p>PO3: Develop research related skills in defining the problem, formulate and test the hypothesis, analysis, interpret, and draw conclusion from data.</p> <p>PO4: Address and develop solutions for societal and environmental needs of local, regional and national development.</p> <p>PO5: Work independently and engage in life long learning and enduring proficient progress.</p> <p>PO6: Provoke employability and entrepreneurship among students along with ethics and communication skills.</p> <p>PO7: Understand the importance of ethical behavior in business contexts and be able to recognize and address ethical dilemmas they may encounter in their professional careers.</p> <p>PO8: Prepared for life long learning and professional development, including the ability to adapt to changes in technology, business practices, and economic conditions throughout their careers.</p>

Programme Specific Outcomes:	<p>PSO1: Computer Science for Real-World Problem Solving Demonstrate the ability to apply computer science principles, mathematical modeling, and computational techniques to analyze and solve complex real-world problems.</p> <p>PSO2: Ethical and Responsible Computing Exhibit professionalism and ethical responsibility in designing and developing computing solutions while ensuring compliance with cyber regulations, laws, and industry standards.</p> <p>PSO3: Innovation and Entrepreneurship in Technology Leverage creativity, innovation, and entrepreneurial skills to develop and implement technology-driven solutions for societal and business challenges.</p>
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Eligibility for Admission:

A candidate who has passed the B.Sc. Degree Examination in Computer Science or Computer Science and Technology or B.C.A. or B.Sc. Software Computer Science of this University or an Examination of any other University accepted by the Syndicate as equivalent thereto shall be permitted to appear and qualify for the Master of Science (M.Sc.) in Computer Science Degree Examination of this University after a Course of two academic years in an affiliated Colleges / Department of this University.

Methods of Evaluation and Assessment

Methods of Evaluation		
Internal Evaluation		25 Marks
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand / Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview	
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate Between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Semester – I							Semester - II						
Code	Course Title	Hours Distribution				C	Code	Course Title	Hours Distribution				C
		L	T	P	S				L	T	P	S	
24PCSC11	CC – 1 Principles of Compiler Design	3	1	2	0	4	24PCSC21	CC - 4 Advanced Operating Systems	3	1	2	0	4
24PCSC12	CC – 2 Analysis and Design of Algorithms	3	1	2	0	4	24PCSC22	CC - 5 Advanced Java Programming	3	1	2	0	4
24PCSC13P	CC - 3 Practical Analysis and Design of Algorithms Lab	0	0	4	0	3	24PCSC23P	CC - 6 Practical Advanced Operating Systems Lab (Linux)	0	0	4	0	3
24PCSE11	EC – 1 Advanced Python Programming	3	1	1	0	3	24PCSC24P	CC - 7 Advanced Java Programming Lab	0	0	4	0	3
24PCSE12P	EC – 2 Machine Learning using Python Lab	0	0	5	0	3	24PCSE21	EC – 3 1.Artificial Intelligence 2.Advanced Software Engineering	2	1	1	0	3
24PCSA11	AECC – 1 Cloud Computing	1	1	0	0	2	24PCSE22	EC – 4 Web Services	2	1	1	0	3
24PCHR11	VE - 1 Human Rights	1	1	0	0	2	24PCSS21	SEC - 1 (NME) Internet concepts and Web Development	1	1	0	0	2
					30	21						30	22

L-Lecture

T-Tutorial

P-Practical

S-Seminar

C-Credit

Students must complete at least one online course (MOOC) from platforms like SWAYAM, NPTEL, or Nanmudalvan within the fifth semester. Additionally, engaging in a specified Self-learning Course is mandatory to qualify for the degree, and successful participation will be acknowledged with an extra credit of 2*.

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCSC11	CC-1 Principles of Compiler Design	Core	3	1	2	0	4	6	25	75	100
Learning Objectives											
LO1	To introducing Grammar, Finite Automata, Parser, Syntax Tree and Code Generation.										
LO2	To enable the students to learn about different phases of Compiler.										
LO3	To learn about Conversion of Source Code to Object Code.										
LO4	To recognize the underlying formal models such as finite state automata, push-down automata and their connection to language definition through regular expressions and grammars.										
LO5	To describe the steps and algorithms used by compilers										
Unit	Content										Hours
1	Introduction to Compiling– Compilers–Analysis of the Source Program–Phases of a Compiler. Grouping of Phases–Compiler Construction Tools.										18
2	Lexical Analysis – Role of the Lexical Analyzer – Specification and Recognition of Tokens –Language for specifying Lexical Analyzer – Finite Automata – Regular Expressions to NFA –Design of Lexical Analyzer Generator– Optimization of DFA based pattern matchers.										18
3	Syntax Analysis–Role of Parser–Context Free Grammars–Top Down Parsing– Bottom Up Parsing–Operator Precedence Parsing–LR Parsers.										18
4	Syntax Directed Translation: Syntax Directed Definitions–Construction of Syntax Trees–Bottom Up evaluation of attributed definition – Bottom Up evaluation of inherited attributes – Recursive evaluators.										18
5	Intermediate Code Generation: Intermediate Languages – Declaration – Assignment Statements. Procedure Calls–Runtime Storage Management. Code Generation and Optimization: Basic Blocks and Flow Graphs–DAG Representation.										18

CO	Course Outcomes
CO1	Understand the phases and tools available in Compiler
CO2	Design and implement a Lexical Analyzer
CO3	Compare and analyze different types of Compilers
CO4	Specify appropriate translations to generate Intermediate Code
CO5	Identify sources for Code Optimization
Textbooks:	
1	Compilers–Principles, Techniques and Tools–Alfred Aho, Ravi Sethi, JeffreyD. Ullman, Pearson
2	Modern Compiler Design–Dick Grune, Bal, Langendoen, Jacobs, Wiley
3	Compiler Design–K. Muneeswaran, Oxford University Press:
Reference Books:	
1	Modern Compiler Design–David Galles, Pearson EducationAsia:2001
2	Advanced Compiler Design and Implementation–Steven S.Muchnick, Morgan Kaufmann Publishers:2000
3	Craftinga Compiler with C–C.N.Fisher, R.J.LeBlane, Pearson Education:2000
Web resources:	
1	https://www.geeksforgeeks.org/introduction-of-lexical-analysis/
2	https://www.tutorialspoint.com/compiler_design/compiler_design_tutorial.pdf

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	1	2	1	3	2	3
CO2	3	3	3	3	3	2	3	2	3	3	3
CO3	3	3	3	3	3	2	3	2	3	3	3
CO4	3	3	3	3	3	2	3	2	3	3	3
CO5	3	3	3	3	3	2	3	2	3	3	3
Total	15	14	15	14	15	9	14	9	15	15	15
Average	3	3	3	3	3	2	3	2	3	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCSC12	Analysis and Design of Algorithms	Core	3	1	2		4	6	25	75	100
Learning Objectives											
LO1	To analyze the asymptotic performance of algorithms										
LO2	To write rigorous correctness proofs for algorithms										
LO3	To demonstrate a familiarity with major algorithms and data structures										
LO4	To discuss various methods like Basic Traversal and Search Techniques, Divide and Conquer method, Dynamic programming, backtracking										
LO5	To a properly designed algorithm can notably improve the performance of a program, leading to quicker execution instances and reduced resource utilization										
Unit	Content										Hours
1	Introduction: - Algorithm Definition and Specification – Space complexity-Time Complexity-Asymptotic Notations - Elementary Data Structure: Stacks and Queues – Binary Tree – Binary Search Tree-Graph.										18
2	Basic Traversal and Search Techniques: Techniques for Binary Trees-Techniques for Graphs -Divide and Conquer:-General Method–Binary Search–Merge Sort–Quick Sort.										18
3	The Greedy Method: - General Method – Knapsack Problem– Minimum Cost Spanning Tree–Single Source Shortest Path.										18
4	Dynamic Programming-General Method–Multistage Graphs–All Pair Shortest Path–Optimal BinarySearchTrees–0/1 Knapsacks–Traveling Salesman Problem.										18
5	Backtracking:-General Method–8-Queens Problem–Sum Of Subsets – Graph Coloring–Hamiltonian Cycles – Branch And Bound:-The Method –Traveling Salesperson										18

CO	Course Outcomes
CO1	Get knowledge about algorithms and determine their time complexity. Demonstrate specific search and sort algorithms using divide and conquer technique
CO2	Gain good understanding of Greedy method and its algorithm
CO3	Able to describe about graphs using dynamic programming technique
CO4	Explore the traversal and searching technique and apply it for trees and graphs
CO5	Demonstrate the concept of backtracking & branch and bound technique
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	Good rich, "Data Structures & Algorithms in Java", Wiley 3 rd 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, Philippe Flajolet, "An Introduction to the Analysis of Algorithms".
5	Addison - Wesley Publishing Company, 1996.
Web Resources:	
1	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
2	https://www.javatpoint.com/daa-tutorial

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	1	2	1	3	2	3
CO2	3	3	3	3	3	2	3	2	3	3	3
CO3	3	3	3	3	3	2	3	2	3	3	3
CO4	3	3	3	3	3	2	3	2	3	3	3
CO5	3	3	3	3	3	2	3	2	3	3	3
Total	15	15	15	15	15	15	15	15	15	15	15
Average	3	3	3	3	3	2	3	2	3	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: FIRST SEMESTER

Course Code	Course Name Core Course	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCS13P	CC-2 Analysis and Design of Algorithm Lab	Core	0	0	4	0	3	4	25	75	100
Learning Objectives											
LO1	To learn and implement fundamental algorithms and data structures like binary search, stack, queue, merge sort, and quick sort.										
LO2	To sharpen problem-solving abilities by applying algorithmic techniques to solve real-world problems such as Tower of Hanoi, knapsack problem, and 8-queens problem.										
LO3	To master recursion principles and techniques by implementing recursive solutions to problems like Tower of Hanoi.										
LO4	To explore graph theory and algorithms covering traversing binary search trees, minimum cost spanning tree, and single-source shortest path										
LO5	To gain insight into algorithmic paradigms such as greedy algorithms and dynamic programming and understand their application through implementation of algorithms like greedy knapsack.										
	List of Programs									Hours	
	<ol style="list-style-type: none"> Write a program for Binary Search. Write a program to perform the operations on Stack. Write a program to perform the operations on Queue. Write a program to sort a given array of elements using Merge Sort. Write a program to sort a given array of elements using Quick Sort. Write a program to solve the tower of Hanoi using recursion. Write a program to traverse binary search tree. Write a program to solve the knapsack problem using a greedy method. Write a program to place the 8 queens on an 8 X 8 matrix so that no two queens Attack. Write a program for Minimum Cost Spanning Tree. Write a program for Single Source Shortest Path. Write a program for Sum of Subsets. 									60	

CO	Course Outcomes
CO1	Get knowledge about algorithms and determine their time complexity. Demonstrate specific search and sort algorithms using divide and conquer technique
CO2	Gain good understanding of Greedy method and its algorithm
CO3	Able to describe about graphs using dynamic programming technique
CO4	Explore the traversal and searching technique and apply it for trees and graphs
CO5	Demonstrate the concept of backtracking & branch and bound technique
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 3 rd 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 Sedgwick, Philippe Flajolet, "An Introduction to the Analysis of Algorithms".
5	Addison - Wesley Publishing Company, 1996.
Web resources:	
1	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
2	https://www.javatpoint.com/daa-tutorial

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	1	2	1	3	2	3
CO2	3	3	3	3	3	2	3	2	3	3	3
CO3	3	3	3	3	3	2	3	2	3	3	3
CO4	3	3	3	3	3	2	3	2	3	3	3
CO5	3	3	3	3	3	2	3	2	3	3	3
Total	15	15	15	15	15	15	15	15	15	15	15
Average	3	3	3	3	3	2	3	2	3	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: FIRST SEMESTER

Course Code	Course Name Elective Course	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCSE11	EC-1 Advanced Python Programming	EC	3	1	1	0	3	5	25	75	100
Learning Objectives											
LO1	To build basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions										
LO2	To learning about conditional statements, checking for certain items in lists, and combining strings using the addition assignment operator.										
LO3	To understand File operations, Classes, and Objects										
LO4	To understanding the concepts Machine Learning										
LO5	To understand a range of the key algorithms and approaches to machine learning										
Unit	Content									Hours	
1	Python:Introduction–Numbers–Strings–Variables–Lists–Tuples–Dictionaries–Sets–Comparison.									15	
2	Code Structures: if, else if, and else–Repeat with while– Iterate with for–Comprehensions–Functions–Generators–Decorators–Namespaces and Scope–Handle Errors with try and except–User Exceptions.									15	
3	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 In self Defense–Get and Set Attribute Values with Properties –Name Mangling for Privacy –Method Types–Duck Typing.									15	
4	Machine learning: What and why?-Types of Machine Learning - Supervised Learning - Unsupervised Learning – reinforcement- The Curse of dimensionality-Over fitting and linear regression- Bias and Variance - Learning Curve-Classification-Error and noise-Parametric vs. non-parametric models-Linear models									15	
5	Measuring (dis)similarity - Evaluating the output of clustering method-Spectral clustering - Graph Laplacian - Normalized graph Laplacian- Hierarchical clustering -Agglomerative clustering - Divisive clustering - Choosing the number of clusters- Bayesian hierarchical clustering- Clustering data points and features- Bi-clustering- Multi-view clustering- K-Means clustering									15	

CO	Course Outcomes
CO1	Understand the basic concepts of Python Programming
CO2	Understand File operations, Classes, and Objects
CO3	Acquire Object Oriented Skills in Python
CO4	Understanding the Concepts of Machine Learning
CO5	Understanding the key algorithm of machine learning
Textbooks:	
1	BillLubanovic, “Introducing Python”,O’Reilly,First Edition-Second Release.
2	MarkLutz, “Learning Python”, O’Reilly, Fifth Edition.
3	Jeeva Jose and P. SojanLal, —Introduction to Computing and Problem Solving with Python, Khanna Book Publisng Co. (P) Ltd., 2016.
4	Machine Learning : A Practitioner's Approach Chandra S.S., Vinod Hareendran S., Anand 2021
Reference Books:	
1	David M.Beazley, “Python EssentialReference”, Developer’s Library, Fourth Edition,2009
2	Sheetal Taneja, Naveen Kumar, “Python Programming-A Modular Approach”, Pearson Publications.
3	Python Programming using problem solving approach reema Thareja 2023, second edition
4	Python Machine Learning, Third Edition is a comprehensive guide to machine learning and deep learning with Python,7 Sebastian Raschka (Author), Vahid Mirjalili , December 2019
5	Introduction to Machine Learning with Python, by Andreas C. Muller, Sarah Guido September 2016
Web resources:	
1	https://www.geeksforgeeks.org/introduction-machine-learning/
2	https://www.programiz.com/python-programming/
3	https://www.geeksforgeeks.org/machine-learning/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	2	3	3	3	3	2	3	3	3	3	2
CO3	3	3	2	3	2	3	3	3	2	3	3
CO4	3	3	3	3	3	2	1	3	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	14	15	12	15	14	13	13	15	14	15	14
Average	3	3	2	3	3	2	3	3	3	3	3

1st YEAR: FIRST SEMESTER

Course Code	Course Name Elective Course	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCSE12P	EC-2 Machine Learning using Python Lab	EC	3	1	1	0	3	5	25	75	100
Learning Objectives											
LO1	To introduce students to the basic knowledge of programming fundamentals of Python										
LO2	Understand and implement the program use basic flow control, including for loops and conditionals										
LO3	Understand and implement the handling of exception										
LO4	Understand and implement the procedures for machine learning algorithms										
LO5	Apply appropriate datasets to the Machine Learning algorithms										
Unit	Content									Hours	
	1. Write Programs using elementary data items, lists, dictionaries, and tuples. 2. Write a Programs using conditional branches, 3. Write Programs using loops. 4. Write Programs using functions. 5. Write a Programs using exception handling. 6. Write a Programs using inheritance. 7. Write a program to train dataset to find mean median mode using numpy. 8. Write a program to draw the line of Linear Regression. 9. Extract the data from database using python 10. Implement k-nearest neighbors classification using python									75	

CO	Course Outcomes
CO1	Able to write programs in Python using OOPS concepts
CO2	To understand the concepts of File operations and Modules in Python
CO3	Implementation of lists, dictionaries, sets and tuples as programs
CO4	Effectively use the various machine learning tools
CO5	Design Python programs for various machine learning algorithms
Textbooks:	
1	Bill Lubanovic, “Introducing Python” , O’Reilly, First Edition-Second Release,2014.
2	MarkLutz, “Learning Python” ,O’Reilly, Fifth Edition, 2013.
Reference Books:	
1	David M.Beazley, “Python EssentialReference”, Developer’s Library, Fourth Edition,2009.
2	Sheetal Taneja, Naveen Kumar, ”Python Programming- A Modular Approach”, Pearson Publications.
Web resources:	
1	https://www.geeksforgeeks.org/python-programming-language/
2	https://www.geeksforgeeks.org/machine-learning/
3	https://www.w3schools.com/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	2	3	3	3	3	2	3	3	3	3	2
CO3	3	3	2	3	2	3	3	3	2	3	3
CO4	3	3	3	3	3	2	1	3	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	14	15	12	15	14	13	13	15	14	15	14
Average	3	3	2	3	3	2	3	3	3	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: FIRST SEMESTER

Course Code	Course Name AECC	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCSA11	AECC -1 Cloud Computing	AECC	1	1	0	0	2	2	25	75	100
Learning Objectives											
LO1	To provide students with the fundamentals and essentials of Cloud Computing.										
LO2	To provide students are able to start using and adopting Cloud Computing services and tools in their real life scenarios.										
LO3	To Gain knowledge on cloud computing, cloud services, architectures, and applications										
LO4	To how to store and share, in and from cloud										
LO5	To the concepts of virtualization and use of cloud service models										
Unit	Content									Hours	
1	Introduction: Cloud Computing Introduction, From, Collaboration to cloud, Working of cloud computing, pros and cons, benefits, developing cloud computing services, Cloud service development, discovering cloud services									6	
2	Cloud Computing For Everyone: Centralizing email communications, cloud computing for community, collaborating on schedules, collaborating on group projects and events, cloud computing for corporation, mapping and schedules.									6	
3	Using Cloud Services: Collaborating on calendars, Schedules and task management, exploring online scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management.									6	
4	Outside The Cloud: valuating web mails services, Evaluating instant messaging, Evaluating web conference tools, creating groups on social networks, Evaluating online groupware.									6	
5	Storing And Sharing: Understanding cloud storage, evaluating online file storage, exploring on line book marking services, exploring on line photo editing applications, exploring photo sharing communities, controlling it with web based desktops.									6	

CO	Course Outcomes
CO1	To understand the principles and paradigm of Cloud Computing
CO2	Ability to design and deploy Cloud Infrastructure
CO3	Understand cloud security issues and solutions
CO4	Ability to understand role of Virtualization Technologies
CO5	Design & develop backup strategies for cloud data based on features
Textbooks:	
1	Michael Miller, "Cloud Computing", Pearson Education, New Delhi.
2	Nikos Antonopoulos, Lee Gillam: "Cloud Computing: Principles, Systems and Applications", Springer, 2012
3	Douglas Comer, The Cloud Computing Book: The Future of Computing Explained, Edition 1, Publisher ,Chapman and Hall/CRC, 2021
4	Lizhe Wang, Rajiv Ranjan, Jinjun Chen, Boualem Benatallah: O'Reilly "Cloud Computing Methodology, System and Applications",2017
Reference Books:	
1	To by Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach, McGraw Hill, 2010
2	Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Helper, Cloud Computing for Dummies, Wiley, 2010.
Web resources:	
1	https://www.tutorialspoint.com/cloud_computing/index.htm
2	https://www.javatpoint.com/cloud-computing-tutorial

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	3	3	3	3	3	3
CO2	3	2	3	2	2	3	2	2	2	3	3
CO3	3	3	3	2	2	2	3	2	2	3	3
CO4	3	2	3	2	2	3	2	2	2	3	3
CO5	3	3	3	2	2	2	3	2	2	3	3
Total	15	13	15	10	10	13	13	11	11	15	15
Average	3	2	3	2	2	2	2	2	2	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name Core Course	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCSC21	Advanced Operating Systems	Core	3	1	2	0	4	6	25	75	100
Learning Objectives											
LO1	To enable the students to learn the different types of operating systems and their functioning.										
LO2	To gain knowledge on Distributed Operating Systems										
LO3	To gain insight into the components and management aspects of real time and mobile operating systems										
LO4	To learn case studies in Linux Operating Systems										
LO5	To learn about File Systems and Storage										
Unit	Content										Hour
1	Basics of Operating Systems: What is an Operating System - Main frame Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments – Process Scheduling – Cooperating Processes – Inter Process Communication - Deadlocks – Prevention –Avoidance – Detection – Recovery.										18
2	Distributed Operating Systems: Issues – Communication Primitives – Lampert’s Logical Clocks –Deadlock handling strategies – Issues in deadlock detection and resolution-distributed file systems– design issues – Case studies – The Sun Network File System-Coda.										18
3	Realtime Operating Systems : Introduction – Applications of Real Time Systems – Basic Model of Real Time System – Characteristics – Safety and Reliability - Real Time Task Scheduling										18
4	Operating Systems for Handheld Systems : Requirements–Technology Overview–Handheld Operating Systems–Palm OS-Symbian Operating System-Android–Architecture of android– Securing handheld systems										18
5	Case Studies : Linux System: Introduction – Memory Management – Process Scheduling –Scheduling Policy - Managing I/O devices – Accessing Files- iOS : Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer - File System.										18

CO	Course Outcomes
CO1	Understand the design issues associated with operating systems.
CO2	Master various process management concepts including scheduling, deadlocks, and distributed file systems
CO3	Prepare Real Time Task Scheduling
CO4	Analyze Operating Systems for Handheld Systems
CO5	Analyze Operating Systems like LINUX and IOS
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”, 3 rd edition, O’Reilly, 2005
4	Neil Smyth, “iPhone OS4 Development Essentials–Xcode”, Fourth Edition, Payload media, 2011.
Web resources:	
1	https://www.geeksforgeeks.org/introduction-of-operating-system-set-1/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	2	2	2	3
CO2	3	3	2	3	2	3	2	3	3	3	2
CO3	2	3	2	3	3	2	2	3	3	3	2
CO4	3	2	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	3	3	2	3	3	3	2
Total	14	14	10	15	13	14	11	14	14	14	12
Average	3	3	2	3	3	3	2.2	3	3	3	2

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name Core Course 2	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCSC22	CC-2 Practical-Advanced Operating Systems Lab(LINUX)	Core Practical	0	0	4	0	3	4	25	75	100
Learning Objectives											
LO1	To understand the design issues associated with operating systems.										
LO2	To master various process management concepts including scheduling, deadlocks, and distributed file systems										
LO3	To prepare Real Time Task Scheduling										
LO4	To analyze Operating Systems for Handheld Systems										
LO5	To analyze Operating Systems like LINUX and Ios										
List of Programs											
1. Basic Linux Commands 1. Shell Scripting 2. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or directory and reports accordingly. Whenever the argument is a file it reports no of lines present in it. 3. File handling utilities ,Process utilities, Disk utilities Networking commands, Filters, Text processing Utilities Backup utilities 4. Write a C program to implement kill(), raise() and sleep()functions. 5. Write a C program that illustrates two processes communicating using Shared memory. 6. Simulate the following CPU scheduling algorithms. a)FCFS b) SJF c) Round Robin d) Priority. 7. Write a C program to simulate disk scheduling algorithms. a) FCFS b) SCAN c) C-SCAN 9. Simulate Bankers Algorithm for Dead Lock 10. Simulate all page replacement algorithms a) FIFO b) LRU c) OPTIMAL										60	

CO	Course Outcomes
CO1	Understand the design issues associated with operating systems.
CO2	Master various process management concepts including scheduling, deadlocks, and distributed file systems
CO3	Prepare Real Time Task Scheduling
CO4	Analyze Operating Systems for Handheld Systems
CO5	Analyze Operating Systems like LINUX and IOS
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 EducationIndia,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”,3 rd edition, O’Reilly,2005
4	Neil Smyth, “iPhonei OS4 Development Essentials–Xcode”, Fourth Edition, Payload media, 2011.
Web resources:	
1	https://www.geeksforgeeks.org/introduction-of-operating-system-set-1

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	2	2	2	3
CO2	3	3	2	3	2	3	2	3	3	3	2
CO3	2	3	2	3	3	2	2	3	3	3	2
CO4	3	2	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	3	3	2	3	3	3	2
Total	14	14	10	15	13	14	11	14	14	14	12
Average	3	3	2	3	3	3	2.2	3	3	3	2

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name Core Course	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCSC23P	Advanced Java Programming	Core	3	1	2	0	4	6	25	75	100
Learning Objectives											
LO1	To enable the students to learn the basic functions, principles and concepts of advanced java programming.										
LO2	To learn why Java is useful for the design of desktop and web applications.										
LO3	To learn how to design a graphical user interface (GUI) with Java Swing										
LO4	To understand how to design applications with threads in Java										
LO5	To learn JDBC, Servlet packages, JQuery, Java Server Pages										
Unit	Content									Hour	
1	Advanced Java Framework : component, container, window, frame, panel- AWT controls and Layout Managers - AWT Controls : Labels, buttons, checkbox, scroll bars, text field, text area. Use of Layout Managers- Media Techniques									18	
2	Introduction to Swing : Swing features, Difference between AWT and Swing. Swing Components: JApplet, Icons and Labels, Text Fields, Combo Boxes -Buttons- Advanced Swing Components: Tabbed Panes, Scroll Panes, Trees, Tables, Progress bar, tool tips-Remote Method Invocation - Creating Stubs and skeletons-Remote object Activation – Java Spaces									18	
3	Java in Databases-JDBC principles–database access-Interacting-database search– The delegation Event Model: Event sources, Event listeners - Event classes - Event Listener interfaces – Mouse Listener Interface -Creating multimedia databases – Database support in web applications - Threading concepts – Networking features .									18	
4	The life cycle of a Servlet – Creating simple Servlet – Handling HTTP Request and Response-sending data to a client and writing the http response header-Cookies and Session Tracking – Introduction to JSP. The Networking classes and interfaces. Inet Address: Factory Methods, Instance Methods. TCP/IP Client Sockets: Who is URL: Formate, The URL Class.									18	
5	Introduction to JDBC , ODBC JDBC Architecture: - Types of JDBC Drivers- Drivers Interfaces and Driver Manager class – Advanced Java Techniques									18	

CO	Course Outcomes
CO1	Develop GUI programs using AWT components for the given problem
CO2	Develop a program using menu and Dialog Boxes for the given problem
CO3	Use relevant type of JDBC Driver for the specified environment
CO4	Develop program for Client/Server Communication through TCP/IP Server sockets for the given problem
CO5	Use delegation event model to develop event driven program for the given problem
Textbooks:	
1	Herbert Schildt - The Complete Reference Java - Tata McGraw Hill Publishing Company Limited Edition 7, 2007.
2	Holzner, Steven et al-Java 2 Programming Black Book –Deramtech Press, New Delhi .ISBN 10 : 817722655X / ISBN 13 : 9788177226553
3	Phil Hanna - JSP 2.0: The Complete Reference -Tata McGraw Hill Publishing Company Limited, Edition 2, 2003
Reference Books:	
1	P. Naughton and H. Schildt - Java2: The Complete Reference - Tata McGraw Hill Publishing Company Limited, Edition 3, 1999.
2	K. Arnold and J. Gosling - The Java Programming Language - Edition 2, Publication, 2000
3	Deitel & Deitel,"Java How to program", 8th ed., PHI.
Web resources:	
1	https://www.tutorialspoint.com/java
2	https://www.javatpoint.com/servlet-tutorial
3	https://www.javatpoint.com/free-java-projects

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	2	2	2	3
CO2	3	3	2	3	2	3	2	3	3	3	2
CO3	2	3	2	3	3	2	2	3	3	3	2
CO4	3	2	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	3	3	3	3	3	3	2
Total	14	14	10	15	13	14	12	14	14	14	12
Average	3	3	2	3	3	3	3	3	3	3	2

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name Core Course 2	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCSC24P	CC-2 Practical- Advanced Java Programming Lab	Core	0	0	4	0	3	4	25	75	100
Learning Objectives											
LO1	To explore advanced topic of Java programming for solving problems and Multi threading and file concepts										
LO2	To perform Font Animation using Java Applets										
LO3	To create a student database using JDBC concepts										
LO4	To implement client server and employee details using Java										
LO5	To create dynamic web pages, using Servlets and JSP										
List of Programs											
1. Multi threading Using Priorities 2. File & String Manipulations 3. Write an Applet Program to use various Controls and perform Font Animation. 4. Create a menu with sub menu, popup menu, short cut keys, check box items and separator. 5. Implement calculator using Java AWT controls. 6. Create a Student mark statement using JDBC control and display the information using Table. 7. Program to implement Client/Server technology. 8. Write a Java program to create an Employee pay bill calculation using various swing controls. 9. Write a servlet to display the user name and password accepted from the client 10. Write a servlet for demonstrating the concept of session and cookies											60

CO	Course Outcomes
CO1	Develop GUI programs using AWT components for the given problem
CO2	Develop a program using menu and Dialog Boxes for the given problem
CO3	Use relevant type of JDBC Driver for the specified environment
CO4	Develop program for Client/Server Communication through TCP/IP Server sockets for the given problem
CO5	Use delegation event model to develop event driven program for the given problem
Textbooks:	
1	Herbert Schildt - The Complete Reference Java - Tata McGraw Hill Publishing Company Limited Edition 7, 2007.
2	Holzner, Steven et al-Java 2 Programming Black Book –Deramtech Press, New Delhi .ISBN 10 : 817722655X / ISBN 13 : 9788177226553
3	Phil Hanna - JSP 2.0: The Complete Reference -Tata McGraw Hill Publishing Company Limited, Edition 2, 2003
Reference Books:	
1	P. Naughton and H. Schildt - Java2: The Complete Reference - Tata McGraw Hill Publishing Company Limited, Edition 3, 1999.
2	K. Arnold and J. Gosling - The Java Programming Language - Edition 2, Publication, 2000
3	Deitel & Deitel,"Java How to program", 8th ed., PHI.
Web resources:	
1	https://www.tutorialspoint.com/java
2	https://www.javatpoint.com/servlet-tutorial
3	https://www.javatpoint.com/free-java-projects

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	2	2	2	3
CO2	3	3	2	3	2	3	2	3	3	3	2
CO3	2	3	2	3	3	2	2	3	3	3	2
CO4	3	2	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	3	3	3	3	3	3	2
Total	14	14	10	15	13	14	12	14	14	14	12
Average	3	3	2	3	3	3	3	3	3	3	2

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name Core Course	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCSE21	Artificial Intelligence	Elective	2	1	1	0	3	4	25	75	100
Learning Objectives											
LO1	To understand the need for ensuring ethics in AI										
LO2	To understand ethical issues with the development of AI agents										
LO3	To apply the ethical considerations in different AI applications										
LO4	To evaluate the relation of ethics with nature										
LO5	To overcome the risk for Human rights and other fundamental values.										
Unit	Content									Hour	
1	Role of Artificial Intelligence in Human Life, Understanding Ethics, Why Ethics in AI? Ethical Considerations of AI, Current Initiatives in AI and Ethics, Ethical Issues with our relationship with artificial Entities									12	
2	AI Governance by Human-right centered design, Normative models, Role of professional norms, Teaching Machines to be Moral.									12	
3	Accountability in Computer Systems, Transparency, Responsibility and AI. Race and Gender, AI as a moral right-holder.									12	
4	Perspectives on Ethics of AI, Integrating ethical values and economic Value, Automating origination AI a Binary approach, Machine learning values, Artificial Moral Agents									12	
5	Ethics of Artificial Intelligence in Transport, Ethical AI in Military, Biomedical research, Patient Care, Public Health, Robot Teaching, Pedagogy, Policy, Smart City Ethics.									12	

CO	Course Outcomes
CO1	Understand the ethical issues in the development of AI Agents
CO2	Learn the ethical considerations of AI with perspectives on ethical values.
CO3	Apply the ethical policies in AI based applications and Robot development.
CO4	To implement the AI concepts to societal problems by adapting the legal concepts by securing fundamental rights
CO5	Overcome the evil genesis in the concepts of AI
Textbooks:	
1	Paula Boddington, —Towards a Code of Ethics for Artificial Intelligence, Springer, 2017
2	Markus D. Dubber, Frank Pasquale, Sunit Das, —The Oxford Handbook of Ethics of AI, Oxford University Press Edited book, 2020
3	S. Matthew Liao, —Ethics of Artificial Intelligence, Oxford University Press Edited Book, 2020
4	Markus D. Dubber, Frank Pasquale, Sunit Das, —The Oxford Handbook of Ethics of AI, Oxford University Press Edited book, 2020
Reference Books:	
1	N. Bostrom and E. Yudkowsky. —The ethics of artificial intelligence. In W. M. Ramsey and K. Frankish, editors, The Cambridge Handbook of Artificial Intelligence, pages 316–334. Cambridge University Press, Cambridge, 2014.
2	Wallach, W., & Allen, C, —Moral machines: coaching robots right from wrong, Oxford University Press, 2008.
Web resources:	
1	https://skillsbuild.org/students/course-catalog/artificial-intelligence
2	https://www.coursera.org/courses?queryartificial%20intelligence

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	2	2	2	3
CO2	3	3	2	3	2	3	2	3	3	3	2
CO3	2	3	2	3	3	2	2	3	3	3	2
CO4	3	2	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	3	3	2	3	3	3	2
Total	14	14	10	15	13	14	11	14	14	14	12
Average	3	3	2	3	3	3	2.2	3	3	3	2

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCSE22	Web Services	Elective	2	1	1	0	3	4	25	75	100
Learning Objectives											
LO1	To understand the foundational concepts of distributed computing and web services, including industry standards and supporting technologies										
LO2	To explore the role of XML and related communication technologies, such as SOAP and WSDL, in facilitating information exchange in distributed environments										
LO3	To examine security issues, transaction management, and QoS considerations in the design and implementation of web services										
LO4	To develop practical skills in building and deploying enterprise web applications										
LO5	To gain proficiency in deploying web services on Tomcat and Axis SOAP server										
Unit	Content									Hour	
1	Overview of Distributed Computing. Introduction to web services, Industry standards Technologies and concepts underlying web services, their support to web services. Applications that consume web services.									12	
2	XML with its choice for web services, network protocols to backend databases, technologies, SOAP, WSDL exchange of information between applications in distributed environment, locating remote web services, its access and usage. UDDI specification an introduction.									12	
3	A brief outline of web services conversation static and interactive aspects of system interface and its implementation, workflow orchestration and refinement, transactions, security issues the common attacks security attacks facilitated within web services quality of services Architecting of systems to meet users requirement with respect to latency, performance, reliability, QOS metrics.									12	
4	Building real world enterprise applications using web services sample source codes to develop web services steps necessary to build and deploy web services and client applications to meet customer's requirement Easier development, customization, maintenance, transactional requirements, seamless porting to multiple devices and platforms.									12	
5	Deployment of Web services and applications onto Tomcat application server and axis SOAP server Web services platform as a set of enabling technologies for XML based distributed computing.									12	

CO	Course Outcomes
CO1	Describe the key concepts industry standards, and technologies supporting distributed computing and web services
CO2	Apply XML, SOAP, WSDL, and UDDI for effective information exchange and service location in distributed environments
CO3	Assess security vulnerabilities and QoS metrics in web services to identify areas for improvement
CO4	Create and deploy enterprise applications using web services to meet specific customer and operational needs
CO5	Deploy web services on platforms like Tomcat and Axis SOAP server, utilizing XML-based distributed computing technologies
Textbooks:	
1	Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services: Architects Guide, Prentice Hall, Nov2003.
Reference Books:	
1	Kirk Zurell- “C Programming for Embedded Systems” R&D, Books- 2000
2	David. E, Simon, “An embedded software primer”, Pearson Education Asia-Addison Wesley Longman (Singapore), Low Priced Edition, 2001, ISBN- 81- 7808- 045- 1
3	Michael Barr, “Programming Embedded Systems in C and C++”, Shroff Publishers & Distributors Pvt. Ltd., Calcutta. March 2001, ISBN- 81- 7366 - 076 – X
4	Andreas Witting, Michael Wittig, “Amazon Web services in Action”, Paperback, 2015
Web resources:	
1	https://www.altexsoft.com/blog/web-service/
2	https://docs.redhat.com/en/documentation/red_hat_jboss_fuse/6.0/html/developing_restful_web_services/restintro#RESTIntro

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	2	2	2	3
CO2	3	3	2	3	2	3	2	3	3	3	2
CO3	2	3	2	3	3	2	2	3	3	3	2
CO4	3	2	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	3	3	2	3	3	3	2
Total	14	14	10	15	13	14	11	14	14	14	12
Average	3	3	2	3	3	3	2.2	3	3	3	2

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name NME	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PCSS21	NME : Internet Concepts and Web Development	SEC	1	1	0	0	2	2	25	75	100
Learning Objectives											
LO1	To understand the basic concepts of web and internet.										
LO2	To learn designing webpage using HTML & CSS										
LO3	To learn the use of scripting languages and appreciate their limitations.										
LO4	To understand the concept of Database and Server-side scripting language										
LO5	To understand the need of AJAX and developing applications using AJAX controls										
Unit	Content									Hours	
1	Introduction To Internet: Internet Overview-Networks-Web Protocols—Web Organization and Addressing - Web Browsers and Web Servers - Security and Vulnerability-Web System Architecture – URL - Domain Name – Client-side and server-side scripting									6	
2	Web Designing:Introduction to HTML, HTML5 - Structure of HTML, HTML elements – Form elements and its controls, Input types and Media elements - CSS, CSS3 - Selectors, Box Model, Backgrounds and Borders, Text Effects, Animations, Multiple Column Layout, User Interface Markup tags for inserting URL, Images, Tables, Frames - Dynamic HTML.									6	
3	Client-Side Processing and Scripting JavaScript Introduction – Data Types – Variables – Operators - Control Statements – Functions – Arrays – DOM, Built-in Objects, Regular Expression, Exceptions, Event handling - Windows and Frames - Forms and Validation. - AJAX – JQuery.									6	
4	Server-Side Processing and Scripting PHP Introduction to PHP, Features, Data types– Variable –Declaring and Using Constants – Operators – Control Structures– Functions – Arrays- Date and Time Functions – String functions - File Handling - Accessing MySQL Database from the Web with PHP. Introduction to MY SQL - The Show Databases and Table - The USE command – Create Database and Tables - Describe Table - Select, Insert, Update, and Delete statement – Some Administrative detail -Loading and Dumping a Database.									6	
5	PHP with AJAX: Introducing Ajax-Ajax Basics-PHP and Ajax-Database Driven Ajax. PHP with SEO: Basic SEO-Provocative SE Friendly URLs-Duplicate Content-CMS: Word press creating an SE-Friendly Blog.									6	

CO	Course Outcomes
CO1	Gain a comprehensive understanding of how the internet works.
CO2	Develop and design websites using HTML, CSS, and JavaScript
CO3	Implement client-side script using JavaScript.
CO4	Implement server-side script using PHP
CO5	Develop application using JavaScript with recent advancement like JSON, AJAX and JQuery.
Textbooks:	
1	Paul Deitel, Harvey Deitel, Abbey Deitel, Internet & World Wide Web - How to Program, 5th edition, Pearson Education, 2012.
2	Kogent Learning Solutions Inc, Web Technologies Black Book, Dream Tech press, 2013.
3	Brad Dayley, Brendan Dayley, and Caleb Dayley, Node.js, MongoDB and Angular Web Development: The definitive guide to using the MEAN stack to build web applications, 2nd Edition, Pearson Education, 2018
Reference Books:	
1	Lindsay Bassett, Introduction to JavaScript Object Notation, 1st Edition, O'Reilly Media, 2015
2	Fritz Schneider, Thomas Powell, JavaScript – The Complete Reference, 3rd Edition, McGraw Hill, 2017
3	Steven Holzener, PHP – The Complete Reference, 1st Edition, McGraw Hill, 2017 4. Sandeep Kumar Patel, Developing Responsive Web Applications with AJAX and JQuery, Packet Publications, 2014
Web resources:	
1	https://www.geeksforgeeks.org/web-development/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	2	3	3
CO2	3	2	3	3	3	3	3	3	3	3	2
CO3	3	3	2	2	3	3	3	3	3	2	3
CO4	3	3	3	3	2	3	2	2	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	14	14	14	14	15	14	14	14	14	14
Average	3	3	3	3	3	3	3	3	3	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name EC	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
	EC: Advanced Software Engineering	EC	2	1	1	0	3	4	25	75	100

Learning Objectives

LO1	Introduction to Software Engineering, Design, Testing and Maintenance.
LO2	Enable the students to learn the concepts of Software Engineering.
LO3	Learn about Software Project Management, Software Design & Testing
LO4	Software engineering is a computer science field that involves designing, developing, testing, and maintaining software applications.
LO5	It uses engineering principles and programming languages to create software that meets user needs.

Unit	Content	Hours
1	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.	12
2	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, SEI CMM.	12
3	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.	12
4	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.	12
5	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.	12

CO	Course Outcomes
CO1	Understand about Software Engineering process
CO2	Understand about Software project management skills, design and quality management
CO3	Analyze on Software Requirements and Specification
CO4	Analyze on Software Testing, Maintenance and Software, Re-Engineering
CO5	Design and conduct various types and levels of software quality for a software project.
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,3rdEdition.
Reference Books:	
1	Software Engineering–K.K.Aggarwal and Yogesh Singh, New Age International Publishers, 3rd edition.
2	A Practitioners Approach – Software Engineering, R.S.Pressman, McGraw Hill.
3	Fundamentals of Software Engineering - Carlo Ghezzi, M. Jarayeri, D. Manodrioli, PHI Publication.
Web resources:	
1	https://www.javatpoint.com/software-engineering-tutorial

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	2	3	3
CO2	3	2	3	3	3	3	3	3	3	3	2
CO3	3	3	2	2	3	3	3	3	3	2	3
CO4	3	3	3	3	2	3	2	2	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	14	14	14	14	15	14	14	14	14	14
Average	3	3	3	3	3	3	3	3	3	3	3

3 – Strong, 2- Medium, 1- Low