

Francis Xavier Engineering College

(An Autonomous Institution)

Tirunelveli 627 003

Tamil Nadu India

Department of MCA

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

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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. **Foundation Knowledge:** Apply knowledge of mathematics, programming logic and coding fundamentals for solution architecture and problem solving.
2. **Problem Analysis:** Identify, review, formulate and analyse problems for primarily focussing on customer requirements using critical thinking frameworks.
3. **Development of Solutions:** Design, develop and investigate problems with as an innovative approach for solutions incorporating ESG/SDG goals.
4. **Modern Tool Usage:** Select, adapt and apply modern computational tools such as development of algorithms with an understanding of the limitations including human biases.
5. **Individual and Teamwork:** Function and communicate effectively as an individual or a team leader in diverse and multidisciplinary groups. Use methodologies such as agile.
6. **Project Management and Finance:** Use the principles of project management such as scheduling, work breakdown structure and be conversant with the principles of Finance for profitable project management.
7. **Ethics:** Commit to professional ethics in managing software projects with financial aspects. Learn to use new technologies for cyber security and insulate customers from malware
8. **Life-long learning:** Change management skills and the ability to learn, keep up with contemporary technologies and ways of working.

Mapping with PO Vs PEO, PSO

PO	PEO1	PEO2	PEO3	PEO4
1	3			
2	2	3	3	
3	3	3	3	
4	2	3	3	1
5		2	3	3
6		2	3	3
7	2	2	3	3
8	1	2	2	3
PSO ₁	3	2	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
6		Audit Course	AC	2	2	0	0	0
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
3	24CA3913	Internship	EEC	4	0	0	4	2
Total				36	20	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	2	1	0	3	Full Stack Development
6	24CA3706	Social Entrepreneurship	III	3	0	0	3	Entrepreneurship
7	24CA3707	Augmented Reality and Virtual Reality	II	2	1	0	3	Artificial Intelligence and Machine Learning

Professional Elective III								
1	24CA3708	Ethical Hacking and Penetration Testing	III	3	0	0	3	Networking and Security
2	24CA3709	Test Driven Development	III	3	0	0	3	Software Development
3	24CA3710	Cloud Computing for Data Science	III	3	0	0	3	Data Science and Analytics
4	24CA3711	Reinforcement Learning	III	3	0	0	3	Artificial Intelligence and Machine Learning
5	24CA3712	Fundamentals of Backend Engineering	III	3	0	0	3	Full Stack Development
6	24CA3713	Emerging Areas in Entrepreneurship	III	3	0	0	3	Entrepreneurship
7	24CA3714	Robotic Process Automation	III	3	0	0	3	Artificial Intelligence and Machine Learning

Professional Elective IV

1	24CA3715	Block Chain Technology and Its Applications	III	3	0	0	3	Networking and Security
2	24CA3716	Game Design and Development	III	3	0	0	3	Software Development
3	24CA3717	Big Data Analytics	III	3	0	0	3	Data Science and Analytics
4	24CA3718	Artificial Intelligence and its Applications	III	3	0	0	3	Artificial Intelligence and Machine Learning
5	24CA3719	DevOps	III	3	0	0	3	Full Stack Development
6	24CA3720	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	2	0	0	2	1
6	24CA0V06	Applied Fintech For Business	VA	2	0	0	2	1

Audit Courses

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24CA0A01	Constitution Of India	AC	2	2	0	0	0
2	24CA0A02	Fundamentals In Indian Knowledge System	AC	2	2	0	0	0
3	24CA0A03	Disaster Management	AC	2	2	0	0	0

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	3	1	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	6	1	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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

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
- 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. David Makinson, "Sets, Logic and Maths for Computing", Springer Indian Reprint, 2011.
2. Grimaldi, R. Pand Ramana, B.V. "Discrete and Combinatorial Mathematics", 5 Edition, Pearson Education, 2006.
3. Hopcroft J.E and Ullman, J.D, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002.
4. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", Tata McGraw Hill, 4th Edition, 2002.
5. Sengadir, T. "Discrete Mathematics and Combinatorics" Pearson Education, New Delhi, 2009.
6. Trembley, J.P. and Manohar, R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, New Delhi, 2007.
7. G. Shanker Rao, "Mathematical Foundation of Computer Science", Dreamtech Press, 2020.

WEB RESOURCES

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

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

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:

- 24CA1B02 - 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	MCQs, Assignment, Tutorials, Case Studies	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:**

- C01** Relate the merits of worst-case, average-case and best-case analysis.
- C02** Summarize the operations in a linked list
- C03** Use linear and non-linear data structures like stacks, queues, and linked list.
- C04** Identify the performance characteristics of fundamental algorithms and data structures and their operations.
- C05** 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	PSO1	PSO2
1	3	2	1						1	
2	2	2	2			1			2	
3	2	1	3	1					3	
4	2	3	1	1					1	
5	2	1		1		1			2	

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& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

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	PSO1	PSO2
1	3	2	2				1		1	
2	2	3	1	1					2	
3	3	2	1		1		1	1	2	
4	2	2	2	1			1		2	
5	2	3	2	2				1	2	

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:

- 24CA1B02 - 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, listof 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

MCQs, Assignment, Tutorials,
Case Studies

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	PSO1	PSO2
1	2	1	2	3						3
2	2		2							2
3	2	2	2	1		1				2

4	2		2	1	1	1				2
5	2		2	1	1	2				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 First 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& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions
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, Ruchika Malhotra, “ Object – Oriented Software Engineering”, PHI Learning Private Limited ,First edition,2012
2. Ivar Jacobson. Magnus Christerson, Patrik Jonsson, 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	PSO1	PSO2
1	1	3	3			3			2	
2	1	2	3			3			2	
3	1	2	3			2			3	
4	1	1	3	3		3			3	
5	1	2	3	1		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:

- NIL

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	C01
2	MySQL Database Creation, Table Creation, Query	C01,C02
3	MySQL Replication – Distributed Databases.	C01,C02,C03
4	Spatial data storage and retrieval in MySQL	C02,C03
5	Temporal data storage and retrieval in MySQL	C03
6	Object storage and retrieval in MySQL	C02,C03
7	XML Databases, XML table creation, XQuery FLWOR expression	C03,C04
8	Mobile Database Query Processing using open source DB (MongoDB/MySQL etc)	C03,C04

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 and projects	Descriptive type questions

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	PSO1	PSO2
1	2	1	3			1			2	
2	1	1	3			1			2	
3	1	2	3						2	
4	1	1	3						2	
5	1	1	3						2	

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?

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

- 24CA1B11 - 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 Dijkstra algorithm.

S. No	List of Experiments	CO
1	Array Implementation of Stack	C03
2	Array Implementation of Queue	C03
3	Linked List implementation of Stack	C03
4	Linked list implementation of Queue	C03
5	Infix to postfix conversion	C02
6	Graph Traversals	C02
7	Polynomial manipulation- addition, subtraction	C01
8	Binary Tree Traversal	C01
9	Quick Sort	C04
10	Divide and conquer – Merge Sort	C04
11	Shortest Path using Dijkstra"s Algorithm	C05
12	Minimum Spanning Tree using Prims Algorithm	C05
13	Dictionary application using any of the data structure	C05

S.No.	List of Projects	Expr.	CO
1	Bank Management System	1,2,3,4	C03
2	Calendar Application	1,2,3,4	C03
3	Customer Billing System	1,2,3,4	C03
4	Cricket Score Sheet	5,6	C02
5	Hospital Management System	5,6	C02
6	Phonebook Application	7,8	C01
7	School Billing System	7,8	C01
8	Employee Record System	7,8	C01

9	Telecom Billing System	7,8	C01
10	Typing Tutor	7,8	C01
11	Library Management System	9,10	C04
12	Department Store Management System	9,10	C04
13	Student Record System	11,12,13	C05
14	Quiz Game	11,12,13	C05
15	Personal Dairy Management System	11,12,13	C05

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 examination

Outcomes

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

- C01 Demonstrate with the various skills of data structures and their applications.**
- C02 Uses appropriate the linear, non linear and tree data structures operations to solve a given problem.**
- C03 Write functions to implement linear data-List, Stack and Queue.**
- C04 Develop the sorting techniques.**
- C05 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

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	PSO1	PSO2
1	3	1	1						1	
2	2	2	2			1			2	
3	2	1	3						3	
4	2	3	1						1	
5	2					1			2	

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?

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
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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. Eduonix <https://www.youtube.com/c/Eduonix>
5. Orai app for mastering Presentation Skills <https://orai.com/>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

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, Ninth 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	PSO1	PSO2
1	3	1	1	3		1				3

2	2	2	2	3		1		1		3
3	2	1	3	2		2		1		3
4	2	3	1	2		1		1		3
5	2			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	MCQs, Assignment, Tutorials, Case Studies	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).
1. "UNIX and Linux System Administration Handbook" by Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley (2020, Addison-Wesley Professional).
2. "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	PSO1	PSO2
1	2	3	2			3		1	3	
2	3	2	2			2		1	2	
3	3	2	2			3		2	3	
4	3	3	2			3		2	3	
5	3	3	3			3		1	2	

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& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

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

- S.N.Maheswari, "Financial and Management Accounting", Sultan Chand & Sons, 5th edition, 2010
- Reddy and Murthy, Financial Accounting by Margham Publications, 2015, Chennai
- I.M.Pandey, "Management Accounting", Vikas Publishing House Pvt. Ltd., 3rd Edition, 2009

WEB RESOURCES

- <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	PSO1	PSO2
1	3	2			2	2		2	3	
2	2	2			2	3		2	1	

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

1 Low 2 Medium 3 High

24CA2604

FULL STACK 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 on 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	MCQs, Assignment, Tutorials, Case Studies	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, Vasana 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	PSO1	PSO2
1	3	2	2	1		3				2
2	3	1	2	2		2				2
3	2	2	2			2				2
4	3	1	2	2		1				2
5	3	1	2	1		1				2

1 Low 2 Medium 3 High

24CA2605

MOBILE APPLICATION DEVELOPMENT

L T P C

3 0 2 4

PREAMBLE:

This course is offered in Second 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.	C01
2	Develop an application that uses event listeners.	C01,C02
3	Develop an application that uses Adapters, Toast.	C01,C02,C03
4	Design an android application to create page using Intent and one Button and pass the Values from one Activity to second Activity.	C02,C03
5	Develop an application that makes use of database.	C03
6	Develop an application that makes use of RSS Feed.	C02,C03
7	Implement an application that implements Multi threading using Struts framework.	C03,C04

8	Develop a native application that uses GPS location information.	C03,C04
9	Design an android application Send SMS using Intent	C02,C03,C05
10	Implement an application that creates an alert upon receiving a message	C01,C02,C03

S.No.	List of Projects	Related Experiment	CO
1	Android-based Function Generator	1 to 10	C01,C02
2	Software-defined Radio.	1,2,3	C01,C02
3	Home Automation System Application.	1,2,3	C02,C03
4	IoT-based Notification System.	1 to 10	C02,C03
5	Android Bluetooth-based Chatting App.	1 to 5	C03
6	Smart Travel Guide Application	1,2,3,6,7,8	C03,C04
7	Surveillance CameraControll App.	1,2,3,6,7,8	C03
8	Android Controlled Robot.	1,2,3,5,6,7	C03,C04
9	Home Automation System	8,9,10	C04
10	Students Communication App.	1 to 10	C03,C04
11	Timetable Manager.	7,8,9,10	C03,
12	Parental Control Application.	8,9,10	C04
13	Unit Converter Application.	1 to 10	C04
14	Notes of the student app.	1 to 10	C03,C04
15	Fingerprint authentication secured Android Notes.	1 to 7	C02,C03

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.

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Develop an application to solve the real time problem

COURSE OUTCOME 2: Create App for user interaction.

COURSE OUTCOME 3: Develop an application using RSS Feed.

COURSE OUTCOME 4: Demonstrate location tracking using GPS

COURSE OUTCOME 5 Demonstrate the data protection

24CA2611	JAVA PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

Preamble:

This course is offered in Second 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 <ol style="list-style-type: none"> 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 	C01
2	Writing window-based GUI applications using frames and applets such as Calculator application, Fahrenheit to Centigrade conversion etc.	C01
3	Write a multithreaded program in Java to multiply two matrices. Assign the computation of each row of the resultant matrix to a separate thread.	C02

4	Create a Personal Information System using Swing	C02
5	Write a program that reads content from a text file named input.txt, converts all text to uppercase, and writes the result to a new file named output.txt.	C03
6	Writing an RMI application to access a remote method.	C03
7	Writing a Servlet program with database connectivity for a web-based application such as students result status checking.	C04
8	Creation and usage of Java bean.	C04
9	Create an Application to search Phone Number using contact Name Using Hash Map.	C05
10	Create an Application which displays in E-mail contacts using Set Interface.	C05
11	Write a Java socket program where the client sends an array of integers to the server. The server receives the array, calculates the total sum of the elements, and sends the result back to the client.	C05

Total Hours:60

S.No.	List of Projects	Related Experiment	CO
1	Course Management System.	1,2,3	C01, C02
2	Electricity Billing System.	1,2,3	C01,C02
3	Airline Reservation System	1,2,3	C01, C02
4	Password Generator.	3	C03
5	Online Resume Builder.	4	C03
6	Temperature Converter.	2	C01
7	Exam Seating Arrangement System.	1,2,3	C02, C03
8	Supermarket Billing Software.	2,4,7	C02, C03
9	Online Hotel Reservations	2,4,7	C01,C02,C04
10	School Management Software	2,4,7	C01,C02,C04
11	Data Visualization Software	9,10	C05
12	Email Client Software.	6,11	C03,C05
13	Web Medical Management System.	2,4,7	C01,C02,CO

			4
14	Supply Chain Management System.	5,6,11	CO3,CO4,CO 5
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

- Herbert Schildt, "Java - The Complete Reference", Eleventh Edition, Tata McGraw Hill, 2020.
- Joyce Farrell, "Java Programming", Cengage Learning, Ninth Edition, 2019.
- Cay Horstmann, "Core Java Volume1:Fundamentals,", 12th Edition, Oracle Press, 2022
- E Balagurusamy, "Programming with Java
- ", McGraw-Hill Education, 2019.

WEB RESOURCES

- 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	PSO1	PSO2
1	3	1	1	3		1				3
2	2	2	2	3		1		1		3
3	2	1	3	2		2		1		3

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

1 Low 2 Medium 3 High

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?

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 sequence.	CO1
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., <div>) and appends it to the document.	CO2
5	Implement a feature that dynamically adds, updates, or removes DOM elements	CO2

	based on user actions (e.g., adding/removing items from a list).	
6	Create a React component using JSX that renders a simple greeting message.	C03
7	Implement form submission handling to validate inputs and perform actions (e.g., API requests).	C03
8	Create a simple Node.js server using Express that responds with "Hello, World!" to incoming requests.	C04
9	Implement CRUD operations (create, read, update, delete) for a collection using Express routes.	C04
10	Write Node.js code to connect to a MongoDB database using mongoose or the native MongoDB driver.	C05
11	Write MongoDB queries (find(), findOne(), find().sort().limit()) to retrieve documents from a collection based on specific criteria.	C05

S.No.	List of Projects	Related Experiment	CO
1	Task Manager with Generators	1,2,3	C01
2	Module-based Quiz App	1,2,3	C01
3	Interactive Form Validation	1,2,3	C02
4	Real-time Document Editor	4,5,6	C02
5	Task Management Dashboard	4,5,6	C03
6	E-commerce Product Catalog	7,8	C03
7	RESTful API for a Blog	7,8	C04
8	Real-time Chat Application	7,8	C04
9	User Management System(Hospital, BOOK etc)	7,8,9,10	C05
10	Event Scheduler	9,10	C05

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, Vasanth 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 and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

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

THIRD SEMESTER**24CA3601****MACHINE LEARNING****L T P C****3 0 0 3****PREAMBLE:**

This course is offered in MCA with specialization in Machine Learning. This course lays the foundation of Machine Learning, Bayesian classifier, Clustering Methods etc. This course is currently as much sought-after skill and is under active research. This course offers students have to refer appropriate research papers and multiple books to get in-depth knowledge about the topics.

PRE-REQUISITE:

- 24MA1258 – Discrete Mathematical Structures

OBJECTIVES:

1. To understand basic concepts and techniques of Machine Learning.
2. To understand various domains
3. To become familiar with parametric methods
4. To understand parametric classification
5. To acquire knowledge in clustering techniques

UNIT I INTRODUCTION OF MACHINE LEARNING 9

Introduction and motivation for machine learning; Examples of machine learning applications– Challenges in machine Learning - Training sets and classifiers – Minor Digression – Hill Climbing – Bayesian Classifiers – The Single-Attribute case – Vectors of discrete attributes – Probabilities of Rare Events – Gaussian “Bell” function- Environmental constraints – Statistical Learning – Bayesian Inference

UNIT II INTER-CLASS BOUNDARIES 9

The Additive Rule – The Multiplicative Rule – Domains with more than one classes - Polynomial Classifiers – Special aspects of Polynomial Classifiers - Numerical Domains and Support Vector Machines.

UNIT III PARAMETRIC METHODS 9

Parametric Classification – assuming a predefined functional form for the data- Regression – linear, polynomial, and logistic regression, and their use cases - Model Complexity – Regularization (L1, L2)-Model Selection Procedures - Evaluating models using key performance metrics.

UNIT IV ESTIMATION METHODS 9

Maximum Likelihood Estimation- purpose in parameter estimation-Applications in various statistical models – Evaluating an Estimator: Bias and Variance bias in evaluating estimators.– The Bayes’ Estimator – Prior, likelihood, and posterior distribution in Bayesian framework.

UNIT V**CLUSTERING****9**

Mixture Densities – k-means clustering – Expectation Maximization Algorithm – Mixtures of Latent Variable Models – Supervised Learning after Clustering – Spectral Clustering – Hierarchical Clustering – Choosing the Number of clusters.

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions
Suggested Activities		
<p>Unit 1: Draw a Gaussian bell curve using normal distribution.</p> <p>Unit 2: Group discussion on Regression</p> <p>Unit 3: Compare the relationship between bias and variance.</p> <p>Unit 4: Describe parametric classification</p> <p>Unit 5: Explain the k-means clustering algorithm.</p>		
Outcomes		
Upon completion of the course, the students will be able to:		

CO1 Understand the basic concepts of Machine Learning

CO2 Solve the classifier issue

CO3 Differentiate bias and variance

CO4 Apply parametric classification techniques

CO5 Develop application using clustering techniques

REFERENCE BOOKS

1. MiroslavKubat, "An Introduction to Machine Learning", Second Edition, Springer, 2017.
2. Yves Kodartoff, RyszardMichalski, "Machine Learning, An Artificial Intelligence Approach", Volume III, Morgan Kaufmann Publishers.
3. Pat Langley and Stanford University, "Elements of Machine Learning", Morgan Kaufmann Publishers
4. EthemAlpaytin, "Introduction to Machine Learning", Third Edition, The MIT press.

WEB RESOURCES

1. <https://www.coursera.org/learn/machine-learning>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA3602	SOFTWARE TESTING AND QUALITY ASSURANCE	L	T	P	C
		3	0	0	3

PREAMBLE

Software Testing is important in the IT world. Testers are highly paid and play an important role in Software Industry. Quality assurance is integrated into the software development lifecycle (SDLC) and requires the involvement of the entire project team as well. The third semester they get a clear idea about different methods of testing and types of testing with advanced testing tools.

PRE-REQUISITE:

- 24CA2702 – Software Project Management

OBJECTIVES:

1. To know the behaviour of the testing techniques and to design test cases
2. To get insight into the levels of testing in the user environment
3. To understand standard principles to check the occurrence of defects and its removal
4. To learn the functionality of automated testing tools to apply in the specialized environment
5. To understand the models and metrics of software quality and reliability

UNIT I TESTING TECHNIQUES & TEST CASE DESIGN 9

Using White Box Approach to Test design - Test Adequacy Criteria – Static Testing Vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White box Based Test Design – Code Complexity Testing –. Test Case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing– Boundary Value Analysis –Decision tables – Equivalence Class Partitioning – State-based testing – Cause-effect graphing – Error guessing – Domain testing – Case study for Control Flow Graph and State-based Testing

UNIT II LEVELS OF TESTING 9

The Need for Levels of Testing- Unit Test Planning –Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording Results – Integration Tests – Designing Integration Tests – Integration Test Planning – Scenario Testing – Defect Bash Elimination. System Testing – Acceptance testing – Performance testing – Regression Testing- Ad-hoc testing – Alpha, Beta Tests- Testing OO systems – Usability and Accessibility Testing – Configuration Testing – Compatibility Testing – Testing the documentation – Website Testing - Case Study for Unit and Integration Testing.

UNIT III TESTING FOR SPECIALIZED ENVIRONMENT 9

Testing Client / Server Systems – Testing in a Multiplatform Environment - Testing Object-Oriented Software – Object Oriented Testing – Testing Web based systems – Web based system – Web Technology Evolution – Traditional Software and Web based Software – Quality Aspects – Web Engineering – Testing of Web based Systems. Case Study for Web Application Testing.

UNIT IV TEST AUTOMATION 9

Selecting and Installing Software Testing Tools - Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation – Tracking the Bug – Debugging – Case study using GUI Testing tool, Unit Testing tool

UNIT V SOFTWARE TESTING AND QUALITY METRICS 9

Six-Sigma – TQM - Complexity Metrics and Models – Quality Management Metrics - Availability Metrics - Defect Removal Effectiveness - FMEA - Quality Function Deployment – Taguchi Quality Loss Function – Cost of Quality. Case Study for Complexity and Object Oriented Metrics.

TOTAL HOURS: 41

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
CAT 1& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities

Unit 1: Importance metrics analysis on test case design.

Unit 2: Assignment 1- Testing Tools available in real-time environment and mention the company specific tools.

Unit 3: Give example IDE for testing.

Unit 4: Write a code to do unit testing using any IDE.

Unit 5: Assignment 2- Quality Assurance measures.

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

- CO1 Understand the process of applying tests to software and the fundamental components of a test case.
- CO2 Debug the project and to test the entire computer-based systems at all levels
- CO3 Test the applications in the specialized environment using various automation tools
- CO4 Develop code to automate test execution and analysis.
- CO5 Apply quality and reliability metrics to ensure the performance of the software

REFERENCE BOOKS

1. Boris Beizer, "Software Testing Techniques", Dream Tech Press, 2009.
2. Dale H. Besterfield, "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint (2011)
3. Andrew S.Tanenbaum, "Modern operating Systems", Fourth Edition, PHI Learning Pvt.Ltd., 2016

WEB RESOURCES

1. <https://nptel.ac.in/courses/106105150>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High**24CA3603****INTERNET OF THINGS AND CLOUD COMPUTING**

L	T	P	C
3	0	2	4

PREAMBLE

This course is offered in MCA programme in the department of Computer Applications as a professional core lab cum theory subject. This course offers the knowledge about the internet of things & cloud computing. In this course it reveals the versatile need and usage of creating dynamic products under the internet of things.

PRE-REQUISITE:

- 24CA1602 - Computer Networks.

2	Measuring Light Intensity with NodeMCU and LDR Sensor.	C01
3	Usage of DHT 11 Temperature and Humidity Sensor.	C02
4	Creating a Web server using NodeMCU and ESP Module.	C02
5	To develop an application for measuring the distance using ultrasonic sensor and post distance value on Google Cloud IoT platform.	C03
6	IoT-Based Sensor Data Acquisition and Cloud Integration using NodeMCU.	C03
7	Creating account on ThingSpeak and connecting temperature and humidity sensor.	C04
8	Creating a twitter app on Thingspeak.	C04
9	Speed Checker to detect rash driving on vehicles using Arduino	C05
10	Object Detection using Arduino	C05

S.No.	List of Projects	Related Experiment	CO
1.	Blinking a LED on Pico Using Micro Python	1,2,3	C01, C02
2.	Install Add-ons, Read 1-Wire Sensor Data	1,2,3	C01,C02
3.	Weather Monitoring system.	1,2,3	C01, C02
4.	Air Quality Monitor.	1,2,3	C01, C02
5.	IOT based Intelligent Gas Leakage Detector Using Arduino	1,2,3	C01, C02
6.	Home Automation System.	4,5	C02, C03
7.	Power Monitoring System.	4,5	C02, C03
8.	Home Automation with Node-RED and Raspberry Pi: Control Lights & Read DHT11 Data	4,5	C02, C03
9.	Battery Powered Attendance system using Face Recognition on ESP32-CAM Board	6	C03
10.	IoT Based GPS Location Tracker using Node MCU and GPS Module – Save GPS co-ordinates and view on Google Maps	6	C03

11.	Health Monitoring System using 7-Segment Display & Atmega Microcontroller.	6	C03
12.	Wireless Communication between Arduino & Raspberry Pi using LoRa Module SX1278	6	C03
13.	Women's Safety Device With GPS Tracking & Alerts	7,8	C04
14.	Low Power IoT Based Compact Soil Moisture Monitoring Device	7,8	C04
15.	Arduino Based System To Measure Solar Power.	7,8	C04
16.	Speed Detector.	9,10	C05
17.	Traffic Light Controller.	9,10	C05
18.	Car Parking System.	9,10	C05
19.	Attendance System	9,10	C05
20.	Visitor Counter with Room Light Controller	9,10	C05
21.	Raspberry Pi based Object Detection using Tensor Flow and OpenCV.	9,10	C05

TOTAL HOURS: 30 HRS

Suggestive Assessment Methods

Continuous Assessment Test (20Marks)	Formative Assessment Test (30Marks)	End Semester Exams (50Marks)
CAT 1& 2 – Written Exam	MCQs, Assignment, Lab Experiments,	Descriptive type questions

Suggested Activities

Unit 1 - Handling the device connectivity with jumper wires.

Unit 2 - Assignments on defines the areas where different protocols are used.

Unit 3 - Study and practice the Arduino kit, Handle the multiple sensors with Node, Raspberry PI software.

Unit 4 - Create an IoT projects with network transaction & Think speak.

Unit 5 - To connect the cloud for IoT applications.

Outcomes

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

C01 Design an IoT simple platform with ARDUINO.

- CO2** Create a web server using NODE MCU and ESP Module.
- CO3** Design Web page and control Home Appliances through Wi-Fi.
- CO4** Write a program using Node MCU to read and update sensor data over cloud.
- CO5** Create a twitter app on thing speak.

Laboratory Requirements

Computer – 30 Systems

Software Front End: Arduino IDE ,Kit: Arduino, Node MCU, sensors, RASPBERRY PI, IOT CLOUD, THINKSPEAK LOGIN.

REFERENCE BOOKS

1. ArshdeepBahga, Vijay Madiseti, "Internet of Things – A hands-on approach", Universities Press, 2015.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
3. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.
4. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012
5. Gautam Shroff, "Enterprise Cloud Computing", Cambridge University Press,2011

WEB RESOURCES

1. <https://nptel.ac.in/courses/106105166/>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: How to get connected Arduino with sensors and Pc?

COURSE OUTCOME 2: Is it possible to setup the cloud for storage & process of IoT technology?

COURSE OUTCOME 3: How to creating a Web page and control Home Appliances through Wi-Fi with Arduino?

COURSE OUTCOME 4: How to create a program using Node MCU to read and update sensor data over cloud?

COURSE OUTCOME 5: How create a twitter app on Thing speak?

24CA3611	MACHINE LEARNING LABORATORY	L	T	P	C
		0	0	4	2

PREAMBLE:

This course is offered to MCA programme, provides a hands-on environment for students to understand, implement, and experiment with core concepts and advanced techniques of Machine Learning. The lab fosters a practical approach to exploring supervised and unsupervised learning methods, Bayesian classifiers, clustering algorithms, and other essential ML techniques

Prerequisites for the course

- 24CA1605 – Advanced Databases and Datamining

Objectives

1. To understand basic concepts and techniques of Machine Learning.
2. To understand various domains
3. To become familiar with parametric methods
4. To understand parametric classification
5. To acquire knowledge in clustering techniques

S. No	List of Experiments	CO
1	Write a program to implement simple linear regression using a small dataset.	CO1
2	Visualize the regression line and calculate metrics like Mean Squared Error (MSE).	CO1
3	Identify datasets from different domains (e.g., healthcare, finance, retail).	CO2
4	Perform exploratory data analysis (EDA) to understand data patterns and domain-specific challenges.	CO2
5	Develop a program to implement multivariate linear regression.	CO3
6	Evaluate the performance using metrics like R^2 score and Residual Sum of Squares (RSS).	CO3
7	Implement a Naïve Bayes classifier for text classification using the Bag-of-Words model.	CO4
8	Test it on a spam detection dataset and analyze its performance.	CO4
9	Implement the K-Means clustering algorithm on a dataset (e.g., customer segmentation).	CO5

10	Visualize the clusters using scatter plots.	C05	
S.No.	List of Projects	Related Experiment	CO
1	Predicting House Prices	1,2	C01
2	Sentiment Analysis for Product Reviews	1,2	C01
3	Customer Segmentation	1,2	C01
4	Spam Email Detection	1,2	C01
5	Handwritten Digit Recognition	3,4	C02
6	Fraud Detection in Banking	3,4	C02
7	Recommendation System	3,4	C02
8	Medical Diagnosis	3,4	C02
9	Image Classification	5,6	C03
10	Churn Prediction for Subscription Services	5,6	C03
11	Stock Price Prediction	5,6	C03
12	Chatbot with NLP	5,6	C03
13	Traffic Sign Recognition	7,8	C04
14	Fake News Detection	7,8	C04
15	Credit Score Analysis	7,8	C04
16	Crop Yield Prediction	7,8	C04
17	Autonomous Vehicle Navigation	9,10	C05
18	Energy Consumption Forecasting	9,10	C05
19	Music Genre Classification	9,10	C05
20	Personalized Learning Path Recommendation	9,10	C05

Suggestive Assessment Methods

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

Outcomes

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

- C01 Understand the basic concepts of Machine Learning
- C02 Solve the classifier issue
- C03 Differentiate bias and variance
- C04 Apply parametric classification techniques

C05 Develop application using clustering techniques

Laboratory Requirements**Computers-30 no's****Software- TensorFlow, PyTorch, Jupyter Notebook****REFERENCE BOOKS**

1. MiroslavKubat, "An Introduction to Machine Learning", Second Edition, Springer, 2017.
2. Yves Kodartoff, RyszardMichalski, "Machine Learning, An Artificial Intelligence Approach", Volume III, Morgan Kaufmann Publishers.
3. Pat Langley and Stanford University, "Elements of Machine Learning", Morgan Kaufmann Publishers.
4. EthemAlpaytin, "Introduction to Machine Learning", Third Edition, The MIT press.

Web Recourses

1. <https://www.coursera.org/learn/machine-learning>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High**COURSE LEVEL ASSESSMENT QUESTIONS**

COURSE OUTCOME 1: Critically analyze the differences between supervised and unsupervised learning, and justify the selection of algorithms for specific real-world scenarios in each category.

COURSE OUTCOME 2: Devise a classification strategy using a Naïve Bayes classifier to filter emails as spam or not spam, and evaluate its effectiveness through an example.

COURSE OUTCOME 3: Assess the implications of the bias-variance trade-off in machine learning, and propose strategies to optimize the performance of predictive models.

COURSE OUTCOME 4: Compare and contrast the parametric classification process using logistic regression with non-parametric methods, and evaluate their suitability for different datasets.

COURSE OUTCOME 5: Design and justify a customer segmentation system for an e-commerce platform using K-Means clustering, including a method to determine the optimal number of clusters.

PROFESSIONAL ELECTIVE I**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:

- **24CA1602 – Computer Networks**

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	MCQs, Assignment, Tutorials, Case Studies	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. Larry L Peterson and Bruce S Davie, Computer Networks, fifth edition, ELSEVIER
3. Andrew S Tanenbaum, Computer Networks, fifth edition, Pearson
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](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	PSO1	PSO2
1	1	3	3				2		2	
2	1	3	3				3		2	

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

1 Low 2 Medium 3 High

24CA2702

SOFTWARE PROJECT MANAGEMENT

L T P C

3 0 0 3

PREAMBLE

This course is offered in 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:

24CA1604 – Object Oriented 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

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
CAT 1& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Outcomes :

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

- C01** Describe the activities during the project scheduling of any software application.
- C02** Survey the risk management activities and the resource allocation for the projects.
- C03** 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 and CO Vs PSO Mapping

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

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:

- **24CA1605 – Advanced Databases and Data Mining**

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& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

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 Publications, 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	PSO1	PSO2
1	3	3	3			3	3	2	2	
2	2	2	1			3	3	1	2	
3	3	2	3			2	2	1	3	
4	2	3	1			1	3	1	2	
5	2	3	3			3	3	2	3	

1 Low 2 Medium 3 High**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:

- NIL

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& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions
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	PSO1	PSO2
1	3	2	2	2				2	3	
2	3	2	2	1				2	3	
3	2	2	2	1				2	3	
4	3	1	2					2	3	
5	3	1	2	1				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 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:

- **24CA1604 – Object Oriented Software Engineering**

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 to 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 – Reverse 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& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

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	PSO1	PSO2
1	2	3	2	1	2	2		2	1	
2	3	2	3		1	1			1	
3	2	3	3			1		1	1	
4	3	2	2		1	1		1	1	
5	3	2	2	1	1	2		1	1	

1 Low 2 Medium 3 High

24CA2706	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

- NIL

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-BusinessPlan- 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)
CAT 1& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Outcomes

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

- C01 Analyse the entrepreneurial ecosystem and to develop entrepreneurial mind-set needed to run a business.
- C02 Identify business opportunities and to analyse same in the light of socio-economic and cultural imperatives.
- C03 Design a business model and Prepare a Business plan.
- C04 Identify an appropriate business entity with required resources complying legal, regulatory and statutory aspects.
- C05 List the art of Pitching and financing the start-up.

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

Web Resources

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

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

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-filing, 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		
Summative /Continuous Assessment (20 Marks)	Formative Assessment (20 Marks)	End Semester Exams (60 Marks)
CAT 1& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

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	PSO1	PSO2
1	2	3	3		1	1		2	1	
2	2	2	2	1	2	1		1	1	
3	3	3	2		2			3	1	
4	2	2	3			1		1	1	
5	2	2	2	1		2		2	1	
1 Low 2 Medium 3 High										

PROFESSIONAL ELECTIVE II

24CA3701

CYBER SECURITY AND RESILIENCE

L T P C

3 0 0 3

PREAMBLE:

This course, offered to the MCA program, introduces cybersecurity concepts, focusing on protecting systems, networks, and data from cyber threats. It covers identifying vulnerabilities, applying cryptographic techniques, and implementing security measures, while emphasizing risk management, compliance, and ensuring the confidentiality, integrity, and availability of digital assets.

PRE-REQUISITE:

- **24CA2701 - NETWORK SECURITY**

OBJECTIVES:

1. To learn the principles of cyber security and to identify threats and risks.
2. To learn how to secure physical assets and develop system security controls.
3. To understand how to apply security for Business applications and Network Communications.
4. To learn the technical means to achieve security.
5. To learn to monitor and audit security measures.

UNIT I

PLANNING FOR CYBER SECURITY

9

Best Practices-Standards and a plan of Action-Security Governance Principles, components and Approach-Information Risk Management-Asset Identification-Threat Identification-Vulnerability Identification-Risk Assessment Approaches- Security Management Function

UNIT II

SECURITY CONTROLS

9

People Management-Human Resource Security-Security Awareness and Education-Information Management- Information Classification and handling-Privacy-Documents and Record Management Physical Asset Management-Office Equipment-Industrial Control Systems-Incorporating Security into SDLC - Disaster management and Incident response planning.

UNIT III

CYBER SECURITY FOR BUSINESS APPLICATIONS AND NETWORKS

9

Business Application Management-Corporate Business Application Security-End user Developed

Applications-System Access- Authentication Mechanisms-Access Control-System Management
Virtual Servers-Network Storage Systems-Network Management Concepts-Firewall-IP Security
Electronic Communications - Case study on OWASP vulnerabilities using OWASP ZAP tool.

UNIT IV TECHNICAL SECURITY 9

Supply Chain Management-Cloud Security-Security Architecture-Malware Protection-Intrusion
Detection-Digital Rights Management-Cryptographic Techniques-Threat and Incident Management
Vulnerability Management-Security Event Management-Forensic Investigations-Local Environment
Management-Business Continuity.

UNIT V SECURITY ASSESSMENT 9

Security Monitoring and Improvement-Security Audit-Security Performance-Information Risk
Reporting-Information Security Compliance Monitoring-Security Monitoring and Improvement Best
Practices.

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities

Unit 1: Discuss and debate information security policies that a privacy focused social media company should comply with.

Unit 2: Discuss data privacy policies implemented in various countries.

Unit 3: Demonstrate how ADB (Android debug bridge) is being used for malicious purposes.

Unit 4: Demonstrate how to troubleshoot networks and analyse packets using tools like Wire Shark.

Unit 5: Discuss the control challenges in virtual networks over cloud environments.

Outcomes:

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

- C01** Develop a set of risk and security requirements to ensure that there are no gaps in an organization's security practices.
- C02** Implement management, operational and technical means for effective cyber security.
- C03** Apply cyber security controls for better performance
- C04** Analyse the gap in the system and devise improvements.
- C05** Analyse and report vulnerabilities in the system

REFERENCE BOOKS

1. William Stallings, "Effective Cyber Security - A guide to using Best Practices and Standards", Addison-Wesley Professional, First Edition, 2019.
2. Adam Shostack, "Threat Modelling - Designing for Security", Wiley Publications, First Edition, 2014.
3. Gregory J. Touhill and C. Joseph Touhill, "Cyber Security for Executives - A Practical Guide", Wiley Publications, First Edition, 2014.
4. Raef Meeuwisse, "Cyber Security for Beginners", Second Edition, Cyber Simplicity Ltd, 2017.
5. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", 2nd Edition, Syngress, 2013.
6. Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, 2015.

WEB RESOURCES

1. <https://www.simplilearn.com/top-resources-to-learn-cybersecurity-article>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA3702

AGILE SOFTWARE DEVELOPMENT

L T P C

3 0 0 3

PREAMBLE:

Agile Software Development is a transformative approach to creating software that prioritize adaptability, collaboration, and customer satisfaction. This syllabus is designed to equip learners with deep understanding of Agile principles, frameworks, and practices essential for thriving in the dynamic field of software engineering.

PRE-REQUISITE:

- **24CA2702 - Software Project Management**

OBJECTIVES:

1. Understand Agile Principles and Frameworks
2. Learn the various costing and life cycle management.
3. Understand the role played by risk in software projects.
4. Appreciate the use of metrics for software project management.

5. Know the challenges in people management.

UNIT I INTRODUCTION TO AGILE DEVELOPMENT 9

What is Agility - Agile Software Development Ecosystems - Customer Delivery Principles - Encouraging Collaboration and Technical Excellence. Iterative and Evolutionary- Motivation- Evidence - Agile Overview-Evolution of Agile Methodologies

UNIT II AGILE PROCESSES 9

User Stories and Story Cards - Scrum - Sprint Process-Retrospective meeting -Dynamic Systems Development Methodology - Crystal Methods - Feature Driven Development.

UNIT III AGILE METHODOLOGIES 9

Lean Development - Extreme Programming: Method Overview - Adaptive Software Development - Unified Process

UNIT IV AGILE ENVIRONMENT 9

Developing an Agile Software Development Environment - Articulating Ecosystem - Designing your Agile methodology - Agile outside Software Development- Epic Creation- Backlog Grooming

UNIT V TESTING FRAMEWORK JUNIT 9

Automatic Tests-Junit's Goal-Fixtures-Testing Exceptions-Junit's Implementation-Junit API-Test First Programming-Stub-Extending Junit-Junit and Ant-Running Junit Standalone-Junit and IDEs-Test Infection.

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities

Unit 1: Identify ways to promote technical excellence and collaboration in a development team

Unit 2: Write user stories and create story cards based on given product requirements.

Unit 3: Design a project plan using the Unified Process for a given scenario.

Unit 4: Create an epic for a given project and break it into smaller user stories.

Unit 5: Implement a stub to test a program with dependencies.

Outcomes:

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

- CO1** Analyse the key characteristics of Agile software development ecosystems.
- CO2** Apply the principles of Agile processes to manage and adapt project workflows.
- CO3** Integrate Agile methodologies to address specific project challenges and requirements.
- CO4** Explore the application of Agile principles outside traditional software development contexts.
- CO5** Analyze test coverage and infection metrics to enhance test effectiveness and software reliability.

REFERENCE BOOKS

1. Dingsoyr, Torgeir, Dyba, Tore, Moe, Nils Brede (Eds.), –Agile Software Development, Current Research and Future Directions||, Springer-Verlag Berlin Heidelberg, 2010
2. David J. Anderson; Eli Schragenheim, –Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results||, Prentice Hall, 2003
3. Hazza& Dubinsky, –Agile Software Engineering, Series: Undergraduate Topics in Computer Science||, Springer, VIII edition, 2009
4. Craig Larman, –Agile and Iterative Development: A manager_s Guide||, Addison-Wesley, 2004
5. Kevin C. Desouza, –Agile information systems: conceptualization, construction, and management||, Butterworth-Heinemann, 2007.

WEB RESOURCES

3. <https://www.udemy.com/course/agile-project-management-genman/>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA3703

DATA VISUALIZATION TECHNIQUES

L T P C

3 0 0 3

PREAMBLE:

This course introduces students to the fundamentals of data visualization, enabling them to communicate insights and patterns in data effectively. Students will learn various data visualization techniques, tools, and best practices to design informative and engaging visualizations.

PRE-REQUISITE:

- 24CA2703 – DATA ETHICS AND GOVERNANCE

OBJECTIVES:

1. To understand the fundamentals of data visualization.
2. To know the working principles of various information visualization depth tools.
3. To acquire knowledge about the issues in data representation.
4. To visualize the Data using the tools Tableau.
5. To gain skill in designing real-time interactive information visualization system.

UNIT I INTRODUCTION 9

Context of data visualization – Definition, Methodology, Visualization design objectives. Key Factors – Purpose, visualization function, and tone, visualization design options -- Scatterplot Maps - Networks and Graphs.

UNIT II VISUALIZATION TECHNIQUES FOR TIME SERIES, TREES 9

Mapping - Time series - Connections and correlations – Indicator-Area chart-Pivot table scatter charts, Scatter maps - Treemaps, Space-filling, and non-space filling methods Hierarchies and Recursion.

UNIT III TEXT AND DOCUMENT VISUALIZATION 9

Acquiring data- Where to Find Data- Tools for Acquiring Data from the Internet-Loading Text Data, Dealing with Files and Folders, Listing Files in a Folder- Asynchronous Image Downloads- Web Techniques, Parsing data.

UNIT IV INTERACTIVE DATA VISUALIZATION 9

Drawing with data – Scales – Axes – Updates, Transition and Motion – Interactivity - Layouts – Geomapping – Exporting.

UNIT V SECURITY IN DATA VISUALIZATION 9

Port scan visualization - Vulnerability assessment and exploitation - Firewall log visualization - Intrusion detection log visualization -Attacking and defending visualization systems.

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities

Unit 1: Create scatterplots, tree maps, and network diagrams from a dataset.

Unit 2: Design time series and hierarchical treemap visualizations.

Unit 3: Parse text data and create visualizations like word clouds or bar charts.

Unit 4: Build interactive visualizations with scales, transitions, and geomapping.

Unit 5: Visualize firewall logs and intrusion data to identify vulnerabilities.

Outcomes:

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

- C01** Apply mathematics and basic science knowledge for designing information Visualizing Systems.
- C02** Collect data ethically and solve engineering problems in visualizing the information.
- C03** Implement algorithms and techniques for interactive information visualization.
- C04** Apply modern visualization tools and solve the space layout problem.
- C05** Analyse and design a system to visualize multidisciplinary multivariate Data individually or in teams.

REFERENCE BOOKS

1. K. Heer, J. Mackinlay, C. Stolte, and R. Munzner, Interactive Data Visualization for the Web, 3rd ed., Sebastopol, CA: O'Reilly Media, 2023.
2. C. Ware, Information Visualization: Perception for Design, 4th ed., Waltham, MA: Morgan Kaufmann, 2020.
3. Joerg Osarek, "Virtual Reality Analytics", Gordon's Arcade, 2016.
4. Matthew O. Ward, George Grinstein, Daniel Keim, "Interactive Data Visualization: Foundation, Techniques and Applications", Second Edition, A. K. Peters/CRC Press, 2015.

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc24_mg113/preview.
2. <https://www.udemy.com/course/data-visualization/?couponCode=BFCPSALE24>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA3704**DEEP LEARNING****L T P C****3 0 0 3****PREAMBLE:**

This course is offered to MCA programme. This course views deep Learning, a branch of Artificial Intelligence, uses neural networks inspired by the human brain to analyze and learn from large data volumes. It powers advancements in areas like image recognition, language processing, and autonomous systems. This subject focuses on its principles and applications, preparing students to develop innovative solutions for complex problems.

PRE-REQUISITE:

• **24CA2704 – AI ETHICS AND POLICY**

OBJECTIVES:

1. To comprehend the principles and structures of artificial neural networks and their role in deep learning.
2. To design and implement deep learning models for solving real-world problems.
3. To apply effective optimization and regularization techniques for improving model performance.
4. To handle structured and unstructured data for deep learning applications.
5. To investigate cutting-edge applications of deep learning in fields like vision, language, and autonomous systems

UNIT I**INTRODUCTION TO MACHINE LEARNING****9**

Linear models (SVMs and Perceptron's, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates

UNIT II**DEEP NETWORKS****9**

History of Deep Learning- A Probabilistic Theory of Deep Learning Back propagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks- Convolutional Networks- Generative Adversarial Networks (GAN), Semi supervised Learning

UNIT III**DIMENSIONALITY REDUCTION****9**

Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyperparameter optimization

UNIT IV**OPTIMIZATION AND GENERALIZATION****9**

Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks Spatial Transformer Networks- Recurrent

networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience

UNIT V CASE STUDY AND APPLICATIONS 9

Imagenet- Detection-Audio Wave Net-Natural Language Processing Word2Vec - Joint Detection BioInformatics- Face Recognition- Scene Understanding Gathering Image Captions

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities

Unit 1: Identify Convolutional Neural Networks models to solve Supervised Learning Problems

Unit 2: Design Auto encoders to solve Unsupervised Learning problems

Unit 3: Assign a task where students use t-SNE or UMAP to reduce the dimensions of a dataset like MNIST or Iris for visualization in 2D or 3D space. .

Unit 4: Apply Classical Supervised Tasks for Image Denoising, Segmentation and Object detection problems.

Unit 5: To create an image captioning model using CNNs for feature extraction and RNNs for caption generation, leveraging datasets like MSCOCO

Outcomes:

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

- C01** Demonstrate the basics of deep learning for a given context. .
- C02** Implement various deep learning models for the given problem
- C03** Realign high dimensional data using reduction techniques for the given problem
- C04** Analyse optimization and generalization techniques of deep learning for the given problem.
- C05** Evaluate the given deep learning application and enhance by applying latest techniques.

REFERENCE BOOKS

1. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers,2013.
2. Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning, MIT Press,2016. Michael
3. Nielsen, Neural Networks and Deep Learning, Determination Press,2015.
4. Cosma Rohilla Shalizi, Advanced Data Analysis from an Elementary Point of View,2015.

WEB RESOURCES

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

2. <https://www.vturesource.com/>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA3705

UI & UX Design

L T P C

2 1 0 3

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 skills of the student and appraises him the complete procedure for solving different kinds of problems that occur in engineering. Based on this, the course aims at giving adequate exposure in probability and estimation theory.

PRE-REQUISITE:

24CA2705 - SOFTWARE ENGINEERING PRINCIPLES

OBJECTIVES:

- To provide a sound knowledge in UI & UX
- To understand the need for UI and UX
- Research Methods used in Design
- Tools used in UI & UX
- Creating a wireframe and prototype

UNIT I

FOUNDATIONS OF DESIGN

9

UI vs. UX Design - Core Stages of Design Thinking - Divergent and Convergent Thinking - Brainstorming and Game storming - Observational Empathy

UNIT II

FOUNDATIONS OF UI DESIGN

9

Visual and UI Principles - UI Elements and Patterns - Interaction Behaviors and Principles – Branding - Style Guides

UNIT III

FOUNDATIONS OF UX DESIGN

9

Introduction to User Experience - Why You Should Care about User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals

UNIT IV RESEARCH, DESIGNING, IDEATING, & INFORMATION ARCHITECTURE 9

Identifying and Writing Problem Statements - Identifying Appropriate Research Methods - Creating Personas - Solution Ideation - Creating User Stories - Creating Scenarios - Flow Diagrams - Flow Mapping - Information Architecture

UNIT V WIREFRAMING, PROTOTYPING AND TESTING 9

Sketching Principles - Sketching Red Routes - Responsive Design - Wireframing - Creating Wireflows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools - Interaction Patterns - Conducting Usability Tests - Other Evaluative User Research Methods - Synthesizing Test Findings - Prototype Iteration

TOTAL: 45 PERIODS

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
CAT 1& 2 - Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities:

UNIT-1 - Hands on Design Thinking process for a product

UNIT-2 - Defining the Look and Feel of any new Project

UNIT-3 - Identify a customer problem to solve

UNIT-4 - Conduct end-to-end user research - User research, creating personas, Ideation process

Flow diagrams, Flow Mapping

UNIT-5 - Sketch, design and build a prototype and perform usability testing and identify improvements

Outcomes

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

- CO1** Build UI for user Applications
- CO2** Analyse the UI Interaction behaviors and principles
- CO3** Evaluate UX design of any product or application
- CO4** Demonstrate UX Skills in product development

CO5 Implement Sketching principles**REFERENCES:**

1. Steve Krug, "Don't Make Me Think, Revisited: A Commonsense Approach to Web & Mobile", Third Edition, 2015
2. Steve Schoger, Adam Wathan "Refactoring UI", 2018
3. <https://www.nngroup.com/articles/>
4. <https://www.interaction-design.org/literature>

CO Vs PO Mapping and CO Vs PSO Mapping

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

24CA3706

SOCIAL ENTREPRENEURSHIP**L T P C****3 0 0 3****PREAMBLE:**

The course will expose the students about Social Entrepreneurship and drivers of social entrepreneurship and enable them to design business models and to finance social enterprises

PRE-REQUISITE:

The students should have the knowledge on entrepreneurship and awareness about social responsibilities

OBJECTIVES:

1. To impart the knowledge about Social Entrepreneurship and drivers of social entrepreneurship.
2. To enable understanding about managing people
3. To design business models and to market social enterprises.
4. To impart knowledge about financing of social enterprises and to measure the outcomes.
5. To provide information about scaling strategies and its implications

UNIT I**ROLE OF SOCIAL ENTREPRENEURSHIP****9**

Social Entrepreneurship- Concept and typologies of social entrepreneurship – Social Entrepreneur – Social Enterprise – Drivers of Social Entrepreneurship – Size and Scope – Elements of Social Entrepreneurial personality.

UNIT II	MANAGING PEOPLE	9
Managing people in Social Enterprises – Role of Volunteer – Motivation of Volunteers – Meaning of Egoism – Motives of Egoism – Implications for Volunteer Management.		
UNIT III	BUSINESS MODELS & MARKETING SOCIAL ENTERPRISES	9
Business Models for Social Enterprises – Design principles for Business Models of Social Enterprises – Replication and Scaling up. Importance of marketing for Social Enterprise.		
UNIT IV	FINANCING & IMPACT MEASUREMENT	9
Financing Instruments – Donations – Equity Capital – Debt Capital – Mezzanine Capital – Hybrid Capital – Financing Institutions – Social Investment Advisors – Social Stock Exchanges – Social Investment Funds – Accountability – Impact Measurement – Measuring Outputs and Outcomes – Techniques involved – Issues in Measuring performance		
UNIT V	SCALING UP & IMPACT OF SOCIAL ENTREPRENEURSHIP	9
Scaling – Prerequisites – Scaling Strategies – Dissemination – Affiliation – Social Franchising – Branching – Choosing the appropriate Scaling Strategy – Scalability from the perspective of investors – Implications of Scaling: Barriers and Solutions.		

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	Case Study, Business model, Seminar, Report, Assignment	Descriptive type questions

Suggested Activities

Unit 1: Report on Social entrepreneurs in Tamil Nadu.

Unit 2: Case study .

Unit 3: Develop a Business Model .

Unit 4 : Seminar

Unit 5: Assignment.

Outcomes:

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

- C01** Examine the role of social entrepreneurship.
- C02** Identifying the personnel required for managing the social enterprise
- C03** Develop a business model for a social enterprise.

CO4 Identifying the various sources through which finance can be mobilised for a social enterprise.

CO5 Examine the proper scaling strategy and to assess the implications of same for a social enterprise.

REFERENCE BOOKS

5. Manual London and Richard G.Marfopoulo, Social Entrepreneurship: How to start Successful Corporate Social Responsibility and Community-Based initiatives for Advocacy and Change. Routeledge , UK 2010.
6. David Bornstein and Susan Davis. Social Entrepreneurship: What Everyone needs to know. Oxford USA 2010.
7. Thomas S.Lyons, Social Entrepreneurship: How Businesses Can Transform Society vol2: Approaches to Financing Social Entrepreneurship. ABC- CLIO, USA 2013.
8. Ryszard Praszkier, Andrzej Nowak, Social Entrepreneurship: Theory and practice. Cambridge, USA 2012.
9. Christine K.Volkman., Kim Oliver Tokarski., Kati Ernst ,Social Entrepreneurship and Social Business: An Introduction and Discussion with Case Studies. Springer Gabler 2012.

WEB RESOURCES

<https://jeffreYROBINSONPHD.COM/wp-content/uploads/2017/06/Social-Entrepreneurship-PalgraveMacmillan-1.pdf> CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA3707

AUGMENTED REALITY AND VIRTUAL REALITY

L T P C

2 1 0 3

PREAMBLE

The course introduces the application of the Augmented Reality (AR) and Virtual Reality (VR) in the design process to efficiently incorporate user experience, identifying and resolving conflicts in real life like settings and saving on costs etc. The course further dwells into prospects of 3D and walkthrough technology in architectural and engineering applications which can be directly automated to create AR-VR environments through guided site visits to World's famous places.

PRE-REQUISITE:

- 24CA2704 – AI ETHICS AND POLICY

OBJECTIVES:

1. To understand Virtual Reality
2. To Familiarize with hardware and software for AR and VR
3. To understand Augmented Reality
4. To develop Augmented Virtuality
5. To develop Mixed Reality applications.

UNIT I INTRODUCTION TO VIRTUAL REALITY 9

Fundamental Concepts and Components of Virtual Reality - Primary Features and Present Development on Virtual Reality - Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output -- Visual / Auditory / Haptic Devices - Geometric Modeling - Behavior Simulation; Physically Based Simulation

UNIT II HAPTIC AND FORCE INTERACTION IN VIRTUAL REALITY 9

Concept of haptic interaction; Principles of touch feedback and force feedback - Typical structure and principles of touch/force feedback Facilities in applications – Case Study - Adding Haptics using Arduino VR

UNIT III AUGUMENTED REALITY 9

Introduction System Structure of Augmented Reality; Key Technology in AR, AR hardware, AR software, AR content, Interaction – General solution for calculating geometric & illumination Consistency in the augmented environment. Tracking, Calibration and registration, Computer visio - Case Study - AR hardware and software.

UNIT IV AUGMENTED VIRTUALITY AND MIXED REALITY 9

Visual coherence, situated visualization, modelling and annotation Authoring AR, navigation, Mobile AR, Augmented Virtuality, Mixed Reality –Case Study - Annotation authoring AR, navigation

UNIT V MIXED REALITY DEVELOPMENT TOOLS 9

Frameworks of Software Development Tools in VR; Modelling Tools for VR, Planning, creating content for VR and AR projects - Gaming and entertainment, Education, Science and Engineering, Information control and bigdata visualization – Case study - Simple Game - Combine VR and AR Game

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities:

Unit 1 – Demonstrate the virtual reality system design

Unit 2 – Develop haptic force interaction processes

Unit 3 - Study about the process of developing the virtual system.

Unit 4 - Demonstrate a VR projects with basic fundamentals.

Unit 5 –Develop project with the VR development tools.

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

C01 Design and Create user environment

C02 Demonstrate VR through simple applications

C03 Have Familiarity with Augmented Reality and Mixed Reality Development platforms

C04 Use techniques to combine AR and VR to generate Augmented Virtuality

C05 Implement simple mixed reality application

REFERENCE BOOKS

1. Schmalstieg/Hollerer, Augmented Reality: Principles & Practice, Pearson Education India, 1st Edition, 2016
2. Paul Mealy, Virtual and Augmented Reality for Dummies, For Dummies, 1st Edition, 2018.
3. M.Claudia tom Dieck,"Agumented Reality and Virtual reality", 1st edition 2021 spriger.

WEB REFERENCES

1. <https://nptel.ac.in/courses/106106138/>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

PROFESSIONAL ELECTIVE III

24CA3708	ETHICAL HACKING AND PENETRATION TESTING	L	T	P	C
		3	0	0	3

PREAMBLE:

This course is offered to the MCA program. It provides a detailed understanding of ethical hacking and penetration testing concepts, focusing on identifying and exploiting vulnerabilities in systems and networks. This course equips students with practical skills to simulate cyberattacks, analyze system weaknesses, and implement effective countermeasures to strengthen cybersecurity defenses.

PRE-REQUISITE:

- 24CA2701 – NETWORK SECURITY

OBJECTIVES:

1. To Understand the Ethical Hacking Process
2. To Get familiarized with Tools and Techniques of Ethical Hacking
3. Understand the ethics of hacking and the importance of ethical hacking, as well as develop knowledge and skills in penetration testing.
4. Comprehend and analyse various types of attacks in cybersecurity, Gain proficiency in using Metasploit for penetration testing.
5. Develop management and reporting skills for penetration test. Explore and exploit vulnerabilities in operating systems.

UNIT I INTRODUCTION TO ETHICAL HACKING 9

An Introduction to ethical Hacking :Security Fundamental, Security testing, Hacker and Cracker, Descriptions, Test Plans-keeping It legal, Ethical and Legality-The Technical Foundations of Hacking: The Attacker's Process, The Ethical Hacker's Process, Security and the Stack

UNIT II FOOTPRINTING AND SCANNING 9

Information Gathering, Determining the Network Range, Identifying Active Machines, Finding Open Ports and Access Points, OS Fingerprinting Services, Mapping the Network Attack Surface

UNIT III MALWARE THREATS 9

Malware Threats : Viruses and Worms, Trojans, Covert Communication, Keystroke Logging and Spyware, Malware Counter measures- Sniffers, Session Hijacking, Denial of Service and Distributed Denial of Service

UNIT IV PENETRATION TESTING 9

Ethical Hacking Overview – Role of Security and Penetration Testers .- Penetration-Testing Methodologies- Laws of the Land –Network and Computer Attacks – Malware – Protecting Against Malware Attacks.- Intruder Attacks – Addressing Physical Security

UNIT V**ADVANCED FEATURES****9**

Physical Penetration Attack - . Insider Attacks – Metasploit - Console to Launch Exploits, Exploiting Client Side Vulnerabilities with Metasploit - Penetration Testing with Metasploit's Meterpreter- Automating and Scripting Metasploit - Going Further with Metasploit.

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities

Unit 1: Problems to solve the ethical hacking

Unit 2 - Problems to find the Open force and access points

Unit 3 - Problems for Malware threats

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:**

- C01** Understand the processes involved in ethical hacking.
- C02** Analyse malware threats and developing solutions.
- C03** Demonstrate computer based vulnerabilities.
- C04** Demonstrate different foot printing, reconnaissance and scanning methods.
- C05** Analyse social engineering, physical penetration, and insider

REFERENCE BOOKS

1. Michael T. Simpson, Kent Backman, and James E. Corley, Hands-On Ethical Hacking and Network Defense, Course Technology, Delmar Cengage Learning, 2010.
2. The Basics of Hacking and Penetration Testing – Patrick Engebretson, SYNGRESS, Elsevier, 2013.
3. The Web Application Hacker's Handbook Discovering and Exploiting Security flaws, Dafydd Suttard, Marcuspinto, 1st Edition, Wiley Publishing.

WEB RESOURCES:

- https://onlinecourses.nptel.ac.in/noc22_cs13/preview

CO Vs PO Mapping and CO Vs PSO Mapping

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

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

1 Low 2 Medium 3 High

24CA3709

TEST DRIVEN DEVELOPMENT

L T P C
3 0 0 3

PREAMBLE:

This course is offered to MCA programme to improve the knowledge of software development. This course helps better modularized, extensible, and flexible code. This course is to provide the students very well knowledge in software development process.

PRE-REQUISITE:

- 24CA2702 – SOFTWARE PROJECT MANAGEMENT

OBJECTIVES:

1. To learn the test driven development
2. To use tools for unit testing in TDD
3. To identify potential regions for refactoring in a software application
4. To develop test cases using TDD tools and frameworks
5. To understand pattern based TDD

UNIT I

Introduction to Test Driven Development

9

Introduction to Test Driven Development: Basics- Origin and terms of TDD-Benefits of TDD – Adoption of TDD – Solution for TDD Adopters – Organization – Additional Reading on Refactoring- Wide Benefits .

UNIT II

Create Clean Code

9

Create Clean Code: Use TDD to clean code – TDD Mantra – A narrated and animated view of the workflow – Clean Coding Reading – Alternate view – Translating business requirements into functional requirements for tests – A day in the life of a test driven developer.

UNIT III

Existing Types of Testing and the Powerful Assert Statement

9

Existing types of testing: Where does types of TDD fit? – Additional readings of testing – The powerful assert statement – Existing types of testing.

UNIT IV

TDD tools and framework

9

Introduction on TDD tools: TDD tools, Frameworks and Environments : Virtual machines, IDE, Unit Testing Frameworks - Frameworks and Environments: Hamcrest and AssertJ, Code coverage

tools, Mocking frameworks - Frameworks and Environments: User-Interface testing, Behavior-driven development(BDD)

UNIT V**TDD Patterns and Methods****9**

Patterns for TDD: TDD patterns – Red Bar patterns, testing patterns, green bar patterns - TDD patterns –xUnit Patterns, Design Patterns - Composing methods - moving features between objects – organizing data – simplifying conditional expressions – making method calls simpler – dealing with generalization.

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities

Unit 1: Introduction of basics techniques in TDD.

Unit 2: External learning on working with code.

Unit 3: Flipped classroom on TDD tools.

Unit 4:Assignment on Frameworks and Environment.

Unit 5: Quiz on TDD patterns and Methods.

Outcomes

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

CO1: Illustrate the concept of basics and TDD tools.

CO2: Develop the clean code.

CO3: Demonstrate the concepts of existing types of testing.

CO4: Apply the TDD frameworks for a complex problem

CO5: Develop the TDD patterns and methods.

REFERENCE BOOKS

1. Bala Paranj, “Test Driven Development in Ruby: A Practical Introduction to TDD Using Problem and Solution Domain Analysis”, Apress, 2017.
2. Viktor Farcic& Alex Garcia, “Test-Driven Java Development”, Packt Publishing Ltd, 2015

CO Vs PO Mapping and CO Vs PSO Mapping

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

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

1 Low 2 Medium 3 High

24CA3710

CLOUD COMPUTING FOR DATA SCIENCE

L T P C

3 0 0 3

PREAMBLE:

This course introduces students to Cloud Computing fundamentals, tools, and applications empowering MCA students to leverage scalable solutions for Data Science innovations.

PRE-REQUISITE:

24CA2703 – DATA ETHICS AND GOVERNANCE

OBJECTIVES:

1. To understand the basic concepts of Distributed systems.
2. To learn about the current trend and basics of Cloud computing.
3. To be familiar with various Cloud concepts.
4. To expose the Server, Network, and storage virtualization.
5. To be aware of Microservices and DevOps.

UNIT I INTRODUCTION TO CLOUD COMPUTING AND DATA SCIENCE 9

Evolution of Cloud Computing - System Models for Distributed and Cloud Computing - NIST Cloud Computing Reference Architecture - Service Models - Cloud Deployment Models: Public, Private, Hybrid Clouds - Introduction to Data Science: Definition and Process - Big Data: Risks and Structure

UNIT II VIRTUALIZATION AND INFRASTRUCTURE 9

Basics of Virtual Machines: Process and System Virtual Machines - Virtualization Techniques, Management, Infrastructure: Comprehensive Analysis - Server Virtualization

UNIT III PROGRAMMING MODELS AND DATA ANALYSIS 9

Hadoop Distributed File Systems: Introduction - Developing MapReduce Applications: Steps and Best Practices - Setting up Hadoop Cluster: Installation and Configuration - Data Analysis Using R: Univariate Analysis, Bivariate Analysis (Correlation)

UNIT IV DATA MODELING AND ANALYTICAL FRAMEWORKS 9

Bayesian Modeling: Basic Concepts and Applications - Support Vector and Kernel Methods - Introduction to NoSQL - MongoDB: RDBMS vs. MongoDB, Data Types, Sharding - Hadoop Ecosystem: Overview of Components

UNIT V**CLOUD INFRASTRUCTURE AND SECURITY****9**

Architectural Design of Compute and Storage Clouds - Inter-Cloud Resource Management -
Global Exchange of Cloud Resources - Cloud Security: Overview and Challenges - SaaS Security:
Best Practices and Considerations - Security Governance and Risk Management

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities

Unit 1: Conduct a group discussion on the evolution of cloud computing and its impact on data science.
Unit 2: Set up a virtual machine using virtualization software and explore its functionalities.
Unit 3: Develop and run a basic MapReduce application on a Hadoop cluster for data processing.
Unit 4: Implement a basic Bayesian model and perform data analysis using R on a given dataset.
Unit 5: Perform a cloud security risk assessment and propose best practices for securing SaaS applications.

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

- C01** Utilize distributed systems effectively in cloud environments.
- C02** Explain key concepts, technologies, strengths, and limitations of cloud computing.
- C03** Analyze cloud architecture, infrastructure, and delivery models.
- C04** Select, install, and implement appropriate technologies for cloud-based solutions.
- C05** Integrate microservices and adopt DevOps practices in cloud environments.

REFERENCE BOOKS

1. Ruparelia, N. B., Cloud Computing, revised and updated ed., MIT Press, 2023. ISBN: 9780262546478.
2. Hwang, K., & Dongarra, J., Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, 2nd ed., Morgan Kaufmann, 2020. ISBN: 9780128044346.
3. Magnus Larsson, "Hands-On Microservices with Spring Boot and Spring Cloud: Build and deploy microservices using spring cloud, Istio and kubernetes", Packt Publishing Ltd, First Edition, September 2019.
4. Richard Rodger, "The Tao of Microservices", ISBN 9781617293146, Manning Publications, First Edition, December 2017.

WEB RESOURCES

4. https://onlinecourses.nptel.ac.in/noc21_cs14/preview
5. <https://www.udemy.com/course/aws-certified-cloud-practitioner-new/>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High**24CA3711****REINFORCEMENT LEARNING**

L	T	P	C
3	0	0	3

PREAMBLE:

This course is offered to MCA programme. This course views deep Learning, a branch of Artificial Intelligence, uses neural networks inspired by the human brain to analyze and learn from large data volumes. It powers advancements in areas like image recognition, language processing, and autonomous systems. This subject focuses on its principles and applications, preparing students to develop innovative solutions for complex problems.

PRE-REQUISITE:

- **24CA2704 - AI ETHICS AND POLICY**

OBJECTIVES:

1. To understand **the basics of reinforcement learning. Its elements and limitations.**
2. To formulate and solve problems modelled with Markov Reward Process
3. To Comprehend solutions for problems with Markov Decision Process . .
4. To apply Dynamic Programming for Markov Decision Process
5. To Analyze Temporal Difference Methods

UNIT I**INTRODUCTION****9**

Introduction to Reinforcement Learning (RL) – Difference between RL and Supervised Learning, RL and Unsupervised Learning. Elements of RL, Markov property, Markov chains, Markov reward process (MRP). Evaluative Feedback

UNIT II**MULTI-ARM BANDIT PROBLEM****9**

An n-Armed Bandit Problem, Exploration vs Exploitation principles, Action value methods, Incremental Implementation, tracking a non-stationary problem, optimistic initial values, upper-

confidence-bound action selection, Gradient Bandits. Introduction to and proof of Bellman equations for MRPs

UNIT III DYNAMIC PROGRAMMING 9

Overview of dynamic programming for MDP, principle of optimality, Policy Evaluation, Policy Improvement, policy iteration, value iteration, asynchronous DP, Generalized Policy Iteration.

UNIT IV MONTE CARLO METHODS FOR PREDICATION AND CONTROL 9

Overview of Monte Carlo methods for model free RL, Monte Carlo Prediction, Monte Carlo estimation of action values, Monte Carlo Control, On policy and off policy learning, Importance sampling.

UNIT V TEMPORAL DIFFERENCE METHODS 9

TD Prediction, Optimality of TD (0), TD Control methods - SARSA, QLearning and their variants.

TOTAL HOURS: 48

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
CAT 1& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities

Unit 1: Clarify the differences between Reinforcement Learning, Supervised Learning, and Unsupervised Learning.

Unit 2: Provide a case study from a recommendation system (e.g., Netflix, Amazon) or a robotic navigation problem. Students can discuss how exploration and exploitation are balanced and how strategies like epsilon-greedy or Upper Confidence Bound (UCB) can be used in practice.

Unit 3: To Create a comparison exercise where students apply both value iteration and policy iteration to the same MDP and compare the convergence rates and final results of each method.

Unit 4: To Apply Monte Carlo Control to a simple RL problem (e.g., Blackjack or a small grid environment). Evaluate the policy using exploration strategies like ϵ -greedy, and optimize the policy over multiple episodes

Unit 5: To Develop an environment where the agent can learn optimal policies using Q-learning. Implement ϵ -greedy exploration and observe how the Q-values update as the agent learns the best policy, independent of the policy being followed.

Outcomes:

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

- CO1** Demonstrate the fundamentals of reinforcement learning
- CO2** Explore finite Markov decision processes and their applications.
- CO3** Analyse temporal difference learning and its advantages.
- CO4** Examine Sarsa, maximization bias, and the concept of double learning.
- CO5** Evaluate the given deep learning application and enhance by applying latest techniques.

REFERENCE BOOKS

1. Csaba Szepesvari, Algorithms for Reinforcement Learning, Morgan & Claypool, 2010, First edition
2. Warren B. Powell, Reinforcement Learning and Stochastic Optimization: A Unified Framework for Sequential Decisions, Wiley, 2022, First Edition. .
3. **Richard S. Sutton and Andrew G. Barto, Reinforcement Learning: An Introduction, MIT Press 2020/Bradford Books 2018, Second Edition.**

WEB RESOURCES

1. <https://nptel.ac.in/course>
2. <https://www.vturesource.com/>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA3712

FUNDAMENTALS OF BACKEND ENGINEERING

L T P C
3 0 0 3

PREAMBLE:

This course is offered in Third semester of MCA programme in the Department of Master of Computer Applications as a Professional Subject. This course covers the fundamentals of becoming a good backend engineer. It provides advice on career paths and portfolio building strategies. This course is essential for beginner backend engineers who want to gain a better understanding of the necessary skills and knowledge required in order to make a successful transition in their industry.

PRE-REQUISITE:

- 24CA2705 – SOFTWARE ENGINEERING PRINCIPLES

OBJECTIVES:

1. To understand the fundamentals of TCP vs UDP, HTTP

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

- CO1 Describe the functions of design patterns
- CO2 Explain the protocols TCP, UDP, HTTP
- CO3 Design and implement the Relational Database systems
- CO4 Develop configuration for socket execution pattern
- CO5 Demonstrate the proxy server

REFERENCE BOOKS

1. Martin Kleppmann, "Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems (Greyscale Indian Edition)" 11 May 2017.

WEB RESOURCES

2. <https://www.udemy.com/course/fundamentals-of-backend-communications-andprotocols>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High**24CA3713****EMERGING AREAS IN ENTREPRENEURSHIP**

L	T	P	C
3	0	0	3

PREAMBLE:

This course will impart knowledge about evolution of enterprise and its modelling and make them understand the process of innovation and strategies to develop a business. Moreover, the students will be enlighten on globalisation and challenges in international trade.

PRE-REQUISITE:

Basic understanding about business and the society.

OBJECTIVES:

1. To create an understanding about role of women and ecosystem for women entrepreneurship.
2. To impart knowledge about rural entrepreneurship and the role of government in rural entrepreneurship.
3. To understand the entrepreneurship opportunities in ecommerce and digital platform
4. To highlight the emerging strategies for growing entrepreneurial mindset.

5. To understand the business opportunities through Internet of things.

UNIT I WOMEN ENTREPRENEURSHIP 9

Evolution of Enterprise – Evolution Modelling- Start Stage-Sustenance Stage- Scaling Stage- Balancing of scaling and sustenance- Stalling and Stagnation Stage-Sick Enterprises- Dimensions of Maturity.

UNIT II RURAL ENTREPRENEURSHIP 9

Meaning of rural entrepreneurship- Need for rural entrepreneurship- Challenges to rural entrepreneurship – Role of government in rural entrepreneurship- Opportunities in rural entrepreneurship – Benefits of rural entrepreneurship.

UNIT III E-Commerce and Digital Platforms 9

The rise of e-commerce and online business models-Role of Artificial Intelligence in e-commerce.- Mobile commerce (M-commerce) and its business implications.-Payment systems and blockchain in e-commerce

UNIT IV GROWING THE BUSINESS 9

Collaboration in entrepreneurship-Approaches to effective collaboration – Collaborating with Public/Private/Civil Sector- Networking- Popular networking forums- Stages of networking- Approaches towards networking – Franchising- Modes of franchising- Franchising as a tool for growth – Franchising across borders.

UNIT V Internet of Things (IoT) and Smart Entrepreneurship 9

Business opportunities in IoT for entrepreneurs.-Smart devices and their impact on business models- The role of IoT in sustainability and green entrepreneurship.-Future trends: IoT and smart cities..

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	Case studies, Seminar, Interview with rural entrepreneurs , Business plan, Assignments	Descriptive type questions

Suggested Activities

Unit 1: Assignment.

Unit 2: Interview with rural entrepreneurs.

Unit 3: Preparing a business plan for the rural business opportunity.

Unit 4 : Case study

Unit 5: Seminar

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

- CO1** Explain the role of women and ecosystem for women entrepreneurship.
- CO2** Classify the need for rural entrepreneurship and the role of government in rural entrepreneurship
- CO3** Extend the growth of opportunities in ecommerce and digital platforms.
- CO4** Explain the strategies for growing entrepreneurial mindset.
- CO5** Examine the business opportunities in internet of things.

REFERENCE BOOKS

1. Satish Taneja, Entrepreneur Development, Himalaya Publishing House, 2010.
2. Vasant Desai, The Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House, 2011.
3. Khanna S.S, Entrepreneurial Development, S.Chand & Co Ltd, 2012..
4. Ryszard Praszkier, Andrzej Nowak, Social Entrepreneurship: Theory and practice. Cambridge, USA, 2012.

WEB RESOURCES

<https://www.yourarticlelibrary.com/women/womenentrepreneurship/womenentrepreneurship/99811>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA3714

ROBOTIC PROCESS AUTOMATION

L T P C

3 0 0 3

PREAMBLE:

This course equips students with the skills to design and implement automated solutions for repetitive tasks, enhancing efficiency and accuracy in business processes.

PRE-REQUISITE:

NIL

OBJECTIVES:

1. To understand the basic concepts of Robotic Process Automation.

2. To expose to the key RPA design and development strategies and methodologies.
3. To learn the fundamental RPA logic and structure.
4. To explore the Exception Handling, Debugging and Logging operations in RPA.
5. To learn to deploy and Maintain the software bot.

UNIT I INTRODUCTION TO ROBOTIC PROCESS AUTOMATION 9

Emergence of Robotic Process Automation (RPA), Evolution of RPA, Differentiating RPA from Automation - Benefits of RPA - Application areas of RPA, Components of RPA, RPA Platforms. Robotic Process Automation Tools - Templates, User Interface.

UNIT II AUTOMATION PROCESS ACTIVITIES 9

Sequence, Flowchart & Control Flow: Sequencing the Workflow, Activities, Flowchart, Control Flow for Decision making. Data Manipulation: Variables, Collection, Arguments, Data Table, Clipboard management, File operations Controls: Finding the control, waiting for a control, Act on a control.

UNIT III APP INTEGRATION, RECORDING AND SCRAPING 9

App Integration, Recording, Scraping, Selector, Workflow Activities. Recording mouse and keyboard actions to perform operation, Scraping data from website and writing to CSV. Process Mining.

UNIT IV EXCEPTION HANDLING AND CODE MANAGEMENT 9

Exception handling, Common exceptions, Logging- Debugging techniques, Collecting crash dumps, Error reporting. Code management and maintenance: Project organization, Nesting workflows, Reusability, Templates, Commenting techniques, State Machine.

UNIT V DEPLOYMENT AND MAINTENANCE 9

Publishing using publish utility, Orchestration Server, Control bots, Orchestration Server to deploy bots, License management, Publishing and managing updates. RPA Vendors - Open Source RPA, Future of RPA

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities

Unit 1: Develop a presentation on the evolution of RPA.

Unit 2: Create a flowchart for a simple automation process.

Unit 3: Extract data from a website and save it to a CSV file.

Unit 4: Simulate and handle common exceptions in RPA workflows.

Unit 5: Research and present future trends in open-source RPA tools.

Outcomes:

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

- C01** Enunciate the key distinctions between RPA and existing automation techniques and platforms.
- C02** Use UiPath to design control flows and work flows for the target process.
- C03** Implement recording, web scraping and process mining by automation.
- C04** Use UIPath Studio to detect, and handle exceptions in automation processes.
- C05** Implement and use Orchestrator for creation, monitoring, scheduling, and controlling of automated bots and processes.

REFERENCE BOOKS

1. Tom Taulli , “The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems” Apress publications, 2020.
2. Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots, Automating Repetitive Tasks & Become An RPA Consultant, Amazon Asia-Pacific Holdings Private Limited 2018
3. A Gerardus Blokdyk, “Robotic Process Automation Rpa A Complete Guide “, 2020
3. Frank Casale (Author), Rebecca Dilla (Author), Heidi Jaynes (Author), Lauren Livingston (Author) Introduction to Robotic Process Automation: a Primer, Institute of Robotic Process Automation Amazon Asia-Pacific Holdings Private Limited, 2018

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_me32/preview
2. <https://www.udemy.com/topic/robotic-process-automation/>

O Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

PROFESSIONAL ELECTIVE IV

24CA3715	BLOCK CHAIN TECHNOLOGY AND ITS APPLICATIONS	L	T	P	C
		3	0	0	3

PREAMBLE:

This course is offered to MCA programme as an Elective Theory Courses. This course Introduce basics of block chain technology. This course also explore various aspects of Blockchain technology like application in various domains

PRE-REQUISITE:

- 24CA3708 – ETHICAL HACKING AND PENETRATING TESTING

OBJECTIVES:

1. To understand the basics of block chain.
2. To implement the cryptographic techniques for security
3. To learn the mechanisms of bit coin
4. To understand the basics of mining bit coin.
5. To develop the applications of block chain.

UNIT I INTRODUCTION 9

Introduction – Basic ideas behind blockchain- Block chain categorization – Permissionless – Permissioned – Blockchain components – Transactions – Asymmetric-key cryptography – Ledgers – Blocks – Chain blocks – Consensus model – Forking – Smart Contracts.

UNIT II CRYPTOGRAPHY AND CRYPTOCURRENCIES 9

Cryptographic hash functions – Hash pointers and data structures – Digital Signatures – Public keys as identities – Two simple crypto currencies. Centralization verses decentralization – Distributed consensus – Consensus without an identity using a block chain – Incentives and proof of work.

UNIT III MECHANICS OF BITCOIN 9

Bit coin Transactions – Bit coin Scripts – Applications of Bit coin Scripts – Bit coin Blocks – The Bit coin networks – Limitations and improvements – Simple local storage – Hot and cold storage – Splitting and sharing keys – Online wallets and exchanges – Payment services – Transaction fees – Currency exchange markets.

UNIT IV BITCOIN MINING 9

The task of bitcoin miners – Mining hardware – Energy consumption and ecology – Mining pools – Mining incentives and strategies. Bit coin and Anonymity: Anonymity basics – How to de-anonymize bit coin – Mixing – Decentralized mixing – Zero coin and zero cash.

UNIT V APPLICATIONS OF BLOCKCHAIN 9

Financial Services – Manufacturing and industrial – Government and public sector – Healthcare and life sciences – Consumer Goods and retail industry – Food industry – Applications considerations: Additional block chain considerations.

TOTAL HOURS: 48

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
CAT 1& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities

Unit 1: Assignment on Ledgers, Blocks

Unit 2: Discussion on Digital Signatures

Unit 3: brainstorming about Online wallets and exchanges

Unit 4: comparative study- Mining hardware

Unit 5: Assignment-Government and public sector

Outcomes

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

- CO1 Examine the basics of cryptography and Block chain Technologies
- CO2 Differentiate the concepts of Symmetric key cryptography, Public key cryptography, Digital signatures and hash functions.
- CO3 Compare the limitations and improvements of Bit coin networks
- CO4 Develop tools used for mining bit coins and anonymity.
- CO5 Develop applications of bit coins and their considerations.

REFERENCE BOOKS

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.
2. Mohsen Attaran, Angappa Gunasekaran, "Applications of Blockchain Technology in Business: Challenges and Opportunities" Springer, 2019.

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_cs44/preview

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA3716

GAME DESIGN AND DEVELOPMENT

L T P C

3 0 0 3

PREAMBLE:

This course is offered to MCA Programme as a Game Development Course. This course aims to focus on the former aspect via design and development of 2D games. The architecture of a modern game consists of subcomponents such as the graphics engine, the physics engine, the audio engine, etc., which are orchestrated by the game logic. The course will introduce all these components of game development in hands-on manner wherein the students will write a 2D game as part of lab exercises.

OBJECTIVES:

1. To get subsequent understanding of game design and development
2. To develop interactive games.
3. To gain knowledge in rendering concepts.
4. To know about various gaming platforms and frameworks.
5. To develop 2D & 3D interactive games.

PRE-REQUISITE:

- 24CA3709 – TEST DRIVEN DEVELOPMENT

UNIT I

GRAPHICS FOR GAME PROGRAMMING

9

Coordinate Systems, Ray Tracing, Modelling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models, Image Texturing, Bump Mapping, Advanced Texturing, Character Animation, Physics-based Simulation.

UNIT II

GAME DESIGN PRINCIPLES

9

Game Logic, Game AI, Path Finding, Game Theory, Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection.

UNIT III

GAMING ENGINE DESIGN

9

Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics.

UNIT IV GAMING PLATFORMS AND FRAMEWORKS Using 9

Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DX Studio, Unity.

UNIT V GAME DEVELOPMENT 9

Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi-Player games - 3D Programming Concepts

TOTAL HOURS: 48

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
CAT 1& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions
Suggested Activities		
Unit 1: Narrate the story using the vertex processing.		
Unit 2: Write a programming for collision detection using java.		
Unit 3: Assignment: How would you approach modifications for a completed game design if shareholders request changes?		
Unit 4: Develop a game using android application.		
Unit 5: Develop innovative games for entertainment.		
Outcomes		
Upon completion of the course, the students will be able to:		

- CO1 Analyse th concepts behind game programming techniques
- CO2 Implement game programming techniques
- CO3 Solve game development tasks.
- CO4 Develop a basic game engine using open-source programming libraries.
- CO5 Develop interactive games using 2D and 3D.

REFERENCE BOOKS

1. JungHyun Han, “3D Graphics for Game Programming”, Chapman and Hall/CRC, 1st Edition, 2011.
2. David H. Eberly, “3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics” Morgan Kaufmann, 2nd Edition, 2006
3. Ernest Adams and Andrew Rollings, “Fundamentals of Game Design”, Prentice Hall 1st Edition, 2006

WEB RESOURCES

1. <https://www.gamedesigning.org/career/programming-languages>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA3717

BIG DATA ANALYTICS

L T P C

3 0 0 3

PRE-REQUISITE:

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 Data Scientist. The course taught basic Analytic tools, sampling techniques, filtering of data using hadoop predictive analysis using R programming, Visualization concepts, algorithms and databases of Big Data

PRE-REQUISITE:

- 24CA3710 – CLOUD COMPUTING FOR DATA SCIENCE

OBJECTIVES:

1. To learn the big data using intelligent techniques.
2. To implement to use various techniques for mining data stream.
3. To understand the basics of R programming.
4. To differentiate the basic visualization concepts of data.
5. To use the basic frameworks for analysing data.

UNIT I

INTRODUCTION TO BIG DATA

9

Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

UNIT II

MINING DATA STREAMS

9

Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP)Applications -- Case Studies - Real Time Sentiment Analysis, Stock Market

Predictions.

UNIT III INTRODUCTION TO R PROGRAMMING 9

Basic Objects: Vector, Matrix, Array, Lists, Data frames, Functions, Assignment Expressions, Conditional Expressions, Loop Expressions, Reading Data, Visualizing Data, Analyzing Data, Understanding functional programming, working with relational databases, working with NoSQL databases, Web scrapping.

UNIT IV DATA ANALYSIS SYTEMS AND VISUALIZATION 9

Link Analysis – Page Rank - Efficient Computation of Page Rank- Topic-Sensitive Page Rank – Link Spam- Recommendation Systems- A Model for Recommendation Systems- Content-Based Recommendations - Collaborative Filtering- Dimensionality Reduction- Visualizations - Visual data analysis techniques-interaction techniques

UNIT V ALGORITHMS, FRAMEWORKSANDAPPLICATIONS 9

Logistical algorithm - Random Forest – Prophet - IBM for Big Data –Framework - Hive – Sharding – NoSQL Databases –Mongo DB- Big data for Ecommerce – Big data for blogs

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions
Suggested Activities		
<p>Unit 1: Data Analytic tools comparison</p> <p>Unit 2: Practical on Map Reduce application for word counting on Hadoop cluster</p> <p>Unit 3: Predictive Analytics using R Programming</p> <p>Unit 4: Assignment 1: Apply Page Rank algorithm to bring you own website to the first sited website.</p> <p>Unit 5: Simulation using python environment</p>		
Outcomes		
Upon completion of the course, the students will be able to:		
<p>CO1 Explain the fundamentals of big data analysis techniques</p> <p>CO2 Design efficient algorithms for mining the data from large volumes</p> <p>CO3 Analyse the basics of R programming.</p> <p>CO4 Calculate page ranks for web pages.</p>		

CO5 Design analysis algorithms using the frameworks.

REFERENCE BOOKS

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2014
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding BigData: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012
3. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007
4. Roger. D. Peng, "R Programming for Data Science", Lean Publishing, 2015
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011

WEB RESOURCES

6. https://onlinecourses.nptel.ac.in/noc20_cs92/preview

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA3718

ARTIFICIAL INTELLIGENCE AND ITS APPLICATIONS

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 professional elective theory subject. This course offers the knowledge about the real time application using artificial intelligence & embedded system techniques.

OBJECTIVES:

1. To understand the various characteristics of Intelligent agents
2. To learn the different search strategies in AI
3. To learn to represent knowledge in solving AI problems
4. To understand the different ways of designing software agents
5. To know about the various applications of AI.

PRE-REQUISITE:

- 24CA3711 – REINFORCEMENT LEARNING

UNIT I INTRODUCTION 9

Introduction-Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

UNIT II PROBLEM SOLVING METHODS 9

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search - Game Playing - Optimal Decisions in Games – Alpha - Beta Pruning - Stochastic Games

UNIT III KNOWLEDGE REPRESENTATION 9

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering-Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information.

UNIT IV SOFTWARE AGENTS 9

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

UNIT V APPLICATIONS 9

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (30Marks)	Formative Assessment Test (20Marks)	End Semester Exams (50Marks)
CAT 1& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions
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 – Choose the problem and generate the solution with the samples.		
Unit 4 – Assignment to study about the concepts of intellectual property rights		
Unit 5 – Register a patent.		
Outcomes		

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

- CO1** Develop an agent strategy to solve a given problem
- CO2** Analyse search algorithms for any AI problem
- CO3** Design first order and predicate logic for a given problem
- CO4** Design software agents to solve a problem
- CO5** Design applications that uses in Artificial Intelligence.

REFERENCE BOOKS

1. Stuart J. Russell and Peter Norvig, Artificial Intelligence: A Modern Approach||, Prentice Hall, Fourth Edition, 2020.
2. Ela Kumar, "Artificial Intelligence", Willey Publications 2020.

WEB RESOURCES

1. <https://nptel.ac.in/courses/106102220>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High**24CA3719****DEVOPS**

L	T	P	C
3	0	0	3

PREAMBLE:

This course is offered in Second semester of MCA programme in the Department of Master of Computer Applications as a Professional Subject. This course is useful to start the career as a DevOps Architect or an Automation Engineer. The course taught Version control tools like Git, Build Jenkins Workspace, Configuration Management using Ansible.

PRE-REQUISITE:

24CA3712 – FUNDAMENTALS OF BACKEND ENGINEERING

OBJECTIVES:

1. To introduce DevOps terminology, definition & concepts
2. To understand the different Version control tools like Git, Mercurial
3. To understand the concepts of Continuous Integration/ Continuous Testing/ Continuous Deployment)

4. To understand Configuration management using Ansible.
5. Illustrate the benefits and drive the adoption of cloud-based Devops tools to solve real world problems.

UNIT I INTRODUCTION TO DEV OPS 9

Devops Essentials - Introduction To AWS, GCP, Azure - Version control systems: Git and Github.

UNIT II COMPILE AND BUILD USING MAVEN & GRADLE 9

Introduction, Installation of Maven, POM files, Maven Build lifecycle, Build phases(compile build, test, package) Maven Profiles, Maven repositories(local, central, global),Maven plugins, Maven create and build Artifacts, Dependency management, Installation of Gradle, Understand build using Gradle.

UNIT III FAMILY BUSINESS AND ENTREPRENEURSHIP 9

Evolution of family business in Indian context – Characteristics of a family business- Advantages of family businesses – Growth of family businesses- Pitfalls in family businesses – Challenges and issues in family businesses.

UNIT IV GROWING THE BUSINESS 9

Collaboration- Collaboration in entrepreneurship-Approaches to effective collaboration – Networking- Popular networking forums- Stages of networking- Approaches towards networking – Franchising- Modes of franchising- Franchising as a tool for growth – Franchising across borders.

UNIT V ENTREPRENEURSHIP EDUCATION AND RESEARCH 9

Gaps in domain knowledge- Need for education and research in entrepreneurship- Entrepreneurship education and its goal- Obstacles to entrepreneurship education - Opportunities in entrepreneurial research – Responsibility for proper research and education.

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	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Suggested Activities

Unit 1: Studying about the various version control tools

Unit 2 : Installing and building the Maven package.

Unit 3 : Creating Jenkins and build the workspace of Jenkins.

Unit 4 : How to Configure the Ansible.

Unit 5 : Build a sample code for creating new pipeline

Outcomes:

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

- C01** Analyze different actions performed through Version control tools like Git.
- C02** Explore Continuous Integration, Continuous Testing and Continuous Deployment
- C03** Ability to Perform Automated Continuous Deployment
- C04** Ability to do configuration management using Ansible
- C05** Examine leverage Cloud-based DevOps tools using Azure DevOps

REFERENCE BOOKS

1. Hands-On Azure Devops: Cidc Implementation For Mobile, Hybrid, And Web Applications Using Azure Devops And Microsoft Azure: CICD Implementation for ... DevOps and Microsoft Azure (English Edition) Paperback – 1 January 2020 by Mitesh Soni
2. Jeff Geerling, “Ansible for DevOps: Server and configuration management for humans”, First Edition 2015.
3. David Johnson, “Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps”, Second Edition, 2016.
4. Mariot Tsitoara, “Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer”, Second Edition, 2019.

WEB RESOURCES

1. <https://www.jenkins.io/user-handbook.pdf>
2. <https://maven.apache.org/guides/getting-started/>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
CAT 1& 2 – Written Exam	Assignment Case Study	Descriptive type questions

Suggested Activities

Unit 1: Assignment.

Unit 2: Innovative business proposals.

Unit 3: Seminar.

Unit 4 : Case study

Unit 5: Flipped Classroom

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

- C01** Examine the evolution of enterprise and evolution modelling.
- C02** Analyse the process of innovation and its need to sustain a business.
- C03** Examine the business strategies and its applications.
- C04** List Out the impact of globalisation on business
- C05** Analyse the need for sustainability in business.

REFERENCE BOOKS

1. Charles W L, Hill & Gareth and R Jones. Strategic Management an Integrated Approach. Biztantra Publishers, New Delhi 2015.
2. Elias M and Awad, Electronic Commerce – From Vision to Fulfilment, Prentice Hall of India, New Delhi.
3. James C Collins & Jerry I Porras, Built to Last, London: Random House Business Books/Hooper Business,2016.

WEB RESOURCES

<https://www.entrepreneur.com/article/252029>

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS01	PS02
1		2	1	3		3	3			3
2			1	3		3	3			3
3		2	3	3		3	3			3
4		2	3	3		2	3			3
5			2	3		2	3			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 /Subtractor – 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 MANAGEMENT AND 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, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, "Computer Organization and 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" 6th Edition Pearson Education, 2003
5. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Second Edition, Morgan Kaufmann, 2002.
6. Morris Mano "Digital Design", Printice Hall of India 1997

WEB 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 Internal Exams (60 Marks)
CAT 1& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions
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 Vs PO Mapping and CO Vs PSO Mapping

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

Low 2 Medium 3 High

24CA1B02

PROBLEM SOLVING AND PROGRAMMING IN C

L T P C

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. Kernighan, 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

Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Internal Exams (60 Marks)
CAT 1 & 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

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	PSO1	PSO2
1	3	2	1						1	
2	2	2	2			1			2	
3	2	1	3	1					3	

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

1 Low 2 Medium 3 High

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:**

- C01 Define a computational solution for a given problem
- C02 Demonstrate a solution for a given program involving programming constructs.
- C03 Identify the techniques to break a problem into logical modules that can be solved / programmed
- C04 Classify the pass parameters using structures and pointers to solving complex problem
- C05 Identify basic file concepts operations.

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High**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 space 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 – optimal storage on tapes.

UNIT III DYNAMIC PROGRAMMING 9

General Method - multistage graphs – all pairs shortest paths – single source shortest paths - String Editing – 0/1 knapsack. Search techniques for graphs – DFS-BFS-connected components -biconnected 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 Concepts 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, Pearson 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 Internal 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:		

- C01 Define the time and space complexities of algorithms
- C02 Demonstrate algorithms based on divide and conquer method.
- C03 Find a solution for the problem based on dynamic programming
- C04 Demonstrate algorithms for back tracking and Branch and Bound.
- C05 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	PSO1	PSO2
1	1	3	3			3			1	
2	1	2	3			3			1	
3	1	2	3			2			2	
4	1	1	3	3		3			2	
5	1	2	3	1		3			1	

1 Low 2 Medium 3 High

24CA2B02

OBJECT ORIENTED PROGRAMMING

L T P C
3 0 0 3

OBJECTIVES:

- To learn how C++ supports Object oriented principles.
- To understand and apply the principles of hiding data.
- To understand the overloading of functions and operators.
- To use the generic programming features of C++ including the STL.
- 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 Internal 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	PSO1	PSO2
1	3	1	1	3		1			1	
2	2	2	2	3		1		1	2	
3	2	1	3	2		2		1	3	
4	2	3	1	2		1		1	1	
5	2			2		1			1	

1 Low 2 Medium 3 High**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. Bhushan Trivedi, "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	PSO1	PSO2
1	3	1	1	3		1			1	
2	2	2	2	3		1		1	2	
3	2	1	3	2		2		1	3	

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

1 Low 2 Medium 3 High

VALUE ADDED COURSES

24CA0V01	JAVASCRIPT FOR WEB DEVELOPMENT	L	T	P	C
		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.

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	PSO1	PSO2
1		2	1	3						3
2		2	2	3		2				3
3		2	2	3	2	2				3

1 Low 2 Medium 3 High

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

24CA0V02	WEB TECHNOLOGIES	L	T	P	C
		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	PSO1	PSO2
1		2	2	3	2					3
2		2	2	3		2				3
3		2	2	3	2	3				3

1 Low 2 Medium 3 High

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	PSO1	PSO2
1		2	3	3						3
2		2	2	3		2				3
3		2	2	3	2	2				3

1 Low 2 Medium 3 High

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

24CA0V04		L	T	P	C
	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:

C01: Understanding the basic concepts and terminology of Tableau.

C02: Connect to and prepare various types of data sources for analysis in Tableau.

C03: Understand the purpose of Power BI and the various components of the software..

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 Business Intelligence" by Brian Larson.

Web Recourses

1. <https://help.tableau.com/current/guides/en-us//tableau-help.htm>
2. [https://docs.microsoft.com/en-us/power-bi/guided-learning/-](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	PSO1	PSO2
1		2	2	3						3
2		2	2	2		2				3
3		2	2	2		2				3

1 Low 2 Medium 3 High**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

24CA0V05**AUTOMATION TESTING TOOLS**

L	T	P	C
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

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**Project demonstration**

module	
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: 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 Gregory Second 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 Petar Tahchiev, 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	PSO1	PSO2
1		2	1	3						3
2		2	2	3		2				3
3		2	2	3	2	2				3

1 Low 2 Medium 3 High

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.

		L	T	P	C
24CA0V06	APPLIED FINTECH FOR BUSINESS	0	0	2	1

Prerequisites for the course

- NIL

Objectives

1. The major areas in FinTech, including Money and Payment, Digital Finance and Alternative Finance.
2. Major technological trends, including cryptocurrencies, Blockchain, AI and Big Data.
3. The fundamental role of Data and Security in data-driven finance.
4. Business and regulatory implications of technology for the financial industry.
5. Ways to analyze and evaluate what is driving technology innovation in Finance.

Module I

10

1. BFSI Value chain
2. How FinTech changed BFSI
3. Modern Banking Landscape
4. Introduction to BankTech

Module II**10**

1. Introduction to InsureTech
2. Introduction to the Fintech landscape
3. FinTech Architecture
4. FinTech Technologies
5. Fintech unicorns and business models

Module III**10**

1. Latest Trends and future of FinTech
2. Applications of FinTech
3. Use cases of FinTech in banks
4. Fintech startups

Total Periods**30****Laboratory Requirements****Computers-30 nos****Suggestive Assessment Methods**

Lab Components Assessments
(50 Marks)

Internal Lab Components Assessments
(50 Marks)

Assessment, Execution of Each module**Startup Presentation****Outcomes****Upon completion of the course, the students will be able to:**

CO1: Knowledge in FinTech, Digital finance and RegTech.

CO2: Develop skills to design, implement, and optimize financial technology solutions to meet industry demands.

CO3: Enhance employability by equipping students with expertise to navigate the FinTech landscape and understand its regulatory frameworks.

CO4: Automate financial operations, improve efficiency, and ensure compliance in financial systems through advanced technology.

CO5: Gain insights into emerging FinTech trends, such as blockchain, cryptocurrencies, and digital banking, and apply them for business innovation.

Reference Books

1. Agustin Rubini, "Fintech in a Flash: Financial Technology Made Easy", Zaccheus, 3rd Edition, 2018
2. Susanne Chishti and Janos Barberis, "The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries", John Wiley, 1st Edition, 2016

3. Theo Lynn, John G. Mooney, Pierangelo Rosati, Mark Cummins, "Disrupting Finance: FinTech and Strategy in the 21st Century", Palgrave, 1st edition, 2018
4. Abdul Rafay, "FinTech as a Disruptive Technology for Financial Institutions", IGI Global, January, 2019
5. Bernardo Nicoletti, The Future of FinTech: Integrating Finance and Technology in Financial Services, Palgrave Macmillan, August, 2018

Web Recourses

5. <https://www.udemy.com/course/fintech-qr-code-based-mobile-payments-system-global-fintech-academy/http://appium.io/docs/en/about-appium/intro/>
6. <https://www.coursera.org/courses?query=fintechhttps://testautomationu.applitools.com/>

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

Test Projects:

- 1 Personal Finance Portfolio Management
- 2 Automated Investment Recommendation System
- 3 Blockchain-based Payment Gateway
- 4 Digital Banking Dashboard
- 5 Loan Eligibility Calculator
- 6 Cryptocurrency Investment Tracker
- 7 Regulatory Compliance Monitoring System
- 8 Real-time Stock Market Dashboard
- 9 Peer-to-Peer Lending Platform
- 10 Financial Data Analytics and Reporting Tool

AUDIT COURSES

24CA0A01

CONSTITUTION OF INDIA

L T P C

2 0 0 0

PRE-REQUISITE:

- NIL

OBJECTIVES:

1. To introduce the historical background and the philosophical foundation of the Indian Constitution.
2. To develop an understanding of constitutional rights, duties, and directive principles that define the legal framework of India.
3. To provide insights into the structure, powers, and responsibilities of the various organs of governance and local administration.

UNIT I HISTORY AND PHILOSOPHY OF INDIAN CONSTITUTION 10

History, Drafting Committee, (Composition & Working), Preamble, Salient Features

UNIT II CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES 10

Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT III ORGANS OF GOVERNANCE AND LOCAL ADMINISTRATION 10

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions. District's Administration, Municipal Corporation. Pachayati raj

TOTAL HOURS: 30**REFERENCE BOOK(S):**

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D. D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Internal Exams (60 Marks)
CAT 1 & 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Outcomes

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

- CO1 Explain the historical evolution, drafting process, and salient features of the Indian Constitution.
- CO2 Analyze the fundamental rights, duties, and directive principles enshrined in the Constitution, and their relevance in civic life and governance.
- CO3 Describe the structure and functioning of the Parliament, Executive, Judiciary, and Local Self-Government institutions in India.

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA0A02	FUNDAMENTALS OF INDIAN KNOWLEDGE SYSTEM	L	T	P	C
		2	0	0	0

PRE-REQUISITE:

- NIL

OBJECTIVES:

1. To sensitize the students about context in which they are embedded i.e. Indian culture and civilisation including its Knowledge System and Tradition.
2. To help student to understand the knowledge, art and creative practices, skills and values in ancient Indian system.
3. To help to study the enriched scientific Indian heritage.
4. To introduce the contribution from Ancient Indian system & tradition to modern science & Technology.

UNIT I INTRODUCTION TO INDIAN KNOWLEDGE SYSTEM 10

Introduction to Indian Knowledge System – Characteristic Features of Indian Knowledge System – Why IKS? – Macaulay’s Education Policy and its Impact – Need for Revisiting Ancient Indian Traditions – Scope of IKS – Universality of IKS (from Micro to Macro) – Development from Earliest Times to 18th Century CE – Tradition of IKS – Ancient Indian Education System: Home, Gurukul, Pathashala, Universities and Educational Centres – Relevant Sites in the Vicinity of the Institute.

UNIT II CORE DISCIPLINES OF INDIAN KNOWLEDGE SYSTEM 10

Medicine (Ayurveda) - Alchemy - Mathematics - Logic - Art of Governance (Arthashastra)-
Aesthetics, town planning, strategic studies, Krishi Shastra (agriculture)Constitutional Remedies,
Directive

UNIT III APPLIED AND SPECIALIZED FIELDS IN INDIAN KNOWLEDGE SYSTEM 10

Vyakarana and lexicography (grammar and dictionary), Natyashastra (performing arts), ancient sports, astronomy, yoga and wellbeing, linguistics, Chitrasutra (painting theory), architecture, taxation, banking, and trade and commerce.

TOTAL HOURS: 30

REFERENCE BOOK(S):

1. Concise history of science in India- D.M. Bose, S.N Sen, B.V. Subbarayappa.
2. Positive sciences of the Ancient Hindus- Brajendranatha seal, Motilal Banrasidas, Delhi 1958.
3. History of Chemistry in Ancient India & Medieval India, P.Ray- Indian Chemicals Society, Calcutta 1956
4. Charaka Samhita- a scientific synopsis, P. Ray & H.N Gupta National Institute of Sciences of India New Delhi 1965.
5. MacDonnell A.A- History of Sanskrit literature
6. Winternitz M- History of Indian Literature Vol. I, II & III
7. Dasgupta S.N & De S.K- History of Sanskrit literature Vol. I.
8. Ramkrishna Mission- cultural heritage of India Vol. I, II & III.
9. Majumdar R. C & Pushalkar A.D- History & culture of the Indian people, Vol. I, II & III.
10. Keith A.B- History of Sanskrit literature.
11. Varadachari V- History of Sanskrit literature Chaitanya Krishna- A new History of Sanskrit.

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Internal Exams(60 Marks)
CAT 1& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

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

- CO1 Understand and appreciate the rich Indian Knowledge Tradition
- CO2 Understand the contribution of Indians in various fields
- CO3 Experience increase subject-awareness and self-esteem

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High

24CA0A03

DISASTER MANAGEMENT

L	T	P	C
2	0	0	0

PRE-REQUISITE:

- NIL

OBJECTIVES:

1. Summarize basics of disaster, Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

UNIT I

DISASTER INTRODUCTION

10

Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude..

UNIT II

TYPES OF DISASTER

10

Economic Damage, Loss of Human and Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT III

DISASTER PRONE AREAS IN INDIA AND PREPAREDNESS AND MANAGEMENT

10

Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides And Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics - Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness.

TOTAL HOURS: 30

REFERENCE BOOK(S):

1. Goel S. L., Disaster Administration And Management Text And Case Studies”, Deep & Deep Publication Pvt. Ltd., New Delhi, 2009.
2. Nishitha Rai, Singh AK, “Disaster Management in India: Perspectives, issues and strategies ’New Royal book Company, 2007.
3. Sahni, Pardeep Et. Al. ,” Disaster Mitigation Experiences And Reflections”, Prentice Hall

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Internal Exams(60 Marks)
CAT 1& 2 – Written Exam	MCQs, Assignment, Tutorials, Case Studies	Descriptive type questions

Outcomes

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

- CO1 Summarize basics of disaster
- CO2 Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- CO3 Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

CO Vs PO Mapping and CO Vs PSO Mapping

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

1 Low 2 Medium 3 High