Francis Xavier Engineering College

(An Autonomous Institution)
Tirunelveli 627 003
Tamil Nadu India

Department of Computer Applications

Curriculum and Syllabi – R 2024-PG

CHOICE BASED CREDIT SYSTEM AND OBE

Department Vision

To provide high quality education in the field of computer applications and there by create computer professionals with proper leadership skills, commitment and moral values

Department Mission

To impart education par-excellence through innovative training, research and development focusing on the industrial requirements making it beneficial to the individuals, industry and the society.

To achieve professional excellence through high quality innovative teaching and training in computer applications for the development of students who can excel in the present future competitive profession according to the changing needs of the companies with high degree of integrity and ethical standards

TABLE OF CONTENTS

Programme Educational Outcomes (PEOs)

PEO1:Computer Applications basics: To prepare students to excel in the computing profession by providing solid technical Foundations in the field of computer applications.

PEO2: Career Development: To provide students various computing skills like the analysis, design and development of innovative software products to meet the industry needs

PEO3: Professional Qualification: To motivate students to pursue lifelong learning and to do research as computing Professionals and scientists

PEO4: Leadership Responsibilities: To motivate students to communicate and function effectively in teams in multidisciplinary fields within the global, societal and environmental context

Programme Specific Objectives (PSOs)

PSO 1: Enable the students to select the suitable data model, appropriate architecture and platform to implement a system with good performance

PSO2: Enable the students to utilize modern technologies to design innovative solutions for various complex societal challenges and to be an entrepreneur

Programme Outcomes (POs)

MCA Graduates will be able to:

1. Computational Knowledge: Apply knowledge of computing fundamentals, computing specialisation, mathematics, and domain knowledge appropriate for the computing specialisation to the abstraction and conceptualisation of computing models from defined problems and requirements.

2. Problem analysis: Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

3. Design/development of solutions: Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

6. Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

7. Societal and Environmental Concern: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.

8. Professional Ethics: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.

9. Individual and team work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

10. Communication Efficacy: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognise the need, and have the ability, to engage in independent learning for continual development as a computing professional.

Mapping with PO Vs PEO, PSO

PO	PEO1	PEO2	PEO3	PEO4
1	3			
2	2	2	2	
3	2	3		
4	1	2	3	
5	1	1	2	
6				3
7			1	3
8	1			2
9	1	3	2	2
10	2		2	3
11	2	2	2	1
12	1		3	
PSO_1	3		2	
PSO_2		2	2	3

1 Low 2 Medium 3 High

FRANCIS XAVIER ENGINEERING COLLEGE

2024 MCA CURRICULUM AND SYLLABUS REGULATIONS 2024

Choice-Based Credit System and Outcome Based Education

SUMMARY OF CREDIT DISTRIBUTION

S. No	CATEGORY	CREDITS PER SEMESTER				TOTAL CREDIT	CREDITS IN %
		I	II	III	IV		
1	FC	4				4	5%
2	PC	19	18	12		49	59%
3	PE		3	9		12	14%
4	EEC	2	2	4	10	18	22%
	TOTAL	25	23	25	10	83	100%

Track No	TRACKS IDENTIFIED
1	Networking and Security
2	Software Development
3	Data Science and Analytics
4	Artificial Intelligence and Machine Learning
5	Full Stack Development
6	Entrepreneurship

FC	-	Foundation Course
PC	-	Professional Core
PE	-	Professional Elective
MC	-	Mandatory Course
EEC	-	Employability Enhancement Course
BC	-	Bridge Course
VA	-	Value Added

FRANCIS XAVIER ENGINEERING COLLEGE

2024 MCA CURRICULUM AND SYLLABUS REGULATIONS 2024

Choice-Based Credit System and Outcome Based Education

I - IV Semester Curriculum and Syllabi

SEMESTER I

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24MA1258	Discrete Mathematical Structures	FC	4	3	1	0	4
2	24CA1601	Data structures and Applications	PC	3	3	0	0	3
3	24CA1602	Computer Networks	PC	3	3	0	0	3
4	24CA1603	Python Programming	PC	4	3	1	0	4
5	24CA1604	Object Oriented Software Engineering	PC	3	3	0	0	3
Theory cum Practical Courses								
1	24CA1605	Advanced Databases and Data Mining	PC	5	3	0	2	4
Practical Courses								
1	24CA1611	Data Structures Laboratory	PC	4	0	0	4	2
2	24CA1912	Communication and Soft Skills Laboratory	EEC	4	0	0	4	2
Total				**30**	**18**	**2**	**10**	**25**

SEMESTER II

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24CA2601	Java Programming	PC	3	3	0	0	3
2	24CA2602	Linux Operating Systems	PC	3	3	0	0	3
3	24CA2603	Fundamentals of Accounting	PC	3	3	0	0	3
4	24CA2604	Full Stack Development	PC	3	3	0	0	3
5		Professional Elective – I	PE	3	3	0	0	3
Theory cum Practical Courses								
1	24CA2605	Mobile Application Development	PC	5	3	0	2	4
Practical Courses								
1	24CA2611	Java Programming Laboratory	PC	4	0	0	4	2
2	24CA2912	Full Stack Development Laboratory	EEC	4	0	0	4	2
			Total	**28**	**18**	**0**	**10**	**23**

SEMESTER III

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24CA3601	Machine Learning	PC	3	3	0	0	3
2	24CA3602	Software Testing and Quality Assurance	PC	3	3	0	0	3
3		Professional Elective – II	PE	3	3	0	0	3
4		Professional Elective – III	PE	3	3	0	0	3
5		Professional Elective – IV	PE	3	3	0	0	3
Theory cum Practical Courses								
1	24CA3603	Internet of Things and Cloud Computing	PC	5	3	0	2	4
Practical Courses								
1	24CA3611	Machine Learning Laboratory	PC	4	0	0	4	2
2	24CA3912	Project Work - Phase – I	EEC	4	0	0	4	2
2	24CA3913	Internship	EEC	4	0	0	4	2
			Total	34	18	0	16	**25**

SEMESTER IV

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Practical Courses								
1	24CA4911	Project Work - Phase – II	EEC	20	0	0	20	10
			Total	20	0	0	20	10

Minimum Number of Credits to be acquired: 83

Professional Elective I

1	24CA2701	Network Security	II	3	0	0	3	Networking and Security
2	24CA2702	Software Project Management	II	3	0	0	3	Software Development
3	24CA2703	Data ethics and governance	II	3	0	0	3	Data Science and Analytics
4	24CA2704	AI Ethics and Policy	II	3	0	0	3	Artificial Intelligence and Machine Learning
5	24CA2705	Software Engineering Principles	II	3	0	0	3	Full Stack Development
6	24CA2706	Entrepreneurship and Innovation Management	II	3	0	0	3	Entrepreneurship
7	24CA2707	Research Methodology and IPR	II	3	0	0	3	Research Methodology and IPR Courses

Professional Elective II

1	24CA3701	Cyber Security and Resilience	III	3	0	0	3	Networking and Security
2	24CA3702	Agile Software Development	III	3	0	0	3	Software Development
3	24CA3703	Data Visualization Techniques	III	3	0	0	3	Data Science and Analytics
4	24CA3704	Deep Learning	III	3	0	0	3	Artificial Intelligence and Machine Learning
5	24CA3705	UI & UX Design	III	3	0	0	3	Full Stack Development
6	24CA3706	Social Entrepreneurship	III	3	0	0	3	Entrepreneurship

Professional Elective III

1	24CA3707	Ethical Hacking and Penetration Testing	III	3	0	0	3	Networking and Security
2	24CA3708	Test Driven Development	III	3	0	0	3	Software Development
3	24CA3709	Cloud Computing for Data Science	III	3	0	0	3	Data Science and Analytics
4	24CA3710	Reinforcement Learning	III	3	0	0	3	Artificial Intelligence and Machine Learning
5	24CA3711	Fundamentals of Backend Engineering	III	3	0	0	3	Full Stack Development
6	24CA3712	Emerging Areas in Entrepreneurship	III	3	0	0	3	Entrepreneurship

Professional Elective IV

1	24CA3713	Block Chain Technology and Its Applications	III	3	0	0	3	Networking and Security
2	24CA3714	Game Design and Development	III	3	0	0	3	Software Development
3	24CA3715	Big Data Analytics	III	3	0	0	3	Data Science and Analytics
4	24CA3716	Artificial Intelligence and its Applications	III	3	0	0	3	Artificial Intelligence and Machine Learning
5	24CA3717	DevOps	III	3	0	0	3	Full Stack Development
6	24CA3718	Building a Sustainable Enterprise	III	3	0	0	3	Entrepreneurship

List of Foundation Courses

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24MA1258	Discrete Mathematical Structures	FC	4	4	0	0	4

List of Professional Core Courses

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
1	24CA1601	Data Structures and Applications	PC	3	3	0	0	3
2	24CA1602	Computer Networks	PC	3	3	0	0	3
3	24CA1603	Python Programming	PC	4	3	1	0	4
4	24CA1604	Object Oriented Software Engineering	PC	3	3	0	0	3
5	24CA1605	Advanced Databases and Data Mining	PC	5	3	0	2	4
6	24CA1611	Data Structures Laboratory	PC	3	3	0	0	3
7	24CA2601	Java Programming	PC	3	3	0	0	3
8	24CA2602	Linux Operating Systems	PC	3	3	0	0	3
9	24CA2603	Fundamentals of Accounting	PC	3	3	0	0	3
10	24CA2604	Full Stack Development	PC	3	3	0	0	3
11	24CA2605	Mobile Application Development	PC	5	3	0	2	4
12	24CA2611	Java Programming Laboratory	PC	3	3	0	0	3
13	24CA3601	Machine Learning	PC	3	3	0	0	3
14	24CA3602	Software Testing and Quality Assurance	PC	3	3	0	0	3
15	24CA3603	Internet of Things and Cloud Computing	PC	5	3	0	2	4
16	24CA3611	Machine Learning Laboratory	PC	3	3	0	0	3

List of Employability Enhancement Course

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Practical Courses								
1	24CA1912	Communication and Soft Skills Laboratory	EEC	4	0	0	4	2

2	24CA2912	Full Stack Development Laboratory	EEC	4	0	0	4	2
3	24CA3912	Project Work - Phase – I	EEC	4	0	0	4	2
4	24CA3913	Internship	EEC	4	0	0	4	2
5	24CA4911	Project Work - Phase – II	EEC	20	0	0	20	10

List of Research Methodology and IPR Courses

S. No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24CA2707	Research Methodology and IPR	RMC	3	3	0	0	3

List of Value Added Courses

S. No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Practical Courses								
1	24CA0V01	JavaScript for Web Development	VA	2	0	0	2	1
2	24CA0V02	Web Technologies	VA	2	0	0	2	1
3	24CA0V03	ASP.NET for Web Development	VA	4	0	0	4	2
4	24CA0V04	Data Analytic Tools	VA	4	0	0	4	2
5	24CA0V05	Automation Testing tools	VA	4	0	0	2	1

Bridge Courses I SEM

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24CA1B01	Digital Logic and Computer Organization	BC	4	4	0	0	4
2	24CA1B02	Problem Solving and Programming in C	BC	3	3	0	0	3
Practical Courses								
1	24CA1B11	Programming in C Laboratory	BC	4	0	0	4	2
			Total	11	7	0	4	9

Bridge Courses II SEM

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24CA2B01	Design and Analysis of Algorithms	BC	3	3	0	0	3
2	24CA2B02	Object Oriented Programming	BC	3	3	0	0	3
Practical Courses								
2	24CA2B11	Object Oriented Programming Laboratory	BC	4	0	0	4	2
			Total	10	6	0	4	8

FIRST SEMESTER

24MA1258	**DISCRETE MATHEMATICAL STRUCTURES**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

PREAMBLE:

An engineering PG student needs to have some basic mathematical tools and techniques to apply in diverse applications in Engineering. This emphasizes the development of rigorous logical thinking and analytical skill to the student and appraises him the complete procedure. For solving different kind so problems that occur in engineering .Based on this, the course aims at giving adequate exposure in mathematical logic and Graphs .

PRE-REQUISITE:

NIL

OBJECTIVES:

1. To provide mathematical background knowledge
2. To provide sufficient experience on various topics of discrete mathematics like matrix algebra, logic and proofs, combinatory, graphs, algebraic structures, formal languages and finite state automata.
3. To extend student's Logical and Mathematical maturity
4. To understand the basic concepts of graph theory
5. To familiarize the applications of algebraic structures

UNIT I **MATRIX ALGEBRA** **9+3**

Matrices - Rank of a matrix - Solving system of equations – Eigenvalues and Eigen vectors - Cayley - Hamilton theorem - Inverse of a matrix.

UNIT II **BASIC SET THEORY** **9+3**

Basic Concepts of set theory and Cartesian products, Relations, Binary relations, Equivalence relations and Partitions, Composition of relations. Functions: Types of functions, Inverse of a function, Composition of functions, Recursive functions.

UNIT III **MATHEMATICAL LOGIC** **9+3**

Propositions and logical operators - Truth table - Propositions generated by a set - Equivalence and implication - Basic laws - Some more connectives - Functionally complete set of connectives – Normal forms - Proofs in propositional calculus - Predicate calculus – K Map

UNIT IV **GRAPHS** **9+3**

Graphs - Basic definitions of graph – Graph models – Graph terminology and special types of graphs – Handshaking theorem - Matrix representation of graphs – Adjacency matrix and Incidence matrix - graph isomorphism

UNIT V **ALGEBRAIC STRUCTURES** **9+3**

Algebraic systems – Definition Semi groups and monoids – Definition of Sub-Semi groups and sub-monoids - Groups – Properties of Groups - Subgroups – Left and Right Cosets – Lagrange's theorem.

TOTAL HOURS 60

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1& 2 – Written Exam	UNIT-1- Problems on matrix algebra. UNIT-2 –MCQ's on basic set theory. UNIT-3 – Problems on mathematical logics. UNIT-4 – Problems on Graphs UNIT-5-Problems on Algebraic Structures	Descriptive type

Suggested Activities:

UNIT-1 – Assignments to solve the problems on algebra in a matrix.

UNIT-2 – Assignments to solve the problems on basic set theory.

UNIT-3 – Problems on mathematical logics.

UNIT-4 – Assignment to study about Graphs

UNIT-5 – Solve the Problems on Algebraic Structures.

Outcomes

Upon completion of the course, the students will be able to:

CO1 Find the Eigenvalues, Eigenvectors, inverse and the positive powers of a square matrix (Apply)

CO2 Apply the basic concept of set theory.

CO3 Design and solve Boolean functions for defined problems.

CO4 Apply the knowledge of Graph terminology in real life phenomena (Analyze)

CO5 Apply the algebraic structures such as groups and subgroups. (Apply)

REFERENCE BOOKS

1. DavidMakinson,"Sets,LogicandMathsforComputing",SpringerIndianReprint,2011.
2. Grimaldi,R.PandRamana,B.V."DiscreteandCombinatorialMathematics",5 Edition,PearsonEducation,2006.
3. HopcroftJEandUllman,J.D,"IntroductiontoAutomataTheory,LanguagesandComputation",Narosa PublishingHouse, Delhi,2002.
4. KennethH.Rosen,"DiscreteMathematicsandItsApplications",TataMcGrawHill,4th Edition,2002.
5. Sengadir,T."DiscreteMathematicsandCombinatorics"PearsonEducation,NewDelhi,2009.

6. Trembley,J.P.andManohar,R,"DiscreteMathematicalStructureswithApplicationsto ComputerScience",TataMcGrawHill,NewDelhi,2007.
7. G.ShankerRao,"MathematicalFoundationofComputerScience",DreamtechPress,2020.

WEB RESOURCES

1. http://nptel.ac.in/courses/106106094
2. http://nptel.ac.in/courses/106108054

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO 1	PSO2
1	3	2	1	1				1	1			1		
2	3	2	1	1				1	1			1		
3	3	2	1	1				1	1			1		
4	3	2	1	1				1	1			1		
5	3	2	1	1				1	1			1		

1 Low 2 Medium 3 High

24CA1601 DATA STRUCTURES AND APPLICATIONS L T P C

3 0 0 3

PREAMBLE:

This course is offered to MCA programme. This course views the problem solving not just as solving the problem somehow but about solving the problem in the most efficient way. This course is used to an appropriate data structure and an appropriate algorithmic technique.

PRE-REQUISITE:

- Problem Solving and Programming in C

OBJECTIVES:

1. To understand the fundamentals of algorithm

2. To illustrate the linked list techniques in its applications.

3. To practice the various applications of Stack and Queue**.**

4. To solve the binary tree and graph traversals for a given problem.

5. To develop sorting and hashing techniques for a complex problem

UNIT I INTRODUCTION 9

Introduction - Abstract Data Types (ADT) – Arrays and its representation –Structures – Fundamentals of algorithmic problem solving – Important problem types – Fundamentals of the analysis of algorithm – analysis framework – Asymptotic notations, Properties, Recurrence Relation- Applications - Online ticket booking

UNIT II LINEAR DATA STRUCTURES – LIST 9

List ADT - Array-based Implementation - Linked list implementation - Singly Linked Lists – Circularly linked lists – Doubly Linked Lists - Applications of linked list – Polynomial Addition.

UNIT III LINEAR DATA STRUCTURES - STACK, QUEUE 9

Stack ADT – Operations on Stack - Applications of stack – Infix to postfix conversion – Evaluation of expression – (Dynamic Stack, Linked Stack) Queue ADT – Operations on Queue - Circular Queue - Applications of Queue - Internet requests and processes using a queue. - Applications of Stack - Syntaxes in languages are parsed using stacks

UNIT IV BINARY TREES AND GRAPHS 9

Trees and its representation – left child right sibling data structures for general trees- Binary Tree – Binary tree traversals –- Binary Search Tree - Graphs and its representation - Graph Traversals - Depth-first traversal – breadth-first traversal-Application of graphs - Case Study: Graphs in Gaming Industry

UNIT V SORTING, SEARCHING AND HASH TECHNIQUES 9

Sorting algorithms: Insertion sort - Bubble sort - Quick sort - Merge sort - Searching: Linear search – Binary Search - Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing - Case Study – Expert system in Intrusion Detection System

TOTAL HOURS: 45

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1& 2 – Written Exam	Unit 1: MCQs on Algorithm Unit 2: Write Programs on linked list operation Unit 3: Design a stack that supports retrieving the min element in o (1). Unit 4: Quiz on Stack and Queue Unit 5: Write programs on sorting and hashing techniques	Descriptive type questions

Suggested Activities

Unit 1: Calculate the complexity of various algorithms.

Unit 2: Implement polynomial addition using linked lists in a programming language.

Unit 3: Simulate a queue-based internet request handler.

Unit 4: Short quiz on graph terminology and properties.

Unit 5: Hands-on lab on implementing hash functions.

Outcomes:

Upon completion of the course, the students will be able to:

CO1 Relate the merits of worst-case, average-case and best-case analysis.

CO2 Summarize the operations in a linked list

CO3 Use linear and non-linear data structures like stacks, queues, and linked list.

CO4 Identify the performance characteristics of fundamental algorithms and data structures and their operations.

CO5 Implement Sorting and Hashing Techniques

REFERENCE BOOKS

1. "Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein,4th Edition, 2022
2. "Data Structure & Algorithm by Bal Krishna Nyaupane,Heritage Publishers & Distributors Pvt.Ltd,Edition 2018.
3. A.K. Sharma, "Data Structures using C", Pearson Education Asia, 2013.
4. Tanaenbaum A.S, Langram Y. Augestein M.J, "Data Structures using C", Pearson Education,2004.

WEB RESOURCES

1. https://nptel.ac.in/courses/106/106/106106231/
2. https://leetcode.com/discuss/study-guide/1178887/compiling-important-topics-of-data-structures-and-algorithm-and-coding-tricks

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	1	1		2	3								
2	1	2	1	3	1									
3			1		1									
4	1	2	1	1									1	
5	1	1	3		1								1	

1 Low 2 Medium 3 High

24CA1602 COMPUTER NETWORKS L T P C

3 0 0 3

PREAMBLE:

Computer Network courses enable the learners to understand networking concepts, technologies and terminologies which in turn helps the students to analyse the flow control and perform error correction and detection. This course presents the concepts of transmission control protocol, which

makes the individual to understand cryptographic principles, and algorithms and also gives glimpses of recent trends in computer networks.

PRE-REQUISITE:

- NIL

OBJECTIVES:

1. To learn about the layered architecture of Computer networks
2. To understand the Error Detection and Correction in Data Link Layer.
3. To use routing protocols for real time applications.
4. To summarize the end-to-end flow of information.
5. To choose an appropriate protocol for the given scenario

UNIT I NETWORK FUNDAMENTALS 9

Uses of Networks – Categories of Networks -Communication model –Data transmission concepts and terminology – Protocol architecture – Protocols – OSI – TCP/IP - Transmission media.

UNIT II DATA LINK LAYER 9

Data link control - Flow Control – Error Detection and Error Correction - MAC – Ethernet, Token ring, Wireless LAN MAC.

UNIT III NETWORK LAYER 9

Network layer – Switching concepts – Circuit switching – Packet switching –IP –– Datagrams ––IP addresses- IPv4 &IPv6– ICMP – Routing Protocols – Distance Vector – Link State- BGP.

UNIT IV TRANSPORT LAYER 9

Transport layer –service –Connection establishment – Flow control – Transmission control protocol – Congestion control and avoidance – User datagram protocol. -Real Time Transport Protocol (RTP).

UNIT V APPLICATIONS 9

Telnet, Blue Tooth – Bridges, Routers, Modems-Applications - DNS- SMTP – WWW –SNMP.

TOTAL HOURS: 45

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 – Written Exam	Unit 1: MCQs on Data Transmission concepts Unit 2: Problems on error correction and detection Unit3: Quiz on Routing protocol	**Descriptive type questions**

	Unit4: Write functions to implement an end-to-end transport service for a given scenario Unit 5: Quiz on Application layer protocols	

Suggested Activities

Unit 1: Create a quiz on data transmission concepts and terminology.

Unit 2: Design a simulation to demonstrate flow control mechanisms in data link control protocols.

Unit 3: Simulate routing protocol in using Wire shark

Unit 4: Simulation of routing protocol using Java network package

Unit 5: Explore applications like DNS, SMTP, WWW, and SNMP, and analyse network traffic using packet sniffing tools.

Outcomes

Upon completion of the course, the students will be able to:

CO1 Illustrate networking concepts and basic communication model.

CO2 Compare Error Detection and Correction in Data Link Layer.

CO3 Choose the appropriate switching concepts for a given problem

CO4 Apply the concepts and techniques of transport layer.

CO5 Design network applications using the right set of protocols

REFERENCE BOOKS

1. Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, Sixth Edition TMH, 2022.
2. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Eighth Edition, Pearson Education, 2021.
3. Andrew S.Tannenbaum David J. Wetherall, “Computer Networks” Fifth Edition, Pearson Education 2011
4. William Stallings, “Data and Computer Communications”, Tenth Edition, Pearson Education, 2014
5. James F. Kurose, Keith W. Ross, “Computer Networking: A Top-down Approach, Pearson Education, Limited, 7th edition, 2016.

WEB RESOURCES

1. https://nptel.ac.in/courses/106/105/106105183/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	1	2	1										
2	3	3	1	3									3	
3	1	2	1	2								1		
4	1	1	1	1								1	2	
5	1	3	1	1								1	3	

1 Low 2 Medium 3 High

24CA1603 PYTHON PROGRAMMING L T P C

3 1 0 4

PREAMBLE

This course is offered in the First semester of the MCA programme in the Department of Master of Computer Applications as a Professional Core Subject. This course is useful for starting a career as a Data Scientist. The course taught Data Structures in Python Programming. Database connectivity and Multi-Threading

PRE-REQUISITE:

- Problem-solving and Programming in C

OBJECTIVES:

1. To recall core Python scripting elements such as variables and flow control structures.
2. To practice how to work with lists and sequence data.
3. To develop Object Oriented Skills using classes
4. To develop the database applications in Python
5. To experiment with Python programs of their own

UNIT I BASIC PROGRAMMING CONSTRUCTS 9+3

Python interpreter and interactive mode - Python Data Types Declaration - Strings: string slices, immutability, string functions and methods, string module; - Python Program Flow Control Conditional blocks - For loop using ranges, string, list and dictionaries - Use of while loops in python - Loop manipulation using pass, continue, break and else - Programming using Python conditional and loops

UNIT II LISTS, TUPLES, DICTIONARIES, & FILES 9+3

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters - Tuples: tuple assignment, tuple as return value - Dictionaries: operations and methods

- Files and exec Files and exception - Text files, reading and writing files, format operator - command line arguments, errors and exceptions - Python Exception Handling - Avoiding code break using exception handling - Safe guarding file operation using exception handling

UNIT III FUNCTIONS, MODULES, PACKAGES AND CLASSES 9+3

Python Organizing python codes using functions - Organizing python projects into modules - Importing own module as well as external modules - Understanding Packages - Programming using functions, modules and external packages - Concept of class, object and instances - Constructor, class attributes and destructors - Real time use of class in live projects - Inheritance, overlapping and overloading operators - Adding and retrieving dynamic attributes of classes - Programming using Oops support

UNIT IV DATABASE CONNECTIVITY AND NETWORK FUNDAMENTALS 9+3

Python Database Interaction - SQL Database connection using python - Creating and searching tables - Reading and storing config information on database - Programming using database connections - Network Fundamentals and Socket Programming - Client-side programming - Writing python program for CGI applications - Creating menus and accessing files Server client program

UNIT V CASE STUDIES 9+3

Python Multithreading- Understanding threads, Forking threads synchronizing the threads - Programming using multithreading - Contacting User Through Emails Using Python - Installing smtp python module - Sending email Reading from file and sending emails to all users addressing them directly for marketing

TOTAL HOURS: 45+15

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1& 2 – Written Exam	Unit–1 Online Quiz in Leetcode. Unit-2 MCQ's on Data Structures Unit-3 Programming contest in Fundamental of OOPS concepts Unit – 4 Scenario-based projects Unit – 5 Case studies in Python Programming	Descriptive type questions
Suggested Activities Unit 1: Logical Thinking demonstration Unit 2: Brain storming List, Tuple and Dictionary Unit 3: Complex problems into simple modules demonstration		

Unit 4: Demonstration of Frontend backend connectivity

Unit 5: Industrial Visit to AK Infopark, Nagercoil, Tamil Nadu

Outcomes

Upon completion of the course, the students will be able to:

CO1 Define algorithmic solutions to simple computational problems

CO2 Write coding to demonstrate simple Python programs

CO3 Select the suitable data type from the data structures.

CO4 Experiment with decomposition of a Python program into function.

CO5 Build Python programs for a complex problem

REFERENCE BOOKS

1. TanejaSheetal, Kumar Naveen, Python Programming A modular approach, Publisher: Pearson Paperback, First Edition, September 2017
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016
3. VaibhavGondaliya, "Programming With Python, Class & Objects, Inheritance, Data File Handling", 2019.
4. Albert Lukaszewski PhD MySQL for Python: Database Access Made Easy Paperback , December 2010
5. Eric Matthes, Python Crash Course, 3rd Edition: A Hands-On, Project-Based Introduction to Programming, 2023

WEB RESOURCES

1. https://nptel.ac.in/courses/106106182

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	1			1			2					1	
2	1	1											1	
3	3	1	1											
4	1	1	1		1								1	
5	1	1			1			3					2	

1 Low 2 Medium 3 High

24CA1604 OBJECT-ORIENTED SOFTWARE ENGINEERING L T P C

3 0 0 3

PREAMBLE:

This course is offered in 1st semester of MCA programme in the department of Computer Applications as an elective subject. This course exposes how to design a complex problem before implementation

.**PRE-REQUISITE:**

- NIL

OBJECTIVES:

1. To understand the phases in object oriented software development
2. To gain fundamental concepts of requirements engineering and analysis.
3. To know about the different approach for object oriented design and its methods
4. To learn about how to perform object oriented testing and how to maintain software
5. To provide various quality metrics and to ensure risk management.

UNIT I SOFTWARE DEVELOPMENT AND PROCESS MODELS 9

Introduction to Software Development – Challenges – An Engineering Perspective – Object Orientation – Software Development Process – Iterative Development Process – Process Models– Life Cycle Models – Unified Process – Iterative and Incremental – Agile Processes.

UNIT II MODELING OO SYSTEMS 9

Object Oriented Analysis (OOA / Coad-Yourdon), Object Oriented Design (OOD/Booch), Hierarchical Object Oriented Design (HOOD), Object Modeling Technique (OMT) – Requirement Elicitation – Use Cases – SRS Document – OOA - Identification of Classes and Relationships, Identifying State and Behavior – OOD - Interaction Diagrams – Sequence Diagram – Collaboration Diagrams - Unified Modeling Language and Tools.

UNIT III DESIGN PATTERNS 9

Design Principles – Design Patterns – GRASP – GoF – Dynamic Object Modeling – Static Object Modeling.

UNIT IV SYSTEM TESTING 9

Software testing: Software Verification Techniques – Object Oriented Checklist :- Functional Testing – Structural Testing – Class Testing – Mutation Testing – Levels of Testing – Static and Dynamic Testing Tools - Software Maintenance – Categories – Challenges of Software Maintenance – Maintenance of Object Oriented Software – Regression Testing

UNIT V SOFTWARE QUALITY AND METRICS 9

Need of Object Oriented Software Estimation – Lorenz and Kidd Estimation – Use Case Points Method – Class Point Method – Object Oriented Function Point – Risk Management – Software Quality Models – Analyzing the Metric Data – Metrics for Measuring Size and Structure – Measuring Software Quality - Object Oriented Metrics

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 – Descriptive type questions	**U**nit 1: Compare different software development process models. Unit 2: Identify the classes , relationship between classes and draw standard UML diagrams using any one UML modeling tool Unit 3: Test the above UML for all the scenarios identified using Selenium Unit 4: Draw a project design using design class Unit 5: MCQs on Model View Controller process	**Descriptive type question**
Suggested Activities: **UNIT-1** Assignments to study about the various software project models **UNIT-2** Task to draw the UML diagrams. **UNIT-3** Assignments to generate the report for business object analysis. **UNIT-4** Demonstration of architecture design for the given project. **UNIT-5** Group discussion on MVC pattern		
Outcomes		
Upon completion of the course, the students will be able to:		

CO1	Summarize the Software Engineering concepts.
CO2	Design static and dynamic models using UML diagrams.
CO3	Interpret the objects from the problem specification.
CO4	Devise the corollaries and axioms for the problem domain
CO5	Use the design strategies for complex problems

REFERENCES:

1. Yogesh Singh, RuchikaMalhotra, " Object – Oriented Software Engineering", PHI LearningPrivate

Limited ,First edition,2012

2. Ivar Jacobson. Magnus Christerson, PatrikJonsson, Gunnar Overgaard, "Object Oriented Software Engineering, A Use Case Driven Approach", Pearson Education, Seventh Impression, 2009
3. Craig Larman, "Applying UML and Patterns, an Introduction to Object-Oriented Analysis and Design and Iterative Development", Pearson Education, Third Edition, 2008.
4. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Jim Conallen,Kelli A. Houston, "Object Oriented Analysis & Design with Applications, Third Edition, Pearson Education,2010
5. David Kung,"Object-Oriented Software Engineering: An Agile Unified Methodology",14th Edition,2020.

WEB RESOURCES

1. https://nptel.ac.in/courses/106105224

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1		2	3	3	2	3					2	3		2
2		2	3	3	2	3					2	3		3
3		2	3	3	2	3					2	3		2
4		2	3	3	2	3		2			2	3		2
5		2	3	3	3	3		2			3	3		2

1 Low 2 Medium 3 High

24CA1605 ADVANCED DATABASES AND DATA MINING L T P C

3 0 2 4

PREAMBLE:

This course is offered to MCA programme to know the knowledge of data mining. This course offers students an introduction to the design and programming of database system. This course covers the ER approach to data modelling and the use of query language in SQL. Students discuss their knowledge in database administration, database design, database tuning, query optimization and knowledge of commercial DBMS.

PRE-REQUISITE:

- Database Management Systems

OBJECTIVES:

1. To find data for processing and storing data.

2. To apply data mining techniques for managing data.
3. To use association rule mining for handling large data.
4. To categorize the concept of classification for the retrieval purposes.
5. To apply the clustering techniques for retrieval of data.

UNIT I RELATIONAL MODEL 9

Data Model – Types of Data Models: – Entity Relationship Model – Relational Data Model – Mapping Entity Relationship Model to Relational Model – Structured Query Language – Database Normalization – Transaction Management.

UNIT II DATA MINING & DATA PREPROCESSING 9

Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT III ASSOCIATION RULE MINING 9

Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Item sets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint-Based Association Mining.

UNIT IV CLASSIFICATION & PREDICTION 9

Classification vs. Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures.

UNIT V CLUSTERING 9

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

TOTAL HOURS: 45

Lab Experiments: 30 Hours

S.No	List of Experiments	CO
1	NOSQL Exercises a. MongoDB – CRUD operations, Indexing, Sharding b. Cassandra: Table Operations, CRUD Operations, CQL Types c. HIVE: Data types, Database Operations, Partitioning – HiveQL. d.OrientDB Graph database – OrientDB Features	**CO1**
2	MySQL Database Creation, Table Creation, Query	**CO1,CO2**

3	MySQL Replication – Distributed Databases.	**CO1,CO2,CO3**
4	Spatial data storage and retrieval in MySQL	**CO2,CO3**
5	Temporal data storage and retrieval in MySQL	**CO3**
6	Object storage and retrieval in MySQL	**CO2,CO3**
7	XML Databases, XML table creation, XQuery FLWOR expression	**CO3,CO4**
8	Mobile Database Query Processing using open source DB (MongoDB/MySQL etc)	**CO3,CO4**

Lab Experiments: 30 Hours

S.No	List of Projects
1	Customer Segmentation using K-Means Clustering
2	Building a Recommendation System with Collaborative Filtering
3	Fraud Detection in Financial Transactions using Anomaly Detection
4	Predictive Maintenance for IoT Devices using Time Series Analysis
5	Implementing Association Rule Mining for Market Basket Analysis
6	Social Media Sentiment Analysis using Natural Language Processing
7	Optimizing Query Performance in Large-Scale Databases
8	Developing a Real-Time Data Warehouse with ETL Processes
9	Implementing a NoSQL Database for High Scalability
10	Disease Prediction using Healthcare Data with Machine Learning
11	Implement a text mining project for sentiment analysis on social media data.
12	Design a graph database for analyzing network traffic and detecting cyber threats.
13	Create an OLAP cube for business intelligence reporting.
14	Develop a recommendation engine using association rule mining.
15	Implement a text mining project for sentiment analysis on social media data.

Suggestive Assessment Methods		
Continuous Assessment Test (30 Marks)	**Lab Components Assessments (20 Marks)**	**End Semester Exams (50 Marks)**
CAT 1 & CAT 2 – Written Exam	Assessment, Execution and viva Demonstration of all programs	**Descriptive type questions**

	and projects	

Suggested Activities

Unit 1: Draw an ER model diagram for Banking application.

Unit 2: Explain and how to data cleaning method is used in KDD process.

Unit 3: Give an analysis of constraint-based method.

Unit 4: How to predict an error measure in lazy learner methods

Unit 5: Illustrate the density-based methods.

Outcomes: Upon completion of the course, the students will be able to:

CO1: Design ER-models to represent simple database application scenarios.

CO2: Illustrate the basic concepts of knowledge discovery from databases.

CO3: Describe data pre-processing and association rule mining techniques.

CO4: Demonstrate the classification algorithms for a given problem.

CO5: Develop solutions for clustering techniques problems.

REFERENCE BOOKS

1. Jiawei Han and MichelineKamber, "Data Mining Concepts and Techniques" Third Edition, Elsevier, 2012.
2. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Addison-Wesley, 2017.

WEB RESOURCES

1. https://swayam.gov.in/nd1_noc20_cs12/preview

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1	2	2	1	3	1	1		1				1	1	
2	2	2	1	3	1	1		1				1	1	
3	2	2	1	3	1	1		1				1	1	
4	2	2	1	3	1	1		1				1	1	
5	2	2	1	3	1	1		1				1	1	

1 Low 2 Medium 3 High

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:List the advantages and potential drawbacks of using MongoDB for large-scale data storage.

COURSE OUTCOME 2: Compare and contrast the use cases of OrientDB with traditional relational databases and other NoSQL databases.

COURSE OUTCOME 3: Compare and contrast different market structures,

COURSE OUTCOME 4: Discuss the benefits and challenges of setting up MySQL replication.

COURSE OUTCOME 5: How do you create, manage, and query data in HIVE?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF WEEKS REQUIRED
1	NOSQL Exercises a. MongoDB – CRUD operations, Indexing, Sharding b. Cassandra: Table Operations, CRUD Operations, CQL Types c. HIVE: Data types, Database Operations, Partitioning – HiveQL. d.OrientDB Graph database – OrientDB Features	1
2	MySQL Database Creation, Table Creation, Query	1
3	MySQL Replication – Distributed Databases.	1
4	Spatial data storage and retrieval in MySQL	1
5	Temporal data storage and retrieval in MySQL	1
6	Object storage and retrieval in MySQL	1
7	XML Databases, XML table creation, XQuery FLWOR expression	1
8	Mobile Database Query Processing using open source DB (MongoDB/MySQL etc)	1

24CA1611 DATA STRUCTURES LABORATORY

L	T	P	C
0	0	4	2

PREAMBLE:

This course is offered to MCA programme. This course views the problem solving not just as solving the problem somehow but about solving the problem in the most efficient way. This course is used to an appropriate data structure and an appropriate algorithmic technique**.**

Prerequisites for the course

● Programming in C Laboratory

Objectives

1. To experiment with the various skills of data structures and their applications.
2. To use linear, nonlinear and tree data structures.
3. To show the operations of linear data structures-List, Stack and Queue.

4. To experiment with the various sorting techniques using quick and merge sort.
5. To select the shortest path using Djikstra algorithm.

S. No	List of Experiments	CO
1	Array Implementation of Stack	**CO3**
2	Array Implementation of Queue	**CO3**
3	Linked List implementation of Stack	**CO3**
4	Linked list implementation of Queue	**CO3**
5	Infix to postfix conversion	**CO2**
6	Graph Traversals	**CO2**
7	Polynomial manipulation- addition, subtraction	**CO1**
8	Binary Tree Traversal	**CO1**
9	Quick Sort	**CO4**
10	Divide and conquer – Merge Sort	**CO4**
11	Shortest Path using Dijkstra‟s Algorithm	**CO5**
12	Minimum Spanning Tree using Prims Algorithm	**CO5**
13	Dictionary application using any of the data structure	**CO5**

S.No.	List of Projects	Related Experiment	CO
1	Bank Management System	**1,2,3,4**	**CO3**
2	Calendar Application	**1,2,3,4**	**CO3**
3	Customer Billing System	**1,2,3,4**	**CO3**
4	Cricket Score Sheet	**5,6**	**CO2**
5	Hospital Management System	**5,6**	**CO2**
6	Phonebook Application	**7,8**	**CO1**
7	School Billing System	**7,8**	**CO1**
8	Employee Record System	**7,8**	**CO1**
9	Telecom Billing System	**7,8**	**CO1**
10	Typing Tutor	**7,8**	**CO1**
11	Library Management System	**9,10**	**CO4**
12	Department Store Management System	**9,10**	**CO4**

13	Student Record System	**11,12,13**	**CO5**
14	Quiz Game	**11,12,13**	**CO5**
15	Personal Dairy Management System	**11,12,13**	**CO5**

Suggestive Assessment Methods

Lab Components Assessments (60 Marks)	**End Semester Exams (40 Marks)**
Assessment, Execution and viva Demonstration of all programs and projects	**End Semester Practical exam**

Outcomes

Upon completion of the course, the students will be able to:

- **CO1 Demonstrate with the various skills of data structures and their applications.**
- **CO2 Uses appropriate the linear, non linear and tree data structures operations to solve a given problem.**
- **CO3 Write functions to implement linear data-List, Stack and Queue.**
- **CO4 Develop the sorting techniques.**
- **CO5 Solve the shortest path using the Djisktra algorithm.**

Laboratory Requirements

Computers-30 no's

Software-Turbo C

REFERENCE BOOKS

1. AnanyLevitin "Introduction to the Design and Analysis of Algorithms" Pearson Education, 2015
2. Harsh Bhasin, "Algorithms Design and Analysis", Oxford University Press 2015
3. A.K. Sharma, "Data Structures using C", Pearson Education Asia, 2013.
4. E. Horowitz, Anderson-Freed and S.Sahni, "Fundamentals of Data structures in C", University Press, 2007
5. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education Asia, 2013
6. E.Balagursamy," Data Structures using C", Tata McGraw Hill 2015 Reprint.
7. Tanaenbaum A.S, Langram Y. Augestein M.J, " Data Structures using C", Pearson Education, 2004,
8. NarasimhaKarumanchi" Data Structure and algorithmic Thinking with Python Data Structure",2016, CareerMonk
9. Hemanth Jain," Problem Solving in Data Structure and Algorithms using C",1stEdition,Taran Technologies Private Limited,2016

Web Recourses

1. https://nptel.ac.in/courses/106/106/106106231/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	3	3	1					1	1	3		3
2	2	2	3	3	1					1	1	3		3
3	2	2	3	3	1					1	1	3		3
4	2	2	3	3	1					1	1	3		3
5	3	3	3	3	1					1	1	3		3

1 Low 2 Medium 3 High

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: List out the time complexity of sorted array operations

COURSE OUTCOME 2: Compare array-based vs linked list stack implementations

COURSE OUTCOME 3: Design a stack that supports retrieving the min element

COURSE OUTCOME 4: Compare Adjacency lists or Adjacency matrices for Graphs representation

COURSE OUTCOME 5: How to find the 100 largest numbers out of an array of 1 billion numbers?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF WEEKS REQUIRED
1	Array Implementation of Stack	1
2	Array Implementation of Queue	1
3	Linked List Implementation of Stack	1
4	Linked List Implementation of Queue	1
5	Infix to Postfix Conversion	1
6	Graph Traversal	1
7	Polynomial Manipulation-addition, subtraction	1
8	Binary Tree Traversal	1
9	Quick Sort	1
10	Divide and Conquer-Merge Sort	1
11	Shortest Path using Dijkstra's Algorithm	1

12	Minimum Spanning Tree using Prim's Algorithm	1
13	Dictionary application using any of the data structure	1

24CA1912	**COMMUNICATION AND SOFT SKILLS LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

Preamble

This course aims to equip MCA students with the essential communication skills needed to thrive in the ever-evolving IT industry. With a focus on the core LSRW (Listening, Speaking, Reading, Writing) skills, the program will provide students with a strong foundation for success in corporate settings.

Prerequisites for the course

The prerequisite knowledge required to study this Course is the basic knowledge in English Language.

Objectives

1. To enhance technical communication skills for clear and effective information delivery across diverse audiences in professional contexts.
2. To prepare participants with essential interview skills, ensuring confidence and effectiveness in job interviews through strategic communication and professional presentation of qualifications.
3. To cultivate essential soft skills that are crucial for professional success, including communication, teamwork, adaptability, problem-solving, and emotional intelligence.

Module I	**Technical Communication Skills**	**20**

Listening: *General understanding skills* - Technical Language in Business - Exploring sector-specific jargon and communication nuances - Tech Giants' Interviews - Analyzing insights from interviews with industry leaders - SWOT Analysis of Tech Giants - Evaluating strengths and weaknesses - *Technical Listening*- Software Installation & Configuration - Understanding installation processes, automation tools, and practical exercises.

Speaking: *Presentation Skills* - Presentation of the strengths and weaknesses of major tech giants (Google, Apple, Amazon, Facebook, Microsoft) and exploration of the ideologies that support their continued success and innovation - *Technical Presentation skills* - articulate presentations elucidating software installation and operational principles with clarity and depth.

Reading: Read with proper stress and intonation - mastering art of conversation and advanced expression techniques - Enhance reading comprehension skills, including the ability to analyze technical documentation - Development of critical thinking and interpretative abilities.

Writing: Drafting professional Emails, writing clear and concise emails to clients and colleagues, Subject verb agreement, Common grammar errors, Words and sentence completion, arrangement of words / sentences.

Module II	**Interview SkillS**	**20**

Listening: Develop interpersonal skills to foster effective relationships - Emphasize the importance of listening skills for better understanding and collaboration - Enhance communication skills for clear and impactful interactions - Interview Skills & etiquettes.

Speaking: Answering commonly asked interview questions, Interview skills, Attending mock interviews, responding to discussions on technical challenges, role-playing client interactions (support calls, training sessions).

Reading: Commonly asked interview questions - Crafting a catchy self-introduction that captivates attention and leaves a lasting impression - analyze company profile - understand organizational goals, market position, and strategic initiatives.

Writing: Crafting a one-page professional resume focused on technical expertise and career achievements - Creating a visually appealing and engaging "visume" (visual resume) using multimedia tools - Mastering the art of professional self-introduction with a focus on technical prowess.

Module III	**Essential Soft Skills**	**20**

Listening: Corporate grooming - Emotional intelligence - Critical listening - Understanding complex presentations at industry conferences, effectively communicating in cross-cultural IT teams.

Speaking: Group discussions - Leading technical brainstorming sessions - delivering impactful presentations on technical solutions to senior management.

Reading: Reading technical concepts - project profile - product profile - Analyzing pros and cons, sharing thoughts in group discussion - Body language etiquette- art of persuasive speech.

Writing: Manuscript speech - extempore speech - organizing ideas and thoughts - impromptu.

S.No	**List of Experiments**	**CO**
1.	Presentation on Software Installation & Configuration	CO 1
2.	Present the SWOT analysis report	CO 1
3.	Draft professional Email	CO 1
4.	Aptitude Exam	CO 1
5.	Listening Comprehension	CO 2
6.	Prepare a Resume	CO 2
7.	Prepare a Visume	CO 2
8.	Mock Interview	CO 2
9.	Listening Comprehension	CO 3
10.	Mock group discussion	CO 3
	Total Periods	**60 Lab**

Suggestive Assessment Methods:

1. Listening and answering questions - MCQ - Cloze Test - Note Making
2. Speaking - App/Software based testing, Group Discussion, Presentation, answering interview Questions.
3. Reading - analyze the passage given - understand the concept and answer Questions - On-line Based
4. Writing - Online MCQ - paper based

Lab Components Assessments (60 Marks)	**End Semester Exams (40 Marks)**
Completion of Suggested Lab Exercises	EXTERNAL: 40 MARKS Online Exam – 20 Marks. Group Discussion – 10 Marks. Personal Interview Questions - 10 marks

Outcomes

Upon completion of the course, the students will be able to:

CO 1	Demonstrate improved ability to articulate technical information clearly and effectively, catering to various audiences' comprehension levels and professional contexts.
CO 2	Achieve improved interview performance through enhanced communication and confident presentation of qualifications, boosting success in job interviews.
CO 3	Acquire essential soft skills, including communication, teamwork, adaptability, problem-solving, and emotional intelligence, enhancing their professional readiness and career prospects.

Text Books

1. Butterfield, Jeff. Soft Skills for Everyone. Cengage Learning: New Delhi,2017.

Reference Books

1. Bailey, Stephen. Academic Writing: A Practical Guide for Students.New York: Rutledge,2011.
2. Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.

WEB RESOURCE(S):

1. Google Cloud https://www.youtube.com/user/googlecloudplatform
2. English Speaking Practice https://play.google.com/store/apps/details?id=com.talkenglish.practice
3. BBC Learning English http://www.bbc.co.uk/learningenglish/

4. Eduonixhttps://www.youtube.com/c/Eduonix
5. Orai app for mastering Presentation Skillshttps://orai.com/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
1								1		3			
2								1	1	3			
3								1	1	3			

SECOND SEMESTER

24CA2601	JAVA PROGRAMMING	L	T	P	C
		3	0	0	3

PREAMBLE:

This course is offered in 2nd semester of MCA programme in the department of Computer Applications a a professional core subject. This course offers programming knowledge of Java language. In this course i reveals the versatile need and usage of dynamic web page.

PRE-REQUISITE:

- Object Oriented Programming

OBJECTIVES:

1. To study about the fundamentals in Core Java.
2. To apply the concepts of Collection classes.
3. To develop servlet applications using Java Database Connectivity.
4. To develop web applications using JSP/Servlets.
5. To examine the various networking concepts in Java.

UNIT I JAVA FUNDAMENTALS 9

Java features – Java Platform – Java Fundamentals – Expressions, Operators, and Control Structures – Classes, Methods – Inheritance - Packages and Interfaces – Boxing, Unboxing and Exception Handling – Thread-LAMBDA Expressions

UNIT II COLLECTIONS AND ADVANCE FEATURES 9

Utility Packages- Introduction to collection –Hierarchy of Collection framework – Generics, Array list, LL, HashSet, TreeSet, HashMap – Comparators – Java annotations

UNIT III ADVANCED JAVAPROGRAMMING 9

Input Output Packages – Inner Classes – Java Database Connectivity - Introduction JDBC Drivers - JDBC connectivity with MySQL/Oracle -Prepared Statement & Result Set – JDBC Stored procedures invocation - Servlets - RMI.

UNIT IV OVERVIEW OF DATA RETRIEVAL & ENTERPRISE APPLICATION DEVELOPMENT 9

Tiered Application development - Java Servers, containers –Web Container – Servlets - Creating Web Application using JSP/Servlets – Web Frameworks / Play Framework – Introduction to Hibernate.

UNIT V JAVA INTERNALS AND NETWORKING 9

Java jar Files-Introspection – Garbage collection – Architecture and design – GC Cleanup process, Invoking GC, Generation in GC - Networking Basics Java and the Net – InetAddress – TCP/IP Client Sockets – URL –URL Connection – TCP/IP Server Sockets – A Caching Proxy HTTP Server – Datagrams.

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1& 2 – Written Exam	**Unit–1** MCQ's on java fundamentals. **Unit-2** MCQ's on collection frame works. **Unit – 3**Write a Programs to perform the advanced java features. **Unit – 4** Assignments to write a program for connecting database. **Unit – 5**Assignments to study about the networking concepts with java	**Descriptive type**

Suggested Activities:

1) Write a program to perform a basic Java features.
2) Create a java program to perform operations on data collections
3) Write a program to demonstrate the database connectivity.
4) Write a java program to demonstrate the networking concepts with java.
5) Write a programs to demonstrate the Inet address creation.

Outcomes

Upon completion of the course, the students will be able to:

CO1 Study about the fundamental concepts in Core Java.

CO2 Write the program to illustrate the concepts of Collection classes.

CO3 Build a program for database applications using Servlets.

CO4 Illustrate attractive web applications using JSP/Servlets.

CO5 Apply the networking concepts in Java.

REFERENCE BOOKS

1. Eleventh Edition, Tata McGraw Hill, 2018.
2. Joyce Farrell, "Java Programming", Cengage Learning, Nineth Edition, 2019.
3. John Dean, Raymond Dean, "Introduction to Programming with JAVA – A Problem Solving Approach", Tata McGraw Hill, 2014.
4. E Balagurusamy," Programming with Java", McGraw-Hill Education, 2019.

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_cs47/preview

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	1	3	1		2	1		2	1		3
2	3	2	2	2	3	1		2	1		2	1		3
3	2	2	1	2	3	1		2	1		2	1		3
4	2	2	2	1	3	1		2	1		2	1		3
5	2	2	1	1	3	1		2	1		2	1		3

1 Low 2 Medium 3 High

24CA2602 LINUX OPERATING SYSTEMS L T P C

3 0 0 3

PREAMBLE:

The Linux OS course for MCA provides a comprehensive introduction to the Linux operating system focusing on command-line proficiency, shell scripting, system calls, and system administration. This course equips students with the skills to manage and automate tasks in a Linux environment effectively.

PRE-REQUISITE:

Operating System Concepts

OBJECTIVES:

1. To understand the foundational concepts and structure of the Linux operating system.
2. To gain proficiency using the command-line interface for basic system operations.
3. To learn to create and execute simple shell scripts for task automation.
4. To develop advanced scripting skills and utilize system calls for complex system management.
5. To acquire the skills to perform essential system administration tasks and manage a Linux system effectively.

UNIT I INTRODUCTION TO THE LINUX ENVIRONMENT 9

History and evolution of the Linux operating systems - The present landscape of Linux derivatives - Comparison between free and proprietary software - An overview of the Linux environment - Introduction to the Bourne Again SHell (bash) - The vim editor.

UNIT II INTRODUCTION TO THE CLI 9

Shell environment, commands, syntax, options, getting help - Basic commands and utilities - File system navigation and manipulation - Process management Command line processing- I/O redirection and filters

UNIT III SHELL SCRIPTING 9

Basics of shell scripting - The built-in constructs of the shell - Basics of filters and regular expressions - Some utility programs - Combining the available facilities to produce new ones – Examples

UNIT IV ADVANCED SHELL SCRIPTING AND SYSTEM CALLS 9

Using advanced features of the shell - The grep filter - The sed filter - The awk filter - Common Linux Commands - Programming using system calls under Linux.

UNIT V LINUX SYSTEM ADMINISTRATION 9

File system management - User management - Configuring the system - Backup and system recovery - Tools and shell scripting for the administrator - Common applications and file formats on Linux - Tools for Linux development

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1& 2 – Written Exam	Unit 1: MCQs on the Evolution of Linux Unit 2: Write Programs on basic commands Unit 3: Descriptive questions on filters and utilities. Unit 4: Quiz on Shell scripting and system calls. Unit 5: Assessment of backup and system recovery tools.	Descriptive type questions

Suggested Activities

Unit 1: Explore and document the differences between Linux distributions.

Unit 2: Perform a set of file management tasks using basic Linux commands.

Unit 3: Write a shell script to automate the backup of a specific directory to a designated location.

Unit 4: Short quiz on Advanced Shell Scripting and System Calls.

Unit 5: Set up and configure a Linux server to host a basic web application.

Outcomes:

Upon completion of the course, the students will be able to:

CO1 Understand the structure and main components of the Linux operating system.

CO2 Use basic Linux commands to manage files and directories.

CO3 Write and run simple shell scripts to automate tasks.

CO4 Create advanced shell scripts that incorporate error handling and system calls.

CO5 Perform essential Linux system administration tasks such as user management and system maintenance.

REFERENCE BOOKS

1. "Linux Bible" by Christopher Negus (2022, Wiley)
2. “Linux Pocket Guide: Essential Commands" by Daniel J. Barrett (2021, O'Reilly Media).
3. "UNIX and Linux System Administration Handbook" by Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley (2020, Addison-Wesley Professional).
4. "The Linux Command Line: A Complete Introduction" by William E. Shotts Jr. (2019, No Starch Press).

WEB RESOURCES

1. https://onlinecourses.swayam2.ac.in/aic20_sp24/
2. https://www.udemy.com/course/mastering-linux/?
3. https://www.edx.org/learn/linux

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	1	1		2	3								
2	1	2	1	3	1									
3			1		1									
4	1	2	1	1									1	
5	1	1	3		1								1	

1 Low 2 Medium 3 High

24CA2603 FUNDAMENTALS OF ACCOUNTING

L	T	P	C
3	0	0	3

PREAMBLE:

This course is offered to MCA programme to gain the knowledge of accounting principles. This course offers students an introduction about the accounting.

PRE-REQUISITE:

NIL

OBJECTIVES:

1. To understand the basics of accounting.
2. To understand the computation of Final Accounts.
3. To understand the analysis of Financial Statement.
4. To understand the concepts of Management and Cost accounting.
5. To understand the computation of various budgets.

UNIT I **INTRODUCTION TO ACCOUNTING** **9**

Introduction, Objectives, Functions of Financial Accounting –Accounting Principles, Concepts and Conventions–Bookkeeping and Accounting. Journal, Ledger, Trial Balance.

UNITII **FINAL ACCOUNTS** **9**

Trading, Profit and Loss Account, Balance Sheet; Adjustment Entries.

UNIT III **FINANCIAL STATEMENT ANALYSIS** **9**

Meaning, Types, Nature of Financial Statement Analysis – Techniques: Ratio Analysis, Fund Flow Statement, Cash Flow Statement.

UNIT IV **MANAGEMENT AND COSTACCOUNTING** **9**

Meaning, Objectives, Functions, scope, Utility of Management Accounting – Meaning, Objectives, Importance of Cost Accounting - Preparation of Cost Sheet.

UNIT V **BUDGETARY CONTROL** **9**

Budget and Budgetary Control-Meaning – Types: Sales Budget, Production Budget,Cash Budget, Master Budget, Flexible Budget.

Total Hrs.: 45

Suggestive Assessment Methods

Continuous Assessment Test (20Marks)	**Formative Assessment Test (20Marks)**	**End Semester Exams (60Marks)**
CAT 1 & CAT 2 – Descriptive type questions	**Unit – 1 –** Problems on basic accounting principles. **Unit – 2 –** Problems on Final Accounts. **Unit –3–** Problems on Financial Statement Analysis. **Unit – 4 –** Problems on Cost Sheet **Unit – 5 –** Problems on budgets.	**Descriptive type question**

Suggested Activities

Unit 1 - Study about the basic principles of accounts.

Unit 2 – Practice the process of maintaining the final accounts in an organization.

Unit 3 - Study to calculate the financial position of an organization.

Unit 4 – Study about the management and cost components in an organization.

Unit 5 –Develop different types of budgets.

Outcomes

Upon completion of the course, the students will be able to:

CO1 Understand the basic concepts of Accounting standards.

CO2 Prepare the final accounts of a business entity.

CO3 Make critical analysis of Financial Statements.

CO4 Understand the utility of Management and Cost accounting.

CO5 Prepare the different types of budgets.

REFERENCE BOOKS

1. S.N.Maheswari,"FinancialandManagementAccounting",SultanChand&Sons,5edition,2010
2. ReddyandMurthy,FinancialAccountingbyMarghamPublications,2015,Chennai
3. I.M.Pandey, "Management Accounting", Vikas Publishing HousePvt.Ltd.,3rdEdition,2009

WEB RESOURCES

1. https://www.udemy.com/course/fundamentals-of-accounting

CO Vs PO Mapping and CO Vs. PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1				1			3	3	2		3	3		
2				1			3	3	2		3	3		
3				1			3	3	2		3	3		
4				1			3	3	2		3	3		
5				1			3	3	2		3	3		

1 Low 2 Medium 3 High

24CA2604 FULL STACK SOFTWARE DEVELOPMENT L T P C

3 0 0 3

PREAMBLE:

This course is offered to MCA programme. The course on Full Stack Software Development focuses o integrating React, Node.js, Express.js, and MongoDB to build scalable and efficient web applications.

PRE-REQUISITE:

- Basic Programming skills

OBJECTIVES:

1. To understand the basics of JavaScript and importance of MERN stack
2. To understand the role of React in designing front-end components

3. To understand the design issues in the development of backend components using Node.js and Express
4. To understand the significance of using MongoDB as a database system
5. To understand the advanced features of full stack development

UNIT I JAVASCRIPT AND BASICS OF MERN STACK 9

JavaScript Fundamentals - Objects - Generators, advanced iteration - Modules - DOM tree - Node properties - browser events - Event delegation - UI Events -Forms, controls - Document and resource loading - Mutation observer - Event loop: microtasks and macrotasks - MERN Components- React - Node.js - Express - MongoDB - Need for MERN - Server-Less Hello World - Server Setup -nvm - Node.js - npm.

UNIT II REACT 9

React Introduction - React ES6 - React Render HTML - React JSX - Components -React Classes - Composing Components - Passing Data - Dynamic Composition - React state - setting State - Async State Initialization - Event Handling Communicating from Child to Parent - Stateless Components - Designing components- React Forms - React CSS - React SaaS

UNIT III NODE.JS AND EXPRESS 9

Node.js basics - Local and Export Modules - Node Package Manager - Node.js web server - Node.js File system - Node Inspector - Node.js EventEmitter - Frameworks for Node.js - Express.js Web App - Serving static Resource - Node.js Data Access - Express REST APIs - REST - Resource Based - HTTP Methods as Actions - JSON- Express - Routing - Handler Function - Middleware - The List API - Automatic Server Restart - Testing - The Create API - Using the List API - Using the Create API- Error Handling - Template Engine.

UNIT IV MONGODB 9

MongoDB - MongoDB Basics - Documents - Collections - Query Language - Installation - The mongo Shell - Schema Initialization - MongoDB Node.js Driver - Reading from MongoDB - Writing to MongoDB - CRUD operations - projections - Indexing - Aggregaton - Replication - Sharding - Creating backup – Deployment.

UNIT V ADVANCED FEATURES 9

Modularization and Webpack - Routing with React Router - Forms - More Filters in the List API - UI Components - Update API - Delete API - React-Bootstrap - Bootstrap Installation - Navigation - Table and Panel - Forms - Alerts - Modals -Server Rendering - Basic Server Rendering - Handling State - MongoDB Aggregate - Pagination - Higher Order Components - Search Bar - Google Sign- In - Session Handling

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1& 2 – Written Exam	Unit 1: Programming exercise on JavaScript basic and advanced features Unit 2: Simple projects for specific use cases Unit 3: Programming exercise on Node.js based development Unit 4: Data manipulation exercises (CRUD) / assignments using MongoDB Unit 5: Assignments on using various APIs	Descriptive type questions

Suggested Activities

Unit 1: Simple programs in MERN environment

Unit 2: Designing components with React CSS and SaaS

Unit 3: Node and Express based web development Handling of various APIs associated with Node.js

Unit 4: Querying the MongoDB databases

Unit 5: Experiments on React Router and various APIs

Outcomes:

Upon completion of the course, the students will be able to:

CO1	Develop proficiency in modern JavaScript fundamentals
CO2	Gain expertise in React fundamentals, and styling with CSS and SaaS.
CO3	Master Node.js basics, module management, web servers, Express.js, REST APIs, routing, middleware, testing, and template engines.
CO4	Build an applications which performs CRUD operations, indexing, aggregation.
CO5	Implement and deploy web applications using API.

TOTAL HOURS: 45

REFERENCE BOOKS

1. Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, A Press Publisher, 2022.

2. "Fullstack React: The Complete Guide to ReactJS and Friends" by Anthony Accomazzo, Ari Lerner, Nate Murray - 2023

WEB RESOURCES

1. http://tutorialsteacher.com

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2
1	3	2	2	1	3	1		2	1		2	1		3
2	3	2	2	2	3	1		2	1		2	1		3
3	2	2	1	2	3	1		2	1		2	1		3
4	2	2	2	1	3	1		2	1		2	1		3
5	2	2	1	1	3	1		2	1		2	1		3

1 Low 2 Medium 3 High

21CA2605 MOBILE APPLICATION DEVELOPMENT L T P C

3 0 2 4

PREAMBLE:

This course is offered in **Third** semester of MCA programme in the Department of Master of Computer Applications as a Professional Core Subject. This course is useful to start the career as a Mobile App Developer. This subject taught us to develop the mobile app by their own

OBJECTIVES:

1. To understand the basic concepts, aware of the GSM, SMS, GPRS Architecture.
2. To compare about wireless protocols -WLN, Bluetooth, WAP, ZigBee issues.
3. To understand the Network, Transport Functionalities of Mobile communication.
4. To apply the knowledge in Mobile Application Development Platform.
5. To apply the basic components needed for Mobile App development.

PRE-REQUISITE:

- Computer Networks

UNIT I WIRELESS COMMUNICATION FUNDAMENTALS 9

Introduction- Difference between wired and wireless-Frequency Spectrum- Multiplexing- Spread spectrum-GSM vs CDMA -Comparison of 2G , 3G, 4G - GSM Architecture-Entities-Call Routing- Address and identifiers- GSM Protocol architecture-Mobility Management-Frequency Allocation- Security – GPRS Architecture .

UNIT II MOBILE WIRELESS SHORT RANGE NETWORKS 9

Introduction-WLAN Equipment-WLAN Topologies-WLAN Technologies-IEEE 802.11 Architecture-WLAN MAC-Security of WLAN, - Standards- WAP Architecture- Bluetooth enabled Devices Network-Layers in Bluetooth Protocol-Security in Bluetooth- IrDA- Zigbee.

UNIT III MOBILE IP NETWORK LAYER, TRANSPORT LAYER 9

IP and Mobile IP Network Layer- Packet delivery and Handover Management-Location Management- Registration- Tunneling and Encapsulation-Route Optimization- Mobile Transport Layer-Conventional TCP/IP Transport Layer Protocol-Indirect, Snooping, Mobile TCP.

UNIT IV MOBILE APPLICATION DEVELOPMENT USING ANDROID 9

Mobile Applications Development - Understanding the Android Software Stack – Android Application Architecture –The Android Application Life Cycle – The Activity Life Cycle-Creating Android Activity Views- Layout -Creating User Interfaces with basic views

UNIT V IMPLEMENTATION OF MOBILE APPLICATION DEVELOPMENT 9

Linking activities with Intents- Services-Broadcast Receivers – Adapters – Data Storage, Retrieval and Sharing.-Location based services- Development of simple mobile applications. Introduction to IOS – Creating an Xcode project- Model View Controller – Auto Layout- Introduction to Swift Language

TOTAL HOURS: 45

Lab Experiments: 30 Hours

S.No	List of Experiments	CO
1	Develop an application that uses Layout Managers.	**CO1**
2	Develop an application that uses event listeners.	**CO1,CO2**
3	Develop an application that uses Adapters, Toast.	**CO1,CO2,CO3**
4	Develop an application that uses Toast.	**CO2,CO3**
5	Develop an application that makes use of database.	**CO3**
6	Develop an application that makes use of RSS Feed.	**CO2,CO3**
7	Implement an application that implements Multi threading using Struts framework.	**CO3,CO4**
8	Develop a native application that uses GPS location information.	**CO3,CO4**
9	Implement an application that writes data to the SD card.	**CO2,CO3,CO5**
10	Develop an app to overcome a real time problem.	**CO1,CO2,CO3**

S.No.	List of Projects	Related Experiment	CO
1	Android-based Function Generator	1 to 10	**CO1,CO2**

2	Software-defined Radio.	1,2,3	**CO1,CO2**
3	Home Automation System Application.	1,2,3	**CO2,CO3**
4	IoT-based Notification System.	1 to 10	**CO2,CO3**
5	Android Bluetooth-based Chatting App.	1 to 5	**CO3**
6	Smart Travel Guide Application	1,2,3,6,7,8	**CO3,CO4**
7	Surveillance CameraControll App.	1,2,3,6,7,8	**CO3**
8	Android Controlled Robot.	1,2,3,5,6,7	**CO3,CO4**
9	Home Automation System	8,9,10	**CO4**
10	Students Communication App.	1 to 10	**CO3,CO4**
11	Timetable Manager.	7,8,9,10	**CO3,**
12	Parental Control Application.	8,9,10	**CO4**
13	Unit Converter Application.	1 to 10	**CO4**
14	Notes of the student app.	1 to 10	**CO3,CO4**
15	Fingerprint authentication secured Android Notes.	1 to 7	**CO2,CO3**

Suggestive Assessment Methods		
Continuous Assessment Test (30 Marks)	**Lab Components Assessments (20 Marks)**	**End Semester Exams (50 Marks)**
CAT 1 & CAT 2 – Written Exam	Assessment, Execution and viva Demonstration of all programs and projects	**Descriptive type questions**

Suggested Activities:

Unit 1: Utilization the resources using Multiplexing.

Unit 2: Assignment 1- Network sharing and use the standard of WLAN.

Unit 3: Assignment 2 - Simulate routing protocol in using TCP/IP.

Unit 4: Implementation of an application in Android.

Unit 5: Mobile development using Swift technology.

Outcomes

Upon completion of the course, the students will be able to:

CO1	Describe the knowledge about various types of Wireless Data Networks and Voice Networks.
CO2	Compare the wireless protocols.
CO3	Identify the architectures, the challenges and the solutions of Wireless Communication.
CO4	Implement the role of Android Application in shaping the future Internet.
CO5	Develop simple Mobile Application Using Android.

REFERENCE BOOKS

R1. Jochen Schillar "Mobile Communications" Pearson Education second Edition, 2012.

R2. Raj Kamal, "Mobile Computing", Oxford Publication, August 2019

R3. Neil Smyth, "Android Studio 4.0 Development Essentials – Java Edition" Kindle Edition" 2020.

R4. Prasant Kumar Pattanik, Rajib Mall, " Fundamentals of Mobile Computing", PHI Learning, Second Edition, 2015

R5. Jerome (J.F) DiMarzio "Android A programmer's Guide" Tata McGraw-Hill 2010 Edition.

R6. RetoMeier, Professional Android 2 Application Development, Wrox"s Programmer to Programmer, 2010.

R7. Barry A. Burd, "Android Application Development For Dummies All in One", Wiley,2020.

Web Recourses

1. https://www.youtube.com/watch?v=5kBknJWi71Q
2. https://www.minigranth.com/mobile-computing/
3. https://www.javatpoint.com/mobile-communication-tutorial
4. https://onlinecourses.swayam2.ac.in/nou24_ge66/preview -

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1			3	1	3	1		1	1	1	2	2		3
2			3	1	3	1		1	1	1	2	2		3
3			3	1	3	1		1	1	1	2	2		3
4			3	1	3	1		1	1	1	2	2		3
5			3	1	3	1		1	1	1	2	2		3

1- Low 2-Medium 3- High

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Can youdevelop an application to solve the real time problem?

COURSE OUTCOME 2: How to interact the user using the toast?

COURSE OUTCOME 3: Can you develop an application using moving numerous?

COURSE OUTCOME 4: How to determine a location and to track the user using GPS?

COURSE OUTCOME 5: How to protect the transfer data in mobile application?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF WEEKS REQUIRED

1	Develop an application that uses Layout Managers.	1
2	Develop an application that uses event listeners.	1
3	Develop an application that uses Adapters, Toast.	1
4	Develop an application that uses Toast.	1
5	Develop an application that makes use of database.	1
6	Develop an application that makes use of RSS Feed.	1
7	Implement an application that implements Multithreadingusing Struts framework.	1
8	Develop a native application that uses GPS location information.	1
9	Implement an application that writes data to the SD card.	1
10	Develop an app to overcome a real time problem.	1

24CA2611 PROGRAMMING WITH JAVA LABORATORY

L	T	P	C
0	0	4	2

Preamble:

This course is offered in 2nd semester of MCA programme in the department of Computer Applications as a professional core laboratory subject. This course offers programming knowledge of Java language. In this course it reveals the versatile need and usage of dynamic web page.

Prerequisites for the course

- Object Oriented Programming Laboratory

Objectives

1. To apply the basic programming constructs in java.
2. To develop window-based GUI applications using applets.
3. To experiment with applications using collection classes.
4. To practice server-side programming for Web Applications.
5. To write a program using advanced features like RMI, Swing, JavaBeans and Sockets.

S.No	List of Experiments	CO

1	Writing Java programs by making use of class, interface, package, etc for the following a. Different types of inheritance study b. Uses of "this" keyword c. Polymorphism d. Creation of user specific packages e. Creation of jar files and using them f. User specific exception handling	**CO1**
2	Writing window-based GUI applications using frames and applets such as Calculator application, Fahrenheit to Centigrade conversion etc.	**CO1**
3	Application of threads examples.	**CO2**
4	Create a Personal Information System using Swing	**CO2**
5	Reading and writing text files.	**CO3**
6	Writing an RMI application to access a remote method.	**CO3**
7	Writing a Servlet program with database connectivity for a web-based application such as students result status checking.	**CO4**
8	Creation and usage of Java bean.	**CO4**
9	Create an Application to search Phone Number using contact Name Using Hash Map.	**CO5**
10	Create an Application which displays in E-mail contacts using Set Interface.	**CO5**
11	FTP Using Sockets.	**CO5**
		Total Hours:60

S.No.	**List of Projects**	**Related Experiment**	**CO**
1	Course Management System.	**1,2,3**	**CO1, CO2**
2	Electricity Billing System.	**1,2,3**	**CO1,CO2**
3	Airline Reservation System	**1,2,3**	**CO1, CO2**
4	Password Generator.	**3**	**CO3**
5	Online Resume Builder.	**4**	**CO3**
6	Temperature Converter.	**2**	**CO1**
7	Exam Seating Arrangement System.	**1,2,3**	**CO2, CO3**

8	Supermarket Billing Software.	**2,4,7**	**CO2, CO3**
9	Online Hotel Reservations	**2,4,7**	**CO1,CO2,CO4**
10	School Management Software	**2,4,7**	**CO1,CO2,CO4**
11	Data Visualization Software	**9,10**	**CO5**
12	Email Client Software.	**6,11**	**CO3,CO5**
13	Web Medical Management System.	**2,4,7**	**CO1,CO2,CO4**
14	Supply Chain Management System.	**5,6,11**	**CO3,CO4,CO5**
15	Network Packet Sniffer.	**6,11**	**CO4,CO4**

Suggestive Assessment Methods	
Continuous Assessment Test (60 Marks)	**End Semester Exams (40-Marks)**
Lab Components Assessments (60 Marks)	**Lab Components – End semester (40 Marks)**

Upon completion of the course, the students will be able to:

CO1	Write a program using basic programming constructs.
CO2	Develop a java program with Java spring classes.
CO3	Use Java objects and collection classes for Java applications.
CO4	Build an application which performs CRUD operations.
CO5	Implement and deploy web applications using JAVA.

Laboratory Requirements

Computers-30 nos

Front-end- Java Development Kit

Backend- Mysql

Server-Apache Tomcat IDE- Netbeans/Eclipse

REFERENCE BOOKS

1. Herbert Schildt, “Java - The Complete Reference”, Eleventh Edition, Tata McGraw Hill, 2020.
2. Joyce Farrell, “Java Programming”, Cengage Learning, Nineth Edition, 2019.
3. Cay Horstmann ,”Core Java Volume1:Fundamentals,”,12th Edition, Oracle Press,2022
4. E Balagurusamy,”Programming with Java

5. ", McGraw-Hill Education, 2019.

WEB RESOURCES

1. **https://onlinecourses.nptel.ac.in/noc22_cs47/preview - Programming In Java**

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	1	3	1		2	1		2	1		3
2	3	2	2	2	3	1		2	1		2	1		3
3	2	2	1	2	3	1		2	1		2	1		3
4	2	2	2	1	3	1		2	1		2	1		3
5	2	2	1	1	3	1		2	1		2	1		3

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Can you define programs using basic programming constructs?

COURSE OUTCOME 2: Are you able to demonstrate window-based GUI applications using applets?

COURSE OUTCOME 3: Can you develop an application using collection classes?

COURSE OUTCOME 4: Are you able to develop a sample web application using JSP/Servlets?

COURSE OUTCOME 5: Can you develop an application which displays in E-mail contacts using Set Interface?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF WEEKS REQUIRED
1	Writing Java programs by making use of class, interface, package, etc for the following a. Different types of inheritance study b. Uses of "this" keyword c. Polymorphism d. Creation of user specific packages e. Creation of jar files and using them f. User specific exception handling	1
2	Writing window-based GUI applications using frames and applets such as Calculator application, Fahrenheit to Centigrade conversion etc.	1

3	Application of threads examples.	1
4	Develop a Personal Information System using Swing	1
5	Reading and writing text files.	1
6	Writing an RMI application to access a remote method.	1
7	Writing a Servlet program with database connectivity for a web-based application such as students result status checking.	1
8	Creation and usage of Java bean.	1
9	Create an Application to search Phone Number using contact Name Using Hash Map.	1
10	Create an Application which displays in E-mail contacts using Set Interface.	1
11	FTP Using Sockets.	1

24CA2612 FULL STACK DEVELOPMENT LABORATORY L T P C

0 0 4 2

PREAMBLE:

This course is offered to MCA programme. The course on Full Stack Software Development focuses on integrating React, Node.js, Express.js, and MongoDB to build scalable and efficient web applications.

PRE-REQUISITE:

- **Web Technologies**

OBJECTIVES

1. To learn and implement JavaScript features.
2. To learn the browser-based JavaScript features in a web based environment
3. To understand and develop front end UI development using React JS.
4. To understand and design back end development using Node.js and Express.
5. To learn NoSQL data technologies and data management with web application

S. No	List of Experiments	CO
1	Implement a function to iterate over the properties of an object and log them	**CO1**
2	Use a generator to implement a custom iterable that generates Fibonacci	**CO1**

	sequence.	
3	Create a module that exports functions to calculate area and perimeter of geometric shapes like rectangle, circle, etc.	**CO1**
4	Create a function that dynamically creates an HTML element (e.g.,) and appends it to the document.	**CO2**
5	Implement a feature that dynamically adds, updates, or removes DOM elements based on user actions (e.g., adding/removing items from a list).	**CO2**
6	Create a React component using JSX that renders a simple greeting message.	**CO3**
7	Implement form submission handling to validate inputs and perform actions (e.g., API requests).	**CO3**
8	Create a simple Node.js server using Express that responds with "Hello, World!" to incoming requests.	**CO4**
9	Implement CRUD operations (create, read, update, delete) for a collection using Express routes.	**CO4**
10	Write Node.js code to connect to a MongoDB database using mongoose or the native MongoDB driver.	**CO5**
11	Write MongoDB queries (find(), findOne(), find().sort().limit()) to retrieve documents from a collection based on specific criteria.	**CO5**

S.No.	List of Projects	Related Experiment	CO
1	Task Manager with Generators	**1,2,3**	**CO1**
2	Module-based Quiz App	**1,2,3**	**CO1**
3	Interactive Form Validation	**1,2,3**	**CO2**
4	Real-time Document Editor	**4,5,6**	**CO2**
5	Task Management Dashboard	**4,5,6**	**CO3**
6	E-commerce Product Catalog	**7,8**	**CO3**
7	RESTful API for a Blog	**7,8**	**CO4**
8	Real-time Chat Application	**7,8**	**CO4**
9	User Management System(Hospital, BOOK etc)	**7,8,9,10**	**CO5**
10	Event Scheduler	**9,10**	**CO5**

Suggestive Assessment Methods	
Lab Components Assessments (60 Marks)	**End Semester Exams (40 Marks)**

Assessment, Execution and viva Demonstration of all programs and projects	**End Semester Practical exam**
Outcomes	

Upon completion of the course, the students will be able to:

CO1	Implement and execute basic JavaScript programs.
CO2	Work with react based framework for front end development.
CO3	Work with back end technologies such as nodeJS and express.
CO4	Handle data and manage using Mango DB as a database for enterprise app development
CO5	Get an insight about the advanced features such as routing, Filters, bootstrap.

Laboratory Requirements

Computers-30 no's

Software- Eclipse, Node js

REFERENCE BOOKS

1. Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, A Press Publisher, 2022.

2. "Fullstack React: The Complete Guide to ReactJS and Friends" by Anthony Accomazzo, Ari Lerner, Nate Murray – 2023

Web Recourses

1. http://tutorialsteacher.com

CO vs PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	1	3	1		2	1		2	1		3
2	3	2	2	2	3	1		2	1		2	1		3
3	2	2	1	2	3	1		2	1		2	1		3
4	2	2	2	1	3	1		2	1		2	1		3
5	2	2	1	1	3	1		2	1		2	1		3

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Explain the concept of objects in JavaScript.

COURSE OUTCOME 2: Compare and contrast browser events and UI events in the context of event propagation and handling.

COURSE OUTCOME 3: Design and develop front end UI development using React JS.

COURSE OUTCOME 4: Write a simple program using back end development using Node.js and Express.

COURSE OUTCOME 5: Write the basic queries in MongoDB

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF WEEKS REQUIRED
1	Building a Task Manager with JavaScript Modules and Generator	1
2	Integrate modules in app.js to initialize the application, handle user interactions (e.g., form submissions, button clicks), and manage overall application flow.	1
3	Working with DOM and Browser Events in Web Development	1
4	UI Events and Event Handling	1
5	Forms, Controls, and Validation	1
6	Front-end UI Development with React: JSX, Components, State Management, Event Handling, and Form Integration	1
7	React CSS and SaaS	1
8	Introduction to Node.js and Express	1
9	Setting Up a Node.js Environment	1
10	Basic MongoDB Operations	1
11	Indexes and Performance Optimization	1

PROFESSIONAL ELECTIVES

24CA2701	NETWORK SECURITY	L	T	P	C
		3	0	0	3

PREAMBLE:

This course is a vital component of the MCA program, focusing on fundamental and advanced network security concepts. Students will explore cryptography, network vulnerabilities, threat detection, security protocols, and defensive strategies. Through hands-on experience with modern security tools, they will learn to protect networks against cyber threats. By course end, students will be prepared to design, implement, and manage secure network infrastructures, paving the way for careers as network security professionals.

PRE-REQUISITE:

Nil

OBJECTIVES:

1. Demonstration of application layer protocols
2. Discuss transport layer services and understand UDP and TCP protocols
3. Explain routers, IP and Routing Algorithms in network layer
4. Disseminate the Wireless and Mobile Networks covering IEEE 802.11 Standard
5. Illustrate concepts of Multimedia Networking, Security and Network Management

UNIT I INTRODUCTION 9

Overview of network security concepts and principles-Threats to network security: types and sources-Risk assessment and management in network security - Legal and ethical considerations in network security

UNIT II NETWORK SECURITY PROTOCOLS AND MECHANISMS 9

Cryptography fundamentals: encryption, decryption, and cryptographic algorithms- Secure communication protocols: SSL/TLS, IPSec- Public key infrastructure (PKI) and digital certificates-Virtual Private Networks (VPNs) and their implementation.

UNIT III NETWORK PERIMETER DEFENSE 9

Firewalls: types, functions, and configuration-Intrusion Detection and Prevention Systems (IDPS) Access Control: principles, mechanisms, and implementation - Secure Network Design: DMZ, VLANs, and sub netting

UNIT IV SECURE NETWORK APPLICATIONS AND SERVICES 9

E-mail security: SPF, DKIM, DMARC - Web security: HTTP/HTTPS, secure coding practices -Secure DNS and implementations - Secure File Transfer Protocols: SFTP, SCP, FTPS

UNIT V ADVANCED TOPICS IN NETWORK SECURITY 9

Wireless network security: WPA, WPA2, WPA3- Cloud security: considerations and best practices

Incident response and handling in network security- Emerging trends in network security: IoT security, AI in cyber security

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1& 2 – Written Exam	Unit 1: MCQs on Network security Unit 2: Organize mock incident response drills to simulate cyber security incidents. Unit 3: Develop a comprehensive network security plan for a hypothetical organization. Unit 4: Analyze recent cyber attacks and their impact on organizations and society Unit 5: Write about Internet of Things (IoT) security challenges	Descriptive type questions

Outcomes:

Upon completion **of the course, the students will be able to:**

CO1 Understand fundamental concepts and principles of network security.

CO2 Analyze and assess security risks to design effective security strategies.

CO3 Implement and configure network security technologies and tools.

CO4 Demonstrate proficiency in detecting, mitigating, and responding to cyber threats.

CO5 Evaluate emerging trends and technologies in network security and their implications.

REFERENCE BOOKS

1. Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition, McGraw Hill, Indian Edition
2. 2. Larry L Peterson and Brusce S Davie, Computer Networks, fifth edition, ELSEVIER
3. 3. Andrew S Tanenbaum, Computer Networks, fifth edition, Pearson
4. 4. Mayank Dave, Computer Networks, Second edition, Cengage Learning.
5. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Sixth edition, Pearson,2017 .

6. Nader F Mir, Computer and Communication Networks, 2nd Edition, Pearson, 2014.

WEB RESOURCES

1.https://nptel.ac.in/courses/106/106/106106231/

2.https://leetcode.com/discuss/study-guide/1178887/compiling-important-topics-of-data-structures-and-algorithm-and-coding-tricks

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	1	1		2	3								
2	1	2	1	3	1									
3			1		1									
4	1	2	1	1									1	
5	1	1	3		1								1	

1 Low 2 Medium 3 High

24CA2702 SOFTWARE PROJECT MANAGEMENT L T P C

3 0 0 3

PREAMBLE

This course is a crucial part of the Master of Computer Applications (MCA) program, designed to provide students with a comprehensive understanding of software project management. It covers essential concepts and practices in planning, executing, and closing software projects. Students will learn about project life cycles, methodologies, risk management, quality assurance, and resource allocation. Through practical exercises and case studies, this course aims to equip students with the skills needed to manage software projects effectively and deliver successful outcomes

PRE-REQUISITE:

Software Engineering

OBJECTIVES:

1. To identify the various strategies of project planning for the software process.
2. To examine the cost estimation during the analysis of the project.
3. To correlate the estimation techniques available in the IT industry
4. To discover the risks available in the Software Management.
5. To categorize the Global standards and social impacts on globalization.

UNIT I INTRODUCTION TO SPM 9

Introduction to Software Project Management: An Overview of Project Planning: Select Project, Identifying Project scope and objectives, infrastructure, project products and Characteristics. Estimate efforts, Identify activity risks, and allocate resources- TQM, Six Sigma, Software Quality: defining software quality, ISO9126, External Standards.

UNIT II SOFTWARE EVALUATION AND COSTING 9

Project Evaluation: Strategic Assessment, Technical Assessment, cost-benefit analysis, Cash flow forecasting, cost-benefit evaluation techniques, Risk Evaluation. Selection of Appropriate Project approach: Choosing technologies, choice of process models, structured methods.

UNIT III SOFTWARE ESTIMATION TECHNIQUES 9

Software Effort Estimation: Problems with over and under estimations, Basis of software Estimation, Software estimation techniques, expert Judgment, Estimating by analogy. Activity Planning: Project schedules, projects and activities, sequencing and scheduling Activities, networks planning models, formulating a network model. Case Study: Effort Estimation models

UNIT IV RISK MANAGEMENT 9

Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Critical Paths, Cost scheduling, Monitoring and Control: Creating Framework, cost monitoring, prioritizing monitoring Case Study: Risk on Complex projects

UNIT V GLOBALIZATION ISSUES IN PROJECT MANAGEMENT 9

Globalization issues in project management: Evolution of globalization- challenges in building global teams-models for the execution of some effective management techniques for managing global teams. Impact of the internet on project management– managing projects for the internet – effect on project management activities. Comparison of project management software's: dot Project, Launch pad, openProj. Case study: PRINCE2.

TOTAL HOURS: 45

REFERENCE BOOK(S):

1. Bob Hughes, Mike Cotterell&Rajib Mall, "Software Project Management",TataMcGraw-Hill Publications, Sixth Edition 2017
2. Futrell , "Quality Software Project Management", Pearson Education India, 2008.
3. Gobalswamy Ramesh, "Managing Global Software Projects", Tata McGraw Hill Publishing Company, 2006.
4. Richard H.Thayer "Software Engineering Project Management", IEEE Computer Society
5. S. A. Kelkar, "Software Project Management" PHI, New Delhi, Third Edition ,2013.

WEB RESOURCE(S):

1. https://onlinecourses.nptel.ac.in/noc19_cs70/preview
2. http://www.ogc.gov.uk/methods_prince_2.asp
3. https://www.tutorialspoint.com/software_engineering/software_project_management.htm

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 – Written Exam	UNIT I: MCQS on Project products and characteristics. UNIT II: Assignment on strategies and evaluation. UNIT III: Case studies on evaluation. UNIT IV: Group discussion risk identification and analysis. UNIT V : Hands-on experience with project management software evaluation and selection.	**Descriptive type question**

Outcomes :

Upon completion of the course, the students will be able to:

CO1 Describe the activities during the project scheduling of any software application.

CO2 Survey the risk management activities and the resource allocation for the projects.

CO3 Use the software estimation and recent quality standards for evaluation of the software Projects

CO4 Survey the various risks available in the Software Management.

CO5 Demonstrate the Global standards and social impacts on globalization.

CO Vs PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	1	3									3
2	2	1	1		2									2
3	2	2	3	3	2									2
4	3	2	1	1	3									3
5	3	2	2	2	3									3

1 Low 2 Medium 3 High

24CA2703 DATA ETHICS AND GOVERNANCE L T P C

3 0 0 3

PREAMBLE:

This course provides an in-depth exploration of the ethical and governance issues surrounding data collection, analysis, and usage. Students will learn about ethical theories, data governance frameworks, data management practices, ethical considerations in AI, and the societal impacts of data.

PRE-REQUISITE:

- **NIL**

OBJECTIVES:

1. To understand the principles and importance of data ethics.
2. To gain knowledge of data governance frameworks and regulatory requirements.
3. To learn best practices in data management and quality assurance.
4. To explore the ethical challenges in AI and machine learning.
5. To assess the social and global impacts of data.

UNIT I Foundations of Data Ethics 9

Introduction to data ethics : Definition and Importance - Historical Context - Key Principles: Transparency, Accountability, Fairness - Ethical Theories and Data : Utilitarianism-Deontological Ethics - Virtue Ethics - Data Privacy and Security: Understanding Data Privacy-Legal Frameworks: GDPR, CCPA - Data Security Best Practices - Case Studies in Data Ethics: Analysis of Real-world Examples -Ethical Dilemmas and Decision Making.

UNIT II Data Governance Frameworks 9

Introduction to Data Governance: Definition and Importance - Key Components: People, Processes, Technology - Data Governance Models : Centralized vs Decentralized Models -Comparative Analysis - Regulatory and Compliance Requirements: Key Regulations -GDPR, HIPAA, CCPA - Compliance Strategies - Implementing Data Governance : Best Practices -Tools and Technologies.

UNIT III Data Management and Quality 9

Data Lifecycle Management : Data Collection and Storage - Data Processing and Analysis -Data Archiving and Deletion - Data Quality Management:Definition and Importance - Dimensions of Data Quality: Accuracy, Completeness, Consistency - Data Stewardship and Ownership : Roles and Responsibilities - Data Stewardship Programs - Ensuring Data Integrity : Techniques and Best Practices - Tools for Data Quality Assessment .

UNIT IV Ethical AI and Machine Learning 9

Introduction to Ethical AI :Definition and Importance - Key Challenges and Risks - Bias and Fairness in AI :Types of Bias in AI - Mitigating Bias in Machine Learning Models -Accountability and Transparency in AI : Explainability of AI Models - Accountability Mechanisms - Case Studies in Ethical AI : Real-world Applications - Lessons Learned.

UNIT V Ethical AI and Machine Learning 9

Social and Global Impacts of Data : Data and Society - Societal Impacts of Data -Digital Divide and Inclusion - Ethical Issues in Big Data : Surveillance and Privacy Concerns - Data Monetization and Ethics - Global Perspectives on Data Ethics : Cross-Cultural Considerations - Global Data Governance Models - Future Trends and Challenges : Emerging Technologies and Ethical Implications - Preparing for Future Ethical Challenges.

TOTAL HOURS :45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 – Written Exam	UNIT I : Case Study Review - Analyze real-world examples of ethical dilemmas in data. UNIT II : MCQ on technologies. UNIT III : Give the challenges in data collection , processing and storage. UNIT IV : Group Discussion from case studies. UNIT V : Assignment to the survey on public perception of data use.	**Descriptive type question**
Outcomes		
Upon completion of the course, the students will be able to:		

CO1: Explain the foundational principles of data ethics and apply ethical theories to data-related scenarios.

CO2: Identify and describe various data governance frameworks and regulatory requirements.

CO3: Implement data management practices to ensure data quality and integrity.

CO4: Evaluate the ethical implications of AI and machine learning models.

CO5: Analyze the societal and global impacts of data and propose ethical solutions to data-related challenges.

REFERENCE BOOKS

1. "Data Ethics: The New Competitive Advantage" by Gry Hasselbalch and Pernille Tranberg, Auerbach Publications, First Edition, 2016.
2. “Data Privacy: Principles and Practice" by Antonio Martino, Springer,First Edition, 2021.
3. "Data Governance: Creating Value from Information Assets" by Neera Bhansali , CRC Press ,First Edition, 2013.
4. “Data and Society: A Critical Introduction" by Anne Beaulieu and Sabina Leonelli, SAGE Publication , First Edition, 2021.

WEB RESOURCES

1. https://datagovernance.com
2. https://onlinecourses.swayam2.ac.in/nou24_ge62/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2

1	**3**	**2**	**2**	**1**	**3**									**3**
2	**2**			**2**	**2**								**1**	**2**
3	**2**			**3**	**2**									**2**
4		**2**			**3**								**2**	**3**
5		**2**	**2**	**2**	**3**									**3**

24CA2704 AI ETHICS AND POLICY L T P C

3 0 0 3

PREAMBLE:

This course is a crucial part of the Master of Computer Applications (MCA) program, designed to address the ethical, social, and policy implications of artificial intelligence (AI). It covers a wide range of topics including ethical frameworks, biases in AI systems, privacy concerns, and the impact of AI on society and the workforce. By understanding these issues, students will be able to develop and implement AI technologies responsibly and ethically..

PRE-REQUISITE:

- **Basics of AI**

OBJECTIVES:

1. To understand the ethical considerations in the development and deployment of AI systems.
2. To analyze the impact of AI on privacy, fairness, and human rights.
3. To evaluate policies and regulations surrounding AI technology.
4. To develop frameworks for responsible AI development and usage.
5. To explore case studies of AI implementation and its societal implications.

UNIT I INTRODUCTION TO AI ETHICS 9

Overview of AI and its applications - Importance of ethics in AI - Ethical frameworks: Utilitarianism, Deontology, Virtue Ethics - Ethical principles in AI: transparency, accountability, and fairness - Case studies on ethical dilemmas in AI

UNIT II BIAS AND FAIRNESS IN AI 9

Understanding bias in AI: sources and types -Fairness in AI: definitions and metrics - Techniques to detect and mitigate bias - Algorithmic transparency and explain ability - Case studies on biased AI systems and their impacts.

UNIT III PRIVACY AND SURVEILLANCE 9

AI and data privacy: concepts and challenges - Privacy-preserving techniques in AI - Surveillance technologies and their ethical implications - Balancing security and privacy in AI applications - Case studies on privacy breaches and surveillance

UNIT IV AI AND SOCIETY 9

Impact of AI on the workforce and employment - Social implications of AI: inequality, discrimination, and justice - Ethical issues in autonomous systems - AI in healthcare and its ethical considerations -Case studies on the societal impacts of AI

UNIT V POLICY AND REGULATION 9

. Overview of AI policies and regulations worldwide - AI governance frameworks and ethical guidelines - Role of government, industry, and academia in AI policy - Developing and implementing responsible AI policies - Future trends and challenges in AI regulation

TOTAL PERIODS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 – Written Exam	Unit 1:Case Study Review - Analyze real-world examples of ethical dilemmas in data. Unit 2:(MCQ) - Assess knowledge of technologies related to bias and fairness in AI. Unit 3:Give the challenges in data collection, processing, and storage Unit 4:Group Discussion - Analyze case studies on the societal impacts of AI. Unit 5:Assignment - Conduct a survey on public perception of data use and present findings	**Descriptive type question**
Outcomes		
Upon completion of the course, the students will be able to:		

CO1 Identify and explain key ethical issues in AI.

CO2 Analyse and critique AI systems for bias and fairness.

CO3 Evaluate the implications of AI on privacy and human rights.

CO4 Understand and apply relevant AI policies and regulations.

CO5 Develop and advocate for ethical AI practices.

REFERENCE BOOKS

1. "Artificial Intelligence: A Guide for Thinking Humans" by Melanie Mitchell, Farrar, Straus and Giroux, First Edition, 2019.
2. "Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy" by Cathy O'Neil, Crown Publishing Group, First Edition, 2016.
3. "The Ethics of Artificial Intelligence" by Nick Bostrom and Eliezer Yudkowsky, Cambridge University Press, First Edition, 2014.
4. "Privacy, Big Data, and the Public Good: Frameworks for Engagement" by Julia Lane et al.,

Cambridge University Press, First Edition, 2014.

5. "AI Ethics" by Mark Coeckelbergh, MIT Press, First Edition, 2020.

WEB RESOURCES

1. https://nptel.ac.in/courses/109106184

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1	3	2	2	2	1	2	3	2	1	1	2	1	2	
2	3	3	2	3	2	2	3	2	1	1	2	1	2	
3	3	3	2	2	1	3	3	2	1	1	2	2	2	
4	2	3	2	2	2	3	3	3	1	1	2	2	2	
5	3	3	3	3	3	3	3	3	2	1	3	2	3	

1 Low 2 Medium 3 High

24CA2705 SOFTWARE ENGINEERING PRINCIPLES L T P C

3 0 0 3

PREAMBLE:

This course is offered in 3rd semester of MCA programme in the department of Computer Applications as a professional elective theory subject. This course is an essential part of the Master of Computer Applications (MCA) program, aimed at providing students with a comprehensive understanding of the principles, methodologies, and tools used in software engineering. It covers the software development lifecycle, project management, design patterns, testing, and maintenance. By learning these principles, students will be able to design, develop, and manage high-quality software projects effectively.

PRE-REQUISITE:

- NIL

OBJECTIVES:

1. To provide an insight into software life cycle and various software process models
2. To know the various designing concepts and notations for modelling the software.
3. To estimate the resources for developing the application and to prepare the schedule
4. To prepare the test cases for the project, apply various testing techniques, strategies and metrics t evaluate the software.
5. To construct software with high quality and reliability.

UNIT I INTRODUCTION 9

Software Engineering Paradigms – SDLC – Waterfall Life Cycle Model – Spiral Model – Prototype Model – Evolutionary Model - Agile Process Model – Unified Process Model - Planning – Software Project Scheduling -

Software Requirement Specification - Case Study: Project Plan and SRS. The secure software development lifecycle – Risk based security testing – Web application session attacks.

UNIT II SOFTWARE DESIGN 9

Designing Concepts - Abstraction – Modularity – Software Architecture – Cohesion – Coupling – Dataflow Oriented Design - Jackson System Development –Real Time and Distributed System Design – Designing for Reuse –– Case Study: Design for any Application Oriented Project.

UNIT III SOFTWARE TESTING AND MAINTENANCE 9

Software Testing Fundamentals – Software Testing Strategies – Black Box Testing – White Box Testing – System Testing – Object Orientation Testing – State Based Testing - Test Case Management – Types of Maintenance – Case Study: Testing Techniques.

UNIT IV SOFTWARE METRICS 9

Scope – Classification of metrics – Measuring Process and Product attributes – Direct and Indirect measures – Cost Estimation – COCOMO Models - Reliability – Software Quality Assurance – Standards – Case Study for COCOMO model.

UNIT V SCM & WEB ENGINEERING 9

Need for SCM – Version Control – SCM process – Software Configuration Items – Taxonomy – Re Engineering – Reverse Engineering - Web Engineering - CASE Repository – Features.

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20Marks)	**Formative Assessment Test (20Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 – Descriptive type questions	**Unit – 1 –** MCQ's on Software Engineering Fundamentals **Unit – 2 –** Problems on Software Design Patterns and Architectures **Unit –3–** MCQ's on Testing Strategies **Unit – 4 –** MCQ's on Software Metrics **Unit – 5 –** Case Studies on SCM	**Descriptive type question**

Outcomes	
Upon completion of the course, the students will be able to :	
CO1	Articulate the research methods in a proper sequence for the given problem.
CO2	Find the problem statement and perform the data collection from various sources
CO3	Identify the problem and report generation with the samplings.
CO4	Study about the IPR development process.
CO5	Apply the concepts of Copy Right Act /Patent Act trademark to the given case.

REFERENCE BOOK(S):

1. Roger S. Pressman, "Software Engineering: A Practitioner Approach", Seventh Edition, Tata McGraw – Hill International Edition, 2009.
2. Ali Behforroz, Frederick J. Hudson, "Software Engineering Fundamentals", Oxford Indian Reprint,2012.
3. Jibitesh Mishra, Ashok Mohanty, "Software Engineering", Pearson Education, First Edition, 2011.
4. PankajJalote, "An Integrated approach to Software Engineering", Third Edition, Narosa Publications, 2011.
5. Roger S. Pressman, David Lowe, "Web Engineering: A Practitioner's Approach",Special Indian edition, McGraw Hill, 2008.
6. Sommerville, "Software Engineering", Tenth Edition, Pearson, 2015.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/106101061

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3			2		3		1			3		
2	2	3			2		3		1			3		
3	2	3			2		3		1			3		
4	2	3			2		3		1			3		
5	2	3			2		3		1			3		

24CA2606 ENTREPRENEURSHIP AND INNOVATION MANAGEMENT

L	T	P	C
3	0	0	3

Preamble:

The course will create an awareness and understanding about Entrepreneurship Ecosystem which will throw light on various innovative ideas and the related business opportunities. Acquiring the knowledge on entrepreneurship and business opportunities will pave the way for developing the right Business Model and Business Plan which will guide them to decide the right choice of business entity.

Prerequisites for the course

Basic understanding and knowledge about business and the environment and its functions.

UNIT I **Entrepreneurship Perspective** **8**

Introduction to Entrepreneurship- Characteristics of an Successful entrepreneurs-Types of Entrepreneurs-Growth of Entrepreneurship in India- Ecosystem and entrepreneurial mobility- - Entrepreneurial Motivation-Entrepreneurial Competencies.

Suggestive Activities:

Identification of unique entrepreneurial characteristics of the top successful entrepreneurs.
Exploring the skills to be possessed by an individual to become an entrepreneur through Interviewing a successful entrepreneur

UNIT II Idea to Opportunity Mapping 12

Business Innovation - Approach to ideation - Ideation Techniques-Focus Group-Brainstorming-Creative Writing-Wish Lists-Ideal Scenario-Campaigns - introspection- Triz - Time Machine- Catch Ball-Scientific method- Mapping Ideas to Opportunities- I2O Evaluation Sieve- Economic Imperative-Cultural Imperative - Social Imperative – Personal Imperative.

Suggestive Activities:

Exploring the value- added Business opportunities for the local dominant agricultural produces
Identifying new emerging business opportunities for products/services
Mapping Ideas to Opportunities (I2O)

UNIT III Business Modelling and Business Planning 10

Business Model Canvas - Functions- Designing a Business Model-Customer-Value Proposition-Communication Channels-Distribution Channels-Resources-Activity- Management- Business Plan-Sections of Business Plan- Reviewing the Business Plan.

Suggestive Activities:

Develop a business mode canvas for a new business idea
Prepare the Business Plan for the new business opportunity

UNIT IV Business Creation and Marshalling Resources 8

Entity Types -Sole Proprietorship- Partnership - Cooperatives-Company-Joint Hindu Family -Steps in setting up a unit- Types of Resources- People- Networks- Partner groups- Infrastructure-Suppliers- Technology- Money- Customers.

Suggestive Activities:

Identify the right choice of business entity for your proposed business

UNIT V The Art of Pitching and Financing the Start-up 7

Defining a Pitch - Types of Pitches- Elevator Pitch- Detailed Pitch- Understanding the aspects of Funds- Basics of Finance- Sources of Funds

Suggestive Activities:

Develop an elevator Pitch for the presentation of business proposal to the investor. Exploring Funding Opportunities for start-ups

TOTAL : 45 HRS

Suggestive Assessment Methods		
Summative /Continuous Assessment (20 Marks)	**Formative Assessment (20 Marks)**	**End Semester Exams (60 Marks)**

Descriptive Type Questions Multiple Choice Questions	Assignments Real time scenarios	Descriptive Type Questions Multiple Choice Questions

Outcomes

Upon completion of the course, the students will be able to:

CO1 Analyse the entrepreneurial ecosystem and to develop entrepreneurial mind-set needed to run a business.	Analyse
CO2 Identify business opportunities and to analyse same in the light of socio-economic and cultural imperatives.	Apply
CO3 Design a business model and Prepare a Business plan.	Create
CO4 Identify an appropriate business entity with required resources complying legal, regulatory and statutory aspects.	Apply
CO5 List the art of Pitching and financing the start-up.	Analyse

Text Book

Raj Shankar, "Entrepreneurship Theory and Practice" , Vijay Nicole Private Limited, 3rd Edition, 2015

Reference Books

1. S.S.Khanka, "Entrepreneurial Development", S.Chand and Company Limited, , (Revised Edition) 2015.
2. Vasant Desai, "The Dynamics of Entrepreneurial Development and Management", Himalaya Publishing House Pvt, Ltd., 6thEdition ,2019.
3. Prasanna Chandra, "Projects – Planning, Analysis, Selection, Implementation and Reviews", Tata McGraw-Hill, 9th Edition 2019.

Web Resources

https://101entrepreneurship.org/entrepreneurial-ecosystem/

https://www.ctc-n.org/resources/opportunity-mapping-identifying-new-business-opportunities-changing-energy-landscape

https://fullscale.io/blog/business-model-vs-business-plan/

https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=23

https://www.forbes.com/sites/allbusiness/2020/06/20/guide-to-investor-pitch-decks-for-startup-fundraising/

CO Vs PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6
1	2	1	1	1	1	2

2	2	1	1	2	2	2
3	2	2	2	2	2	2
4	3	3	3	3	3	3
5	3	3	3	3	3	3

24CA2707 RESEARCH METHODOLOGY AND IPR L T P C

3 0 0 3

PREAMBLE:

This course is offered in 2nd semester of MCA programme in the department of Computer Applications as a professional elective theory subject. This course offers the knowledge about the research methodologies and building a patents.

PRE-REQUISITE:

NIL

OBJECTIVES:

1. To design the research process & observe the experiment surveys.
2. To use sampling methods to measure the data.
3. To analysis the data findings and report generation.
4. To study about the development process of Intellectual Property Rights.
5. To design and register the patent.

UNIT I RESEARCHDESIGN 9

Overview of research process and design, Use of Secondary and exploratory data to answer the researchquestion,Qualitativeresearch,Observationstudies,ExperimentsandSurveys

UNITII DATA COLLECTION AND SOURCES 9

Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data - Preparing, Exploring, examining and displaying

UNIT III DATA ANALYSIS AND REPORTING 9

Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.

UNIT IV INTELLECTUAL PROPERTY RIGHTS 9

Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Biodiversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.

UNIT V **PATENTS** **9**

Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification, Types of patent application, process E-filling, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents.

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20Marks)	**Formative Assessment Test (20Marks)**	**End Semester Exams (60Marks)**
CAT 1 & CAT 2 – Descriptive type questions	**Unit – 1 –** MCQ's on Qualitative research methods. **Unit – 2 –** Problems on measuring the data samplings. **Unit –3–** MCQ's on multivariate analysis & hypothesis testing on data. **Unit – 4 –** MCQ's on rights & common rules of IPR. **Unit – 5 –** MCQ's on Grant & licencing of patent.	**Descriptive type question**

Suggested Activities

Unit 1 –Find the appropriate research methods for given problem.

Unit 2 –Study the problem and collect the samples from various sources.

Unit 3 – Generate the solution with the samples for a given problem

Unit 4 – Assignment to study about the concepts of intellectual property rights

Unit 5 – Develop& register a patent.

Outcomes

Upon completion of the course, the students will be able to :

CO1	Articulate the research methods in a proper sequence for the given problem.
CO2	Find the problem statement and perform the data collection from various sources
CO3	Identify the problem and report generation with the samplings.
CO4	Study about the IPR development process.
CO5	Apply the concepts of Copy Right Act /Patent Act trademark to the given case.

REFERENCE BOOKS

1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods ",Tata Mc Graw Hill Education,11e(2012).
2. CatherineJ.Holland,"Intellectualproperty:Patents,Trademarks,Copyrights,TradeSecrets",EntrepreneurPress,2007.

WEB RESOURCES

1. https://onlinecourses.swayam2.ac.in/ntr24_ed53/preview

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3			2		3		1			3		
2	2	3			2		3		1			3		
3	2	3			2		3		1			3		
4	2	3			2		3		1			3		
5	2	3			2		3		1			3		

1- Low 2- Medium 3- High

BRIDGE COURSES- FIRST SEMESTER

24CA1B01 DIGITAL LOGIC AND COMPUTER ORGANIZATION L T P C

3 1 0 4

OBJECTIVES:

1. To list the various number systems and Boolean algebra.
2. To categorize the different types of combinational and sequential circuits.
3. To illustrate the basic operations that happens in a CPU.
4. To experiment with the data path and control path implementation.
5. To observe the memory hierarchy design and I/O design.

PRE-REQUISITE:

- Number systems and their conversions.

UNIT I DIGITAL FUNDAMENTALS AND LOGIC GATES 9+3

Number Systems and Conversions – Digital Systems-Binary Numbers –Number Base Conversions-Octal and Hexadecimal Numbers –Complements. Boolean Algebra and Simplifications –Theorem and properties of Boolean Algebra- Minimization of Boolean Functions – Karnaugh Map-QuineMcClusky Method-Logic Gates – NAND NOR implementation.

UNIT II COMBINATIONAL AND SEQUENTIAL LOGIC 9+3

Design of Circuits –Adder /Subtracter – Encoder – Decoder – MUX /DEMUX – Comparators, Flip flops – Triggering – Master – Slave Flip Flop – State Diagram and Minimization – Counters – Registers-Shift Registers-Ripple Counters- Synchronous Counters – other counters.

UNIT III BASIC STRUCTURE OF COMPUTER SYSTEM 9+3

Functional Units - Basic Operational Concepts – Performance and Metrics – instruction and instruction sequencing –Arithmetic Logic Shift Design Unit(ALU Design) – Fixed point and Floating point operations

UNIT IV PROCESSOR DESIGN 9+3

Processor basics –CPU Organization – Data Path Design – Control Design unit – Basic concepts – Hardwired control unit – Micro Programmed control unit – Pipelining concept (Pipe control) – Hazards- super scalar operations.

UNIT V MEMORY MANAGEMENTAND I/O SYSTEMS 9+3

Memory technology – Memory Systems- Virtual Memory – Caches – Design Methods – Associative memories – Input /output system – Programmed I/O – DMA and interrupts – I/O devices and Interfaces.

TOTAL HOURS: 45+15 HR

REFERENCE BOOK(S):

1. M. Morris Mano, Michael D. Ciletti," Digital Design ", Fourth Edition.
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky and NaraigManjikian, "Computer Organization an Embedded Systems", Sixth Edition, Tata McGraw Hill, 2012.
3. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill,1998
4. William Stallings, "Computer Organization & Architecture" – Designing for Performance" 6t Edition Pearson Education, 2003
5. David A. Patterson and John L. Hennessy, "Computer Organization and Design: Th Hardware/Software Interface", Second Edition, Morgan Kaufmann , 2002.
6. Morris Mano "Digital Design", Printice Hall of India 1997

VEB RESOURCE(S):

1. https://nptel.ac.in/courses/106105163/
2. https://learn.saylor.org/course/CS301
3. https://www.oreilly.com/library/view/designing-embedded-hardware/0596007558/ch01.html

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials**	**Descriptive type question**

Outcomes

Upon completion of the course, the students will be able to:

CO1 List conversions and arithmetic operations in various number systems.

CO2 Carry out the operations of logical circuits such as comparators and counters.

CO3 Summarize the basic operations that happens in a CPU.

CO4 Perform the flow of execution of a pipelined instruction in a processor.

CO5 Define the memory hierarchy design and I/O design.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1	3	2												3
2	3	3	2	1										3
3		1	1	2	1							2		
4			2	2			1					2		
5			2		1							2		

24CA1B02 PROBLEM SOLVING AND PROGRAMMING IN C L T P C

3 0 0 3

PRE-REQUISITE:

Basic programming constructs

OBJECTIVES:

1. To define the basic concepts of problem solving approaches
2. To make use of the constructs and control structures in C programming.
3. To identify the techniques of structured / functional decomposition to break a program into smaller pieces.
4. To classify the mechanics of parameter passing
5. To define the various operations in processing a file in C Language.

UNIT I INTRODUCTION TO COMPUTER PROBLEM SOLVING 9

Introduction – The Problem Solving aspect – Top down design – Implementation of algorithm – Program Verification – The efficiency of algorithms – The analysis of algorithms – Fundamental Algorithms.

UNIT II INTRODUCTION TO C 9

Introduction to C Programming – Operators and Expressions – Data Input and Output– Program Structure – Stages of Compilation of a Program. - Control Statements – Decision making using looping and branching

UNIT III FUNCTIONS AND ARRAYS 9

Functions – Defining a Function – Accessing a Function – Function Prototypes – Passing Arguments to a Function – Recursion – Storage classes - Arrays – Defining and Processing Arrays – Passing arrays to a Function – Multidimensional Arrays – String and array of strings - String processing – Library functions

UNIT IV POINTERS AND STRUCTURES 9

Introduction to Pointer - Pointer Declaration – Dynamic Memory Allocation – Arrays of Pointers – Double pointers - Representing arrays using pointers – Pass by value and Pass by reference – Strings representation using pointers - Defining a Structure – Processing a Structure – Passing Structures to Functions - Structure and arrays – Unions

UNIT V FILE PROCESSING AND PREPROCESSORS 9

File Operations: open, close, read, write, append - Sequential access and random access to files- In built file handling functions (rewind(),fseek(), ftell(), feof(), fread(), fwrite()) - simple programs using pointers and files.

TOTAL HOURS: 45

REFERENCE BOOK(S):

1. Byron S Gottfried ,"Programming with C", Schaum's Outlines, Tata McGraw Hill, Second Edition, 2006.
2. E. Balagurusamy, "Programming in ANSI C", Tata McGraw-Hill Education, 5th edition, 2010
3. Deitel and Deitel, "C How to program", Prentice Hall, 1994.
4. B.W. Kerninghan, D.M.Ritchie," The C Programming Language", PHI, 2nd Edition, 1995.
5. Stephen G Kochan, "Programming in ANSI C",Sams Publications, 1994
6. Brian W Kernighan & Dennis Ritchie, "The C programming language", 2nd Edition, Prentice Hall ,2015
7. Cormen,Leiserson, Rivest, Stein, " Introduction to Algorithms", McGraw Hill , Publishers, 2002
8. Reema. Thareja, "Programming in C", Oxford University Press, 2nd Edition,2016

WEB RESOURCE(S):

- https://nptel.ac.in/courses/106104128/

Suggestive Assessment Methods	
Lab Components Assessments (50 Marks)	**Internal Lab (50 Marks)**

Demonstration of the programs	**Demonstration of the programs**

Outcomes
Upon completion of the course, the students will be able to:

CO1 Define a computational solution for a given problem

CO2 Demonstrate a solution for a given program involving programming constructs.

CO3 Identify the techniques to break a problem into logical modules that can be solved / programmed

CO4 Classify the pass parameters using structures and pointers to solving complex problem

CO5 Identify basic file concepts operations.

CO Vs PO Mapping and CO Vs PSO Mapping

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO1 1**	**PO12**	**PSO1**	**PSO2**
1	3	3	3				2				2	2		3
2	3	3	3		2						3	3		3
3		2	3	3	2				2	2	3	2		
4	3	2	2							2	2	2		3
5		3	3							2	3	2		

24CA1B11 PROGRAMMING IN C LABORATORY L T P C

0 0 4 2

OBJECTIVES:

1. To define the basic concepts of problem solving approaches
2. To make use of the constructs and control structures in C programming.
3. To identify the techniques of structured / functional decomposition to break a program into smaller pieces.
4. To classify the mechanics of parameter passing
5. To define the various operations in processing a file in C Language.

PRE-REQUISITE:

- Basic programming constructs

LIST OF EXPERIMENTS

1. C Programming using Simple statements and expressions
2. Problem solving using decision making and looping.
3. Simple programming for one dimensional and two-dimensional arrays.
4. Program to solve problems using String functions
5. Programs with user defined functions

6. Program using structures and unions
7. Program to check whether a given number is Armstrong number or not?
8. Program to solve a problem using recursion.
9. Sort the list of numbers using pass by reference and pass by value
10. Programs to read and write contents in a file

TOTAL HOURS: 45

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/106104128/

Suggestive Assessment Methods	
Lab Components Assessments (50 Marks)	**Internal Lab (50 Marks)**
Demonstration of the programs	**Demonstration of the programs**
Lab Requirements: **Computers – 30 Nos** **Software – Turbo C / Open Software**	
Outcomes	
Upon completion of the course, the students will be able to:	

CO1 Define a computational solution for a given problem

CO2 Demonstrate a solution for a given program involving programming constructs.

CO3 Identify the techniques to break a problem into logical modules that can be solved / programmed

CO4 Classify the pass parameters using structures and pointers to solving complex problem

CO5 Identify basic file concepts operations.

CO Vs PO Mapping and CO Vs PSO Mapping

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO1 1**	**PO1 2**	**PSO1**	**PSO2**
1	3	3	3				2				2	2		3
2	3	3	3		2						3	3		3
3		2	3	3	2				2	2	3	2		
4	3	2	2							2	2	2		3
5		3	3							2	3	2		

BRIDGE COURSE - SECOND SEMESTER

24CA2B01	**DESIGN AND ANALYSIS OF ALGORITHMS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. To define the basic concepts of algorithms and the notations.
2. To make use of various algorithms for divide and conquer method.
3. To find a solution for problems based on dynamic programming.
4. To experiment with the techniques of back tracking and Branch and Bound.
5. To explain the concepts on NP-Hard and NP-Complete problems.

PRE-REQUISITE:

- Programming Language and Data structures.

UNIT I INTRODUCTION **9**

Introduction - Definition of Algorithm – pseudo code conventions – recursive algorithms – time and spac complexity –big-"oh" notation – practical complexities – randomized algorithms – repeated element primarily testing - Divide and Conquer: General Method - Finding maximum and minimum – merge sort.

UNIT II DIVIDE AND CONQUER **9**

Divide and conquer contd. – Quicksort, Selection, Strassen's matrix multiplication – Greedy Method General Method –knapsack problem - Tree vertex splitting - Job sequencing with deadlines – optima storage on tapes.

UNIT III DYNAMIC PROGRAMMING **9**

General Method - multistage graphs – all pairs shortest paths – single source shortest paths - Strin Editing – 0/1 knapsack. Search techniques for graphs – DFS-BFS-connected components -biconnecte components.

UNIT IV BACK TRACKING **9**

General Method – 8-queens - Sum of subsets - Graph Coloring – Hamiltonian cycles. Branch and Bound General Method - Traveling Salesperson problem.

UNIT V LOWER BOUND THEORY **9**

Comparison trees - Oracles and advisory arguments - Lower bounds through reduction - Basic Concept of NP-Hard and NP-Complete problems.

TOTAL HOURS: 45

REFERENCE BOOK(S):

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms 3rd Edition, 2009
2. AnanyLevitin, Introduction to the Design and Analysis of algorithms, 3rd Edition, 2011.
3. SandeepSen, amit Kumar, "Design and Analysis of Algorithms: A Contemporary Perspective",Cambridge University, 2019.

4. G. Brassard and P. Bratley, Fundamentals of Algorithms, PHI, New Delhi.
5. A.V. Aho, J.E. Hopcroft, J.D. Ullmann, The design and analysis of Computer Algorithms, Pearso Edition, 2008

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/106/106/106106131/
2. https://www.coursera.org/specializations/algorithms

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials**	**Descriptive type question**
Outcomes		
Upon completion of the course, the students will be able to:		

CO1 Define the time and space complexities of algorithms

CO2 Demonstrate algorithms based on divide and conquer method.

CO3 Find a solution for the problem based on dynamic programming

CO4 Demonstrate algorithms for back tracking and Branch and Bound.

CO5 Explain the concepts on NP-Hard and NP-Complete problems.

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1	3	2	2			1					1	2		3
2	3	2	2			1					1	2		3
3	3	2	2			1					1	2		3
4	3	2	2			1					1	2		3
5	3	2	2			1					1	2		3

24CA2B02 OBJECT ORIENTED PROGRAMMING L T P C

3 0 0 3

OBJECTIVES:

1. To learn how C++ supports Object oriented principles.
2. To understand and apply the principles of hiding data.
3. To understand the overloading of functions and operators.
4. To use the generic programming features of C++ including the STL.

5. To implement the concept of code reuse.

PRE-REQUISITE:

- Basics of C programming.

UNIT I FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING 9

Procedural Programming Vs. Object-Oriented Programming - Object–Oriented Programming concepts -Enumeration Types –– Functions and Pointers – Function Invocation– Scope and Storage Class – Pointer Types – Arrays and Pointers – Call–by–Reference

UNIT II IMPLEMENTING ENCAPSULATION 9

Aggregate Type struct – Structure Pointer Operators – Unions – Bit Fields – Data Handling and Member Functions – Classes –Solid Principles- Constructors and Destructors – Static Member – this Pointer – reference semantics

UNIT III POLYMORPHISM 9

ADT Conversions – Overloading – Overloading Operators – Unary Operator Overloading – Binary Operator Overloading – Function Selection – Pointer Operators – Visitation – Iterators – containers – Sequence Containers - List – List Iterators – Associative Containers.

UNIT IV TEMPLATES AND FILE HANDLING 9

Template Class – Function Templates – RTTI Templates - Class Templates – Parameterizing – STL– Algorithms – Function Adaptors – Streams and Formatted I/O – I/O Manipulations -File handling – Random Access.

UNIT V INHERITANCE 9

Derived Class – Typing Conversions and Visibility – Code Reuse – Virtual Functions – Templates and Inheritance – Run–Time Type Identifications – Exceptions – Handlers – Standard Exceptions.

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (50 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials**	**Descriptive type question**
Outcomes		
Upon completion of the course, the students will be able to:		

COURSE OUTCOME(S):

CO1 Understand the object-oriented programming concepts such as encapsulation.

CO.2 Use proper class protection mechanism.

CO3 Demonstrate the use of virtual functions to implement polymorphism.

CO4 Understand and implement the features of C++ including templates and file handling for providing programmed solutions to complex problems.

CO5 Reuse the code with different categories of Inheritance.

REFERENCE BOOK(S):

1. E Balagurusamy, "Object oriented Programming with C++", 8th Edition, 2019, Tata McGraw Hill.
2. BhushanTrivedi, "Programming with ANSI C++", Oxford Press, Second Edition, 2012
3. Ira Pohl, "Object–Oriented Programming Using C++", Pearson Education, 2 Edition, 2003
4. Kamthane," Object Oriented Programming with ANSI and Turbo C++", Pearson Education, 2003.
5. HM Deitel and PJ Deitel "C++ How to Program", Seventh Edition, 2010, Prentice Hall

WEB RESOURCE(S):

1. https://www.edureka.co/blog/object-oriented-programming/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1	3	3	3									2	3	3
2	3	3	3		2							3	3	3
3		2	3	3	2							2		
4	3	2	2									2		3
5		3	3									2		

24CA2B11 OBJECT ORIENTED PROGRAMMING LABORATORY L T P C

0 0 4 2

OBJECTIVES:

1. To develop skills in object oriented programming.
2. To learn generic data structures using templates.
3. To implement the concept of polymorphism.
4. To understand the importance of STL.
5. To learn file handling in C++.

PRE-REQUISITE:

- C programming Fundamentals

	LIST OF EXPERIMENTS	**9**
1.	Enumeration and Function Overloading	
2.	Scope and Storage class	
3.	Stack and Queue ADTs	
4.	Classes and objects	

5.	Constructors and Destructors and Constructor Overloading
6.	Static member and methods
7.	Bit fields
8.	Overload as binary operator, friend and member function
9.	Overload unary operator in Postfix and Prefix form as member and friend function
10.	Iterators and Containers
11.	Function templates
12.	Template class
13.	Inheritance
14.	Virtual functions
15.	Exception Handling
16.	File Handling – Read, Write, Update

TOTAL HOURS: 60

REFERENCE BOOK(S):

1. E Balagurusamy, "Object oriented Programming with C++", 8th Edition, 2019, Tata McGraw Hill.
2. BhushanTrivedi, "Programming with ANSI C++", Oxford Press, Second Edition, 2012
3. Ira Pohl, "Object–Oriented Programming Using C++", Pearson Education, 2 Edition, 2003
4. Kamthane," Object Oriented Programming with ANSI and Turbo C++", Pearson Education, 2003.
5. HM Deitel and PJ Deitel "C++ How to Program", Seventh Edition, 2010, Prentice Hall

WEB RESOURCE(S):

1. https://www.edureka.co/blog/object-oriented-programming/

Suggestive Assessment Methods	
Lab Components Assessments (50 Marks)	**Internal Lab (50 Marks)**
Demonstration of the programs	**Demonstration of the programs**
Lab Requirements: **Computers – 30 Nos** **Software – Turbo C / Open Software**	
Outcomes	
Upon completion of the course, the students will be able to:	

COURSE OUTCOME(S):

CO1 Understand the object-oriented programming concepts such as encapsulation.

CO2 Use proper class protection mechanism.

CO3 Demonstrate the use of virtual functions to implement polymorphism.

CO4 Understand and implement the features of C++ including templates and file handling

for providing programmed solutions to complex problems.

CO5 Reuse the code with different categories of Inheritance.

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1	3	3	3									2	3	3
2	3	3	3		2							3	3	3
3		2	3	3	2							2		
4	3	2	2									2		3
5		3	3									2		

1→Low 2→Medium 3→High

VALUE ADDED COURSES

		L	T	P	C
24CA0V01	**JAVASCRIPT FOR WEB DEVELOPMENT**	**0**	**0**	**2**	**1**

Prerequisites for the course

- NIL

Objectives

1. To design dynamic web pages using JavaScript.
2. To develop interactive web applications using JavaScript.
3. To debug JavaScript code..

Module I **9**

1. Write a code for JavaScript using Variables and Data types
2. Develop a JavaScript to manipulate the Document Object Model.
3. Develop a code Using Operators and Expressions in JavaScript

Module II **9**

4. Write a program that compares two strings and prints out whether they are equal, greater than, less than, or not equal.
5. Write a function that takes two arguments, a string and a number, and returns a string that contains the number of times the string appears in the number.
6. Implement a function that removes the last element from an array and returns the modified array using the pop method.

Module III **12**

7. Create an object called person with properties name, age, and gender. Assign appropriate values to these properties and print them to the console.
8. Implement a program that reads JSON data from a file and dynamically generates an image

gallery using DOM manipulation. Display the images on the web page with captions and provide navigation buttons for scrolling through the gallery.

9. Create a function that simulates an asynchronous API call. It should accept a callback function as a parameter and invoke the callback after a delay of 2 seconds. Test it by passing a callback function that logs a message when invoked.
10. Write a program that prompts the user to enter two numbers and divides the first number by the second number. Implement error handling to catch any potential division by zero errors and display an appropriate error message.

Total Periods 30

Suggestive Assessment Methods	
Lab Components Assessments (60 Marks)	**Internal Lab Components Assessments (40 Marks)**
Assessment, Execution and viva – Each module	**Project demonstration**
Laboratory Requirements	
Computers-30 nos **Editor: Sublime, Notepad++**	
Upon completion of the course, the students will be able to:	
CO1: Understand the fundamentals of JavaScript syntax, variables, data types, operators, control structures, functions, and objects. CO2: Use JavaScript to create, modify, delete, handle events, and update website content. CO3: Apply JavaScript to develop interactive web applications and performing asynchronous operations. CO4:Debug JavaScript code and implement error handling techniques to handle unexpected errors.	

Text Books

1. "JavaScript: The Good Parts" by Douglas Crockford (2008)
2. "Eloquent JavaScript: A Modern Introduction to Programming" by Marijn Haverbeke (2018)
3. "JavaScript: The Missing Manual" by David Sawyer McFarland (2020)

Reference Books

R1."Secrets of the JavaScript Ninja" by John Resig and Bear Bibeault (2013)

R2. "Effective JavaScript: 68 Specific Ways to Harness the Power of JavaScript" by David Herman (2013)

Web Recourses

1. https://javascript.info/
2. https://www.freecodecamp.org/learn/javascript-algorithms-and-data-structures/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO12	PSO1	PSO2
1		3	3	1	3		1	1	1		3			3
2		3	3	1	3		1	1	1		3			3
3		3	3	1	3		1	1	1		3			3
4		3	3	1	3		1	1	1		3			3

Test Projects:

1 To-Do List App
2 Weather App
3 Quiz App
4 Budget Tracker
5 Image Gallery
6 Recipe Finder
7 Note-taking App
8 Social Media Dashboard
9 Online Code Editor
10 Interactive Game

		L	T	P	C
24CA0V02	**WEB TECHNOLOGIES**	**0**	**0**	**2**	**1**

Prerequisites for the course

- NIL

Objectives

1. Gain proficiency in creating well-structured, responsive, and visually appealing web Create and style web pages using HTML and CSS.
2. Develop server-side scripts using PHP.
3. Build dynamic and interactive web applications.

Module I **9**

1. Creating a Basic Web Page: Create a simple web page using HTML with a title, headings, paragraphs, and links.
2. Styling a Web Page with CSS: Apply styles to a web page using CSS to enhance the visual appearance.
3. Building a Multi-Page Website: Design a multi-page website with navigation links connecting the pages.

Module II **9**

4. Form Handling with HTML and CSS: Create a web form using HTML and style it with CSS, including text fields, radio buttons, and checkboxes.
5. Introduction to PHP: Develop a basic PHP script to display dynamic content on a web page.
6. User Input Handling with PHP: Create a web form to capture user input and process it using PHP.

Module III **12**

7. PHP and MySQL Integration: Connect a PHP script to a MySQL database to store and retrieve data.
8. Implementing Sessions and Cookies in PHP: Manage user sessions and cookies to maintain state across web pages.
9. Creating a Login System: Develop a user authentication system with PHP and MySQL, including registration, login, and logout functionalities.
10. Building a Dynamic Web Application: Integrate HTML, CSS, and PHP to create a fully functional web application that performs CRUD (Create, Read, Update, Delete) operations on a database.

Total Periods **30**

Suggestive Assessment Methods	
Lab Components Assessments (60 Marks)	**Internal Lab Components Assessments (40 Marks)**
Assessment, Execution and viva – Each module	**Project demonstration**
Laboratory Requirements	
Computers-30 nos **Editor: Sublime, Notepad++**	
Upon completion of the course, the students will be able to:	
CO1: Develop responsive and visually appealing web pages using HTML and CSS. CO2: Implement server-side functionality using PHP to handle user input and manage data. CO3: Integrate front-end and back-end technologies to create dynamic and interactive web applications.	

Reference Books

1. "HTML and CSS: Design and Build Websites" by Jon Duckett
2. "PHP & MySQL: Novice to Ninja" by Kevin Yank

Web Recourses

3. **https://developer.mozilla.org/en-US/**

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO12	PSO1	PSO2
1		3	3	1	3		1	1	1		3			3
2		3	3	1	3		1	1	1		3			3
3		3	3	1	3		1	1	1		3			3

Test Projects:

1. Personal Portfolio Website
2. Online Resume Builder
3. Simple Blog Platform
4. E-commerce Product Page
5. Event Registration Form
6. Photo Gallery
7. To-Do List Application
8. Weather Forecast Dashboard
9. User Authentication System
10. CRUD Operations with PHP and MySQL

24CA0V03 ASP.NET for Web Development

L	T	P	C
0	0	4	2

Prerequisites for the course

- HTML, CSS, and JavaScript

Objectives

- To understand the benefits of MVC pattern to develop web applications.
- To use the ASP.NET MVC framework to develop and manage MVC applications.
- To deploy MVC applications to a production environment

Module I **20**

1. Define the model:
   - Create a "TodoItem" class with properties like "Id", "Title", "Description", "DueDate", and "IsCompleted".
   - Add a "TodoItemDbContext" class that inherits from "DbContext" to handle the database operations. Configure a database connection string in the "Web.config" file or the appropriate configuration file for your environment.
   - Create a database migration and update the database schema using Entity Framework Code First migrations.
2. Create the controller:

- Add a new controller named "TodoController" that inherits from "Controller".
- Implement actions for CRUD operations (Create, Read, Update, Delete) and other necessary actions (e.g., listing all todo items).
- Use the "TodoItemDbContext" to interact with the database and retrieve or modify the todo items.

3. Create the views:
   - Create views for the actions defined in the "TodoController".
   - Design and implement the views using Razor syntax and HTML. Include forms for creating and editing todo items, as well as displaying the list of todo items.
   - Use HTML helpers and model binding to bind form data to the model properties.
4. Develop a view in ASP.NET MVC that displays a detailed view of a specific product. Pass the product ID as a parameter and retrieve the product data from a database or an API to display its details in the view.

Module II **20**

5. Develop a controller in ASP.NET MVC that handles form submissions. Implement an action method that receives form data, performs validation, and redirects the user based on the form submission result.
6. Create an ASP.NET MVC action method that returns a ViewResult. This action method should render a specific view and pass data from the controller to the view for display.
7. Develop a strongly-typed view that displays a list of entities. Pass a collection of entities from the controller to the view and iterate over it using a loop to render each entity's details.
8. Implement client-side validation using Data Annotations in an ASP.NET MVC application. Configure the necessary scripts and dependencies to enable client-side validation for a specific model class.

Module III **20**

9. Implement a custom HTML Helper in ASP.NET MVC that generates a dropdown list from a collection of items. Use the helper in a view to render the dropdown list and bind its selected value to a property of the model.
10. Create an AJAX Action Link in ASP.NET MVC that updates a specific section of a page without refreshing the entire page. Use the Ajax.ActionLink helper and configure it to update a target element based on the clicked link.
11. Implement a dynamic dropdown list in an ASP.NET MVC view using jQuery's get method. Retrieve data from the server using the get method and populate the dropdown list with the received data.
12. Create an ASP.NET MVC application that reads data from a text file using the StreamReader class. Display the content of the file on a web page.

13. Implement a controller action in ASP.NET MVC that uses a library like EPPlus to create an Excel document. Iterate through the list of records and add each record as a row in the Excel document. Provide the generated Excel file for download.

Total Periods 60

Suggestive Assessment Methods	
Lab Components Assessments (60 Marks)	**Internal Lab Components Assessments (40 Marks)**
Assessment, Execution and viva – Each module	**Project demonstration**

Laboratory Requirements

Computers-30 nos

IDE: Microsoft Visual Studio 2010

Outcomes

Upon completion of the course, the students will be able to:

CO1: Build ASP.Net MVC applications that use the MVC architectural pattern.

CO2: Implement authentication and authorization using ASP.Net Identity.

CO3: Build and deploy ASP.Net MVC applications.

Text Books

1. Programming Microsoft ASP.NET MVC by Dino Esposito, Third Edition.

Reference Books

1. Pro ASP.NET MVC 5 by Adam Freeman.

Web Recourses

1. https://learn.microsoft.com/en-us/dotnet/architecture/modern-web-apps-azure/
2. https://codecanyon.net/item/forumx-mvc-5-forum-application/11966435

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO12	PSO1	PSO2
1			3		3	2					2	2		3
2			3		3	2					2	2		3
3			3		3	2					2	2		3

Test Projects:

1	Personal Portfolio Website with ASP.NET
2	Online Job Application System
3	Blogging Platform with ASP.NET MVC
4	E-commerce Website with Product Management

5	Event Registration and Management System
6	Online Library Management System
7	Task Management Application
8	Weather Forecast Dashboard with API Integration
9	User Authentication and Authorization System
10	CRUD Operations with Entity Framework

		L	T	P	C
24CA0V04	**DATA ANALYTICS TOOLS**	**0**	**0**	**4**	**2**

Prerequisites for the course

- NIL

Objectives

1. To understand the basics of data visualization and making impactful visualizations.
2. To take better decisions using the data analytical tools.
3. To create basic charts, graphs and visualizations using Tableau.
4. To understanding the basics of data modeling and how Power BI can help create impactful data models.
5. To create basic charts, graphs and visualizations using Power BI.

Module I **20**

1. Connect Tableau to an Excel file containing sales data.
2. Building a Dashboard with Multiple Data Sources
3. Connect Tableau to two different datasets, such as sales data from a SQL Server database and customer demographic data from an Excel file.
4. Create a comprehensive report in Tableau, including multiple visualizations and key insights.
5. Advanced Data Blending and Cross-Database Joining

Module II **20**

6. Import a dataset with time-based data, such as sales data over multiple years.
7. Create a box plot in Tableau to visualize the distribution, quartiles, and outliers in the data.
8. Design a dual combination chart in Tableau to visualize the relationship between these variables on dual axes.
9. Experiment with different color palettes, labeling, and tooltips to enhance the heat map's interpretability.
10. Create a Gantt chart in Tableau to visualize the timeline and duration of each task.

Module III **20**

11. Import a complex dataset into Power BI, such as sales data with multiple tables and relationships.
12. Create a robust data model in Power BI by establishing relationships between tables, defining hierarchies, and implementing calculated columns and measures using Data Analysis Expressions
13. Creating an Interactive Dashboard
14. Evaluate the impact of these advanced visualization techniques on data analysis and decision-making.
15. Create visualizations based on the data model and explore the impact of different DAX calculations on the visuals.

Total Periods **60**

Suggestive Assessment Methods	
Lab Components Assessments (60 Marks)	**Internal Lab Components Assessments (40 Marks)**
Assessment, Execution and viva – Each module	**Project demonstration**
Laboratory Requirements	
Computers-30 nos **Software: Excel, python, tableau, PowerBI**	
Upon completion of the course, the students will be able to:	
CO1: Understanding the basic concepts and terminology of Tableau. CO2: Connect to and prepare various types of data sources for analysis in Tableau. CO3: Understand the purpose of Power BI and the various components of the software. CO4: Create data visualizationsand maps to display data in a meaningful way.	

Text Books

T1. "Communicating Data with Tableau: Designing, Developing and Delivering Data Visualizations" by Ben Jones.-27 June 2014.

T2. "Beginning Power BI : A Practical Guide to Self-Service Data Analytics with Excel 2016 and Power BI Desktop" by Dan Clark.

Reference Books

R1. "Tableau Your Data!: Fast and Easy Visual Analysis with Tableau Software" by Daniel G.Murray

R2. "Data Visualization with Power BI and Excel: A complete Guide to Self-Service Buissness Intelligence" by Brian Larson.

Web Recourses

16. https://help.tableau.com/current/guides/en-us//tableau-help.htm

17. https://docs.microsoft.com/en-us/power-bi/guided-learning/-

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1		3	3	1	3		1	1	1		3			3
2		3	3	1	3		1	1	1		3			3
3		3	3	1	3		1	1	1		3			3
4		3	3	1	3		1	1	1		3			3

Test Projects:

1 Patient Risk Healthcare Dashboard

2 Sales Forecast Analysis Dashboard

3 Marketing Campaign Dashboard

4 Crime Analysis Dashboard

5 Air Quality and Pollution Analysis Dashboard

6 Climate Change dashboard

7 Airport Authority Performance dashboard

8 Product Sales Data Analysis

9 Marketing Campaign Insights Analysis

10 Financial Performance Analysis

		L	T	P	C
24CA0V05	**AUTOMATION TESTING TOOLS**	**0**	**0**	**2**	**1**

Prerequisites for the course

- NIL

Objectives

1. To speed up the testing process by executing tests quickly, repeatedly, and efficiently.
2. To help achieve better test coverage by executing a large number of tests.
3. To ensure consistent and accurate execution of test cases.
4. To rerun quickly and easily, ensuring that previously working functionality.
5. To reduce testing efforts, leading to cost and time savings.

Module I **9**

1. Record the testing process using Selenium Tool to tests the ability of users to log in / register users for an account to the web application.
2. Write a code to tests the ability of users to search for information and tests the ability of users to purchase items from the web application.
3. Implement the procedure to tests the ability of users to contact the web application's customer support team.

Module II **9**

4. Design a test case to tests the limits of your application's functionality. For example, test the minimum and maximum values that can be entered into a field, or test the maximum number of characters that can be entered into a field.
5. Design to divide the application's functionality into equivalence classes, and then testing each class. For example, divide the functionality of a login page into two equivalence classes: valid logins and invalid logins. Test each class by entering valid and invalid login credentials.
6. Apply code to test the different states of the application. For example, test the state of a shopping cart when it is empty, when it contains one item, and when it contains multiple items.

Module III **12**

7. Use Appium's locators to interact with elements in the app, such as clicking buttons, entering text, or verifying text content.
8. Create a test scenario that reads test data from an external source (e.g., Excel, CSV, JSON) and uses that data to drive your Appium tests.
9. Write a test code to enhance the test scripts to capture screenshots at specific points or upon encountering failures.
10. Implement logging mechanisms to track the test execution progress and record any important information or errors.

Total Periods **30**

Laboratory Requirements	
Computers-30 nos **Software: Selenium**	
Suggestive Assessment Methods	
Lab Components Assessments (60 Marks)	**Internal Lab Components Assessments (60 Marks)**
Assessment, Execution and viva – Each module	**Project demonstration**

Outcomes

Upon completion of the course, the students will be able to:

CO1: Understand the automation testing concepts and different testing scenarios.

CO2: Develop practical skills in creating, designing, and implementing automated test scripts.

CO3: Enhance students' employability in the software testing field

CO4: Automate repetitive and time-consuming test cases and exploratory testing activities.

CO5: Ensure that tests are executed automatically and providing fast feedback.

Text Books

1. Software Test Automation Paperback by Dorothy Graham, Mark Fewster– 28 June 1999.
2. "JUnit in Action" by Petar Tahchiev, Felipe Leme, Vincent Massol, and Gary GregorySecond Edition, 2010
3. "Java Testing with Spock" by Konstantinos Kapelonis

Reference Books

R1. "Selenium WebDriver Recipes in C#" by Zhimin Zhan, Second Edition Paperback – 14 April 2016

R2. "JUnit in Action" by PetarTahchiev, Felipe Leme, Vincent Massol, and Gary Gregory,

R3. "Appium Recipes" by Shankar Garg, Paperback – Illustrated, 21 December 2016

Web Recourses

1. **https://www.selenium.dev/documentation/en/webdriver/**
2. **http://appium.io/docs/en/about-appium/intro/**
3. **https://www.softwaretestinghelp.com/**
4. **https://testautomationu.applitools.com/**

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO12	PSO1	PSO2
1		3		3	3			1				3		3
2		3		3	3			1				3		3
3		3		3	3			1				3		3
4		3		3	3			1				3		3
5		3		3	3			1				3		3

Test Projects:

1 Automate the testing of a popular e-commerce website, covering scenarios like user registration, login, product search, adding items to the cart, and checking out.

2 Use Selenium Web Driver with your preferred programming language and framework (e.g., Java with TestNG or Python with pytest) to automate the test cases.

3	Implement test cases for both positive and negative scenarios, including error handling, validation checks, and order processing.
4	Automate the testing of a web application across multiple browsers and versions using Selenium Web Driver.
5	Write test scripts that cover common functionality and ensure consistent behavior across different browsers (e.g., Chrome, Firefox).
6	Include scenarios that validate UI elements, CSS styling, responsiveness, and browser-specific functionalities.
7	Create a test project that demonstrates data-driven testing techniques using a framework like TestNG or JUnit.
8	Read test data from external sources (e.g., Excel, CSV, or databases) and execute the same test cases with different data sets.
9	Implement data parameterization, data validation, and data manipulation in your test scripts.
10	Integrate your automation tests with version control, build scripts, and reporting tools to achieve a streamlined testing process.