Francis Xavier Engineering College

(An Autonomous Institution)
Tirunelveli 627 003
Tamil Nadu India

Department of Computer Applications

Curriculum and Syllabi – R 2021-PG

CHOICE BASED CREDIT SYSTEM AND OBE

Department Vision

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

Department Mission

- To impart education par-excellence through innovative training, research and development focusing on the industrial requirements making it beneficial to the individuals, industry and the society.
- To achieve professional excellence through high quality innovative teaching and training in computer applications for the development of students who can excel in the present future competitive profession according to the changing needs of the companies with high degree of integrity and ethical standards

TABLE OF CONTENTS

Programme Educational Outcomes (PEOs)

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

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

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

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

Programme Specific Objectives (PSOs)

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

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

Programme Outcomes (POs)

Engineering Graduates will be able to:

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

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

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

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

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

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

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

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

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

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

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

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

Mapping with PO Vs PEO, PSO

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

1→Low 2→Medium 3→High

FRANCIS XAVIER ENGINEERING COLLEGE

2021 MCA CURRICULUM AND SYLLABUS REGULATIONS 2021

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	4%
2	PC	18	19	15		52	59%
3	PE		3	6		9	10%
4	EEC	3	3	4	12	22	25%
	TOTAL	25	25	25	12	87	100%

Track No	TRACKS IDENTIFIED
1	Advanced Networking and Security
2	Software Development
3	System Development
4	Artificial Intelligence and Data Science
5	Information Management and Quality control
6	Full Stack Development

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

2021 MCA CURRICULUM AND SYLLABUS REGULATIONS 2021

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	21MA1258	Mathematical Foundations of Computer Applications	FC	4	4	0	0	4
2	21CA1101	Data structures	PC	3	3	0	0	3
3	21CA1102	Computer Networks	PC	3	3	0	0	3
4	21CA1103	Operating Systems	PC	3	3	0	0	3
5	21CA1104	Object Oriented Analysis and Design	PC	3	3	0	0	3
Theory cum Practical Courses								
1	21CA1105	Web Front End Essentials	PC	5	3	0	2	4
Practical Courses								
1	21CA1111	Data Structures Laboratory	PC	4	0	0	4	2
2	21CA1912	Communication and Soft Skills Laboratory	EEC	4	0	0	4	2
3	21CA1M01	PHP Programming	EEC	2	0	0	2	1
			Total	31	19	0	12	**25**

SEMESTER II

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	21CA2101	Programming with Java	PC	3	3	0	0	3
2	21CA2102	Python Programming	PC	4	3	1	0	4
3	21CA2103	Advanced Databases and Data Mining	PC	3	3	0	0	3
4	21CA2105	Fundamentals of Accounting	PC	4	3	1	0	4
5	21CA2M01	Aptitude Skill Development	MC	3	3	-	-	-
6		Professional Elective – I	PE	3	3	0	0	3
Theory cum Practical Courses								
1	21CA2104	Web Application Development Frameworks	PC	5	3	0	2	4
Practical Courses								
1	21CA2111	Programming with Java Laboratory	PC	4	0	0	4	2
2	21CA2912	Technical Seminar and Report Writing	EEC	2	0	0	2	1
3	21CA2913	Dot Net Programming	EEC	4	0	0	2	1
			Total	34	21	1	12	**25**

SEMESTER III

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	21CA3101	Big Data Analytics	PC	3	3	0	0	3
2	21CA3102	Mobile Computing	PC	3	3	0	0	3
3	21CA3103	Software Testing and Quality Assurance	PC	3	3	0	0	3
4		Professional Elective – II	PE	3	3	0	0	3
5		Professional Elective – III	PE	3	3	0	0	3
4	21CA3M02	Reasoning Skill Enhancement	MC	3	3	-	-	-
Theory cum Practical Courses								
1	21CA3104	Internet of Things and Cloud Computing	PC	5	3	0	2	4
Practical Courses								
1	21CA3111	Mobile Application Development Laboratory	PC	4	0	0	4	2
2	21CA3912	Mini Project	EEC	4	0	0	4	2
3	21CA3913	Internet Marketing and Analytics	EEC	3	0	1	2	2
			Total	33	21	0	12	**25**

SEMESTER IV

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Practical Courses								
1	21CA4911	Project Work	EEC	24	0	0	24	12
			Total	24	0	0	24	12

Minimum Number of Credits to be Acquired: 87

List of Foundation Courses

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	21MA1258	Mathematical Foundations of Computer Applications	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	21CA1101	Data structures	PC	3	3	0	0	3
2	21CA1102	Computer Networks	PC	3	3	0	0	3
3	21CA1103	Operating Systems	PC	3	3	0	0	3
4	21CA1104	Object Oriented Analysis and Design	PC	3	3	0	0	3
5	21CA1105	Web Front End Essentials	PC	5	3	0	2	4
6	21CA1111	Data Structures Laboratory	PC	4	0	0	4	2
7	21CA2101	Programming with Java	PC	3	3	0	0	3
8	21CA2102	Python Programming	PC	4	3	1	0	4
9	21CA2103	Advanced Databases and Data Mining	PC	3	3	0	0	3
10	21CA2105	Fundamentals of Accounting	PC	3	3	1	0	4
11	21CA2104	Web Application Development Frameworks	PC	5	3	0	2	4
12	21CA2111	Programming with Java Laboratory	PC	4	0	0	4	2
13	21CA3101	Big Data Analytics	PC	3	3	0	0	3
14	21CA3102	Mobile Computing	PC	3	3	0	0	3
15	21CA3103	Software Testing and Quality Assurance	PC	3	3	0	0	3
16	21CA3104	Internet of Things and Cloud Computing	PC	5	3	0	2	4
17	21CA3111	Mobile Application Development Laboratory	PC	4	0	0	4	2

List of Employability Enhancement Course

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Practical Courses								
1	21CA1912	Communication and Soft Skills Laboratory	EEC	**4**	0	0	4	2
2	21CA1M01	PHP Programming	EEC	2	0	0	2	1
3	21CA2912	Technical Seminar and Report Writing	EEC	2	0	0	2	1
4	21CA2913	Dot Net Programming	EEC	2	0	0	2	1
5	21CA3912	Mini Project	EEC	4	0	0	4	2

6	21CA3913	Internet Marketing and Analytics	EEC	3	1	0	2	2
7	21CA4911	Project Work	EEC	24	0	0	24	12

List of Professional Electives Courses

S.No	Course Code	Course Name	Semester	L	T	P	C	Stream/ Domain
Professional Elective I								
1	21CA2201	Cryptography and Network Security	II	3	0	0	3	**Advanced Networking and Security**
2	21CA2202	Information Security and Audit	II	3	0	0	3	**Information Management and Quality control**
3	21CA2203	Digital Image Processing	II	3	0	0	3	**Artificial Intelligence and Data Science**
4	21CA2204	Augmented Reality and Virtual Reality	II	3	0	0	3	**Artificial Intelligence and Data Science**
5	21CA2205	Real Time Embedded System	II	3	0	0	3	**System Development**
6	21CA2206	Software Project Management	II	3	0	0	3	**Software Development**
7	21CA2207	Research Methodology and IPR	II	3	0	0	3	**Research**
8	21CA2208	Principles in Programming Languages	II	3	0	0	3	**Full Stack Development**
Professional Elective II								
1	21CA3201	E Commerce and Business Intelligence	II	3	0	0	3	**Information Management and Quality control**
2	21CA3202	Block Chain Technology and its applications	II	3	0	0	3	**Advanced Networking and Security**
3	21CA3203	Cyber Security and Forensics	II	3	0	0	3	**Advanced Networking and Security**
4	21CA3204	Adhoc and Sensor Network	II	3	0	0	3	**Advanced Networking and Security**
5	21CA3205	High Performance Computing	II	3	0	0	3	**System Development**
6	21CA3206	Artificial Intelligence and its Applications	II	3	0	0	3	**Artificial Intelligence and Data Science**
7	21CA3207	Test Driven Development	II	3	0	0	3	**Software Development**
8	21CA3215	UI & UX Design	II	3	0	0	3	**Full Stack Development**

Professional Elective III

1	21CA3208	Natural Language Processing with Python	III	3	0	0	3	**Artificial Intelligence and Data Science**
2	21CA3209	Game design and development	III	3	0	0	3	**Software Development**
3	21CA3210	Enterprise Resource Planning	III	3	0	0	3	**Information Management and Quality control**
4	21CA3211	Machine Learning and Deep Learning	III	3	0	0	3	**Artificial Intelligence and Data Science**
5	21CA3212	Soft Computing Techniques	III	3	0	0	3	**System Development**
6	21CA3213	Cyber Laws and IT Acts	III	3	0	0	3	**Advanced Networking and Security**
7	21CA3214	Operation Research	III	3	0	0	3	**Information Management and Quality control**
8	21CA3216	Fundamentals of Backend Engineering	III	3	0	0	3	**Full Stack Development**

List of Value Added Courses

S. No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Practical Courses								
1	21CA1V01	JavaScript for Web Development	VA	**2**	0	0	2	1
2	21CA1V02	Automation Testing tools	VA	**2**	0	0	2	1
3	21CA1V03	Cloud Platforms	VA	**2**	0	0	2	1
4	21CA2V01	MVC Framework	VA	**4**	0	0	4	2
5	21CA2V02	Data Analytic Tools	VA	**4**	0	0	4	2
6	21CA2V03	Intelligent Systems and Data Analysis	VA	**4**	0	0	4	2
7	21CA3V01	Node.js and Express.js Essentials	VA	**2**	0	0	2	1
8	21CA3V02	Angular for Modern Web Development	VA	**2**	0	0	2	1
9	21CA3V03	Cross-Platform Mobile Development with React Native	VA	**2**	0	0	2	1

List of Mandatory Courses

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	21CA2M01	Aptitude Skill Development	MC	**3**	3	0	0	0
2	21CA3M02	Reasoning Skill Enhancement	MC	**3**	3	0	0	0

Bridge Courses I SEM

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	21CA1B01	Digital Logic and Computer Organization	BC	4	4	0	0	4
2	21CA1B02	Problem Solving and Programming in C	BC	3	3	0	0	3
3	21CA1B03	Design and Analysis of Algorithms	BC	3	3	0	0	3
Practical Courses								
1	21CA1B11	Programming in C Laboratory	BC	4	0	0	4	2
			Total	14	**10**	**0**	**4**	**12**

Bridge Courses II SEM

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Cum Practical Courses								
1	21CA2B01	Database Management Systems	BC	3	1	0	2	2
2	21CA2B02	Object Oriented Programming	BC	3	1	0	2	2
			Total	6	2	0	4	**4**

FIRST SEMESTER

21MA1258 MATHEMATICAL FOUNDATIONS OF COMPUTER APPLICATIONS L T P C

4 0 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 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:

- 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 make the students ability to deal with abstraction
5. To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

UNIT I MATRIX ALGEBRA 12

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 12

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 12

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 FORMAL LANGUAGES 12

Languages and grammars – Phrase structure grammar – Classification of grammar – pumping lemma for regular languages – Context free languages.

UNIT V FINITE STATE AUTOMATA 12

Finite State Automata – Deterministic finite state Automata (DFA) – Non-deterministic finite state automata (NFA) - Equivalence of DFA and NFA - Equivalence of NFA and Regular Languages.

TOTAL 60

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

Suggested Activities:

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

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

UNIT-3 – Problems on mathematical logics.

UNIT-4 – Assignment to study about the context free languages.

UNIT-5 – Solve the Problems on Finite set automata.

Outcomes

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

CO1 Get basic knowledge of matrix, set theory, functions and relations concepts needed for designing and solving problems.

CO2 Know logical operations and predicate calculus needed for computing skill

CO3 Design and solve Boolean functions for defined problems.

CO4 Apply the acquired knowledge of formal languages to the engineering areas like Compiler Design

CO5 Apply the acquired knowledge of finite automata theory and to design discrete problems to solve by computers.

REFERENCE BOOKS

1. G.ShankerRao,"Mathematical Foundation of Computer Science",Dreamtech Press,2020.
2. David Makinson, "Sets, Logic and Maths for Computing", Springer Indian Reprint, 2011.
3. Sengadir, T. "Discrete Mathematics and Combinatorics" Pearson Education, New Delhi, 2009.

WEB RESOURCES

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

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
1	3	3		3							2		3	
2	3	3		3							2		3	
3	3	3		3							2		3	
4	3	3		3							2		3	
5	3	3		3							2		3	

21CA1101 DATA STRUCTURES 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:

- Programming in C Laboratory

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 frame work – Asymptotic notations, Properties, Recurrence Relation.

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.

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.

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.

TOTAL HOURS: 45

Suggestive Assessment Methods

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

Suggested Activities

Unit 1: Problems on Algorithm analysis.

Unit 2: Demonstration of Doubly linked list from stack with min complexity

Unit 3: Hands on training on Stack and Queue

Unit 4: Problem on DFS and BFS.

Unit 5: Demonstration of sorting and hashing techniques using C programming

Outcomes:

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

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

CO2 Summarise the operations in linked list

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

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

CO5 Implement Sorting and Hashing Techniques

REFERENCE BOOKS

1. A.K. Sharma, "Data Structures using C", Pearson Education Asia, 2013.
2. 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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2
1	3	2	2	3	3	1					1	1	3	
2	3	2	2	3	3	1					1	1	3	
3	3	2	2	3	3	1					1	1	3	
4	3	2	2	3	3	1					1	1	3	
5	3	3	3	3	3	1					1	1	3	

	L	T	P	C
21CA1102 COMPUTER NETWORKS	**3**	**0**	**0**	**3**

PREAMBLE:

Computer Network courses enables 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, algorithms and also gives the 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	**Formative Assessment Test**	**End Semester Exams**

(20 Marks)	**(20 Marks)**	**(60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Unit 1:** MCQs on Data Transmission concepts **Unit 2:** Problems on error correction and detection **Unit3:** Quiz on Routing protocol **Unit4:** Write functions to implement an end-to-end transport service for a given scenario **Unit 5:** Quiz on Application layer protocols	**Descriptive type questions**

Suggested Activities

Unit 1: Performance metrics analysis on Data transmission concepts

Unit 2: While a frame of data is transmitted from the data-link layer to the physical layer, extra redundant bits are added to the original frame and an erroneous data is received by the receiver. Give suitable solution for the above scenario.

Unit 3: Simulate routing protocol in using Wireshark

Unit 4: Simulation of routing protocol using Java network package

Unit 5: HTTP/DNS format using Wireshark

Outcomes

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

- **CO1** Illustrate networking concepts and basic communication model.
- **CO2** CompareError 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. Andrew S.Tannen baum David J. Wetherall, "Computer Networks" Fifth Edition, Pearson Education 2011
2. William Stallings, "Data and Computer Communications", Tenth Edition, Pearson Education, 2014
3. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-down Approach, Pearson Education, Limited, 7th edition, 2016.

WEB RESOURCES

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

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA1103 OPERATING SYSTEMS L T P C

3 0 0 3

PREAMBLE:

This course is offered in 1st semester of MCA programme in the department of Computer Applications as an elective subject. This course exposes the principles of operating system. In this course it reveals the versatile need and usage of operating system.

PRE-REQUISITE:

- NIL

OBJECTIVES:

1. To study about the operating system components and its services.
2. To apply methods for handling critical session & Deadlock problems.
3. To implement the techniques for managing the memory.
4. To use the techniques for scheduling disk systems.
5. To experiment with the components of operating system with relevant case study.

UNIT I INTRODUCTION 9

Introduction -Types of operating systems-Operating systems structures-Systems components-Operating systems services-System calls-Systems programs-Processes- Process concept-Process scheduling-Operation on processes-Co-operating processes-Inter process communications-CPU Scheduling-Scheduling criteria-Scheduling algorithms- Multiple-processor Scheduling

UNIT II PROCESS SYNCHRONIZATION 9

Process Synchronization –Critical Section problem – Semaphores-Classical problems of

synchronization-Critical regions-Monitors-Deadlock Characterization-Deadlock handling-Deadlock Prevention – Deadlock avoidance-Deadlock Detection-Deadlock Recovery–Threads-Multithreading Models

UNIT III MEMORY MANAGEMENT 9

Memory Management-Swapping-Contiguous Memory allocation-Paging-Segmentation- Virtual Memory-Demand paging-Page Replacement-Thrashing.

UNIT IV DISK SCHEDULING AND DISTRIBUTED SYSTEMS 9

Disk Structures-Disk Scheduling-File Systems Interface-File concepts-Access methods-Directory Structures-File System Implementation-File Systems structures-Directory Implementation-Allocation Methods-Free Space management-Distributed File systems- Naming and Transparency-Remote File Accesses- File replication.

UNIT V CASE STUDIES 9

Linux System-design Principles- Process management-File Systems-Windows 11- History-Design Principles –System components –Virtual machine OS – Mobile OS – Android and IOS

TOTAL HOURS: 45

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 – Descriptive type questions	**Unit – 1** MCQ's on System call & Process. **Unit – 2** MCQ's on Threading & Deadlock prevention. **Unit – 3** Problems on Swapping techniques. **Unit – 4** MCQ's on remote file accessing & Distributed file systems. **Unit – 5** Presentation of different Operating systems.	**Descriptive type question**

Suggested Activities

Unit 1 - Problems to solve the Process & CPU scheduling
Unit 2 - Problems to find the semaphores & Critical sessions.
Unit 3 - Problems for page replacement techniques.
Unit 4 - Problems on disk scheduling & File allocation techniques.
Unit 5 - Assignments to study about the various OS(IoS, Android, UNIX, UBUNTU)

Outcomes

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

CO1	Classify the schedule algorithms
CO2	Use the methods for handling problems that occurs in resource sharing.
CO3	Solve deadlocks in various operating systems.
CO4	Classify files systems and the distributed methods in operating systems.
CO5	Discover the operating system components and services with the recent OS techniques.

REFERENCE BOOKS

1. Abraham Silberschalz Peter B Galvin, G.Gagne, "Operating Systems Concepts", 10thEdition, John Wiley & Sons, 2018.
2. Dhananjay M Dhamdhere, "Operating Systems: A Concept-based Approach", Third Edition, Tata McGraw-Hill Education, 2017.
3. Andrew S.Tanenbaum, "Modern operating Systems", Fourth Edition, PHI Learning Pvt.Ltd., 2016
4. Marko Gargenta, "Learning Android",Oreilly publications,2014
5. Matt Neuburg, "Programming IOS 4: Fundamentals of IPhone, IPad, and IPod Touch Development", Oreilly publications,2011

WEB RESOURCES

1. https://archive.nptel.ac.in/courses/106/105/106105214/

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA1104 OBJECT ORIENTED ANALYSIS AND DESIGN

L	T	P	C
3	0	0	3

PREAMBLE:

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

PRE-REQUISITE:

- NIL

OBJECTIVES:

1. To Understand the Software Engineering concepts
2. To demonstrate the functioning of UML diagrams
3. To identify the problem domain from the problem specification.
4. To apply design axioms and corollaries for the classes and object relational systems.
5. To develop the designing strategies for a given complex problem.

UNIT I OVERVIEW OF SOFTWARE ENGINEERING 9

Software Engineering Paradigms – Waterfall Life Cycle Model – Spiral Model – Prototype Model – Agile Process Model – Unified Process Model – Planning – Software Project Scheduling – SRS – Case Study: Project Plan and SRS – Object basics – Object state and properties – Behaviour – Methods – Messages – Information hiding – Class hierarchy – Relationships – Associations – Aggregations- Identity – Dynamic binding – Persistence – Meta classes

UNIT II METHODOLOGY AND UML 9

Object oriented system development life cycle. – Introduction – Survey – Rumbaugh, Booch, Jacobson methods – Unified modeling language – Static and Dynamic models – Rational Rose Suite – UML diagrams – Static diagram : Class diagram – Use case diagrams – Behaviour Diagram : Interaction diagram – State chart diagram – Activity diagram – Implementation diagram: Component diagram – Deployment diagram – example – Design of online railway reservation system using UML diagrams

UNIT III OBJECT ORIENTED ANALYSIS 9

Identifying Use case – Business object analysis – Use case driven object-oriented analysis – Use case model – Documentation – Classification – Identifying object, relationships, attributes, methods – Super sub class – A part of relationships Identifying attributes and methods – Object responsibility – construction of class diagram for generalization, aggregation – example – Design of online banking system using UML diagrams

UNIT IV OBJECT ORIENTED DESIGN 9

Design process and benchmarking – Axioms – Corollaries – Designing classes – Class visibility – Refining attributes – Methods and protocols – Object storage and object interoperability – Databases – Object relational systems – Designing interface objects – Macro and Micro level processes – The purpose of a view layer interface – Object Oriented User Interface

UNIT V PATTERN AND CASE STUDIES 9

MVC Architectural Pattern and Design – Designing the system – Creative Patterns and Frameworks Railway domain: Platform assignment system for the trains in a railway station- Academic domain: Student Marks Analyzing System – ATM system – Stock maintenance - Quiz

System- E-mail Client system – Cryptanalysis – Health Care Systems. Use Open source CASE Tools: StarUML/ UML Graph for the above case studies.

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 – Descriptive type questions	**Unit 1:** MCQs on software project planning **Unit 2:** Draw the UML diagrams for software project **Unit 3:** Problems analysis on business objects. **Unit 4:** Draw a project design using design class **Unit 5**: MCQs on Model View Controller process	**Descriptive type question**

Suggested Activities:

UNIT-1 Assignments to study about the various software project models

UNIT-2 Task to draw the UML diagrams.

UNIT-3 Assignments to generate the report for business object analysis.

UNIT-4 Demonstration of architecture design for the given project.

UNIT-5 Group discussion on MVC pattern

Outcomes

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

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

REFERENCE BOOKS

1. Ugrasen Suman, Object-oriented Analysis and Design using UML, Cengage India, 2019

WEB RESOURCES

2. https://nptel.ac.in/courses/106105153

CO Vs PO Mapping and CO Vs PSO Mapping

CO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PSO**	**PSO**

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**1**	**2**	**1**	**2**
1		2	3	3	2	3					2	3		2
2		2	3	3	2	3					2	3		3
3		2	3	3	2	3					2	3		2
4		2	3	3	2	3		2			2	3		2
5		2	3	3	3	3		2			3	3		2

21CA1105 WEB FRONT END ESSENTIALS L T P C

3 0 2 4

PREAMBLE:

This course is offered to MCA programme as a Theory cum Practical Courses. This course improving web development techniques skills for students. This course will also concentrate on client side and User Interface design techniques

PRE-REQUISITE:

- NIL

OBJECTIVES:

1. To recall the basic concepts of User Interface design HTML 5.
2. To develop web pages using HTML and CSS.
3. To build dynamic web pages with validation using JavaScript objects with event handling mechanisms.
4. To construct the web development techniques on client-side using AJAX, JSON and Bootstrap.
5. To develop the web application using jQuery techniques in dynamic Scripting.

UNIT I UI DESIGN - HTML5 9

Markup Language (HTML5): Basics of Html -Syntax and tags of Html- Introduction to HTML5 - Semantic/Structural Elements -HTML5 style Guide and Coding Convention– Html Svg and Canvas – Html API‟s - Audio & Video - Drag/Drop - Local Storage - Web socket API– Debugging and validating Html.

UNIT II UI DESIGN - CSS 9

Cascading Style Sheet (CSS3): The need for CSS – Basic syntax and structure Inline Styles – Embedding Style Sheets - Linking External Style Sheets - Introduction to CSS3 – Backgrounds - Manipulating text - Margins and Padding - Positioning using CSS - Responsive Web Design - Introduction to LESS/SASS- Bootstrap in CSS.

UNIT III OVERVIEWOFJAVASCRIPT 9

Introduction - Core features - Data types and Variables - Operators, Expressions, and Statements Functions - Objects - Array, Date and Math Related Objects - Document Object Model - Event Handling - Controlling Windows & Frames and Documents - Form validations.

UNIT IV ADVANCED FEATURESOFJAVASCRIPT 9

Browser Management and Media Management – Classes – Constructors – Object-Oriented Techniques in JavaScript – Object constructor and Prototyping - Sub classes and Super classes – Introduction to JSON – JSON Structure –Introduction to jQuery –Introduction to AJAX-Bootstrap - Bootstrap components.

UNIT V JQUERY BASIC 9

Basics –String, Numbers, Boolean, Objects, Arrays, Functions, Arguments, Scope, Built-in Functions, jQuery – Selectors - jQuery – CSS Element Selector and ID Selector - CSS Element Class Selector and Universal Selector – CSS Multiple Elements E, F, G Selector - Callback Functions.

TOTAL HOURS: 45 HRS

Lab Experiments: 30 Hours

S.No	List of Experiments	CO
1	Create your own Resume using HTML 5 Tags. Debug and validate your HTML document (Resume) using W3C validator and fix the issues	**CO1**
2	Create your own Resume and add Styles to your Resume using CSS 3 Properties. 1. Add External, Internal and Inline CSS styles to know the priority. 2. Add CSS3 Animation to your profile	**CO1,CO2**
3	Create a student Registration form for Job Application and validate the form fields using JavaScript.	**CO1,CO2,CO3**
4	Create a CGPA Calculator in Web Browser using HTML, CSS and JavaScript. Use functions in JavaScript..	**CO2,CO3**
5	Create a Quiz Program with adaptive questions using JavaScript	**CO3**
6	Create a Pan Card Validation form using Object Oriented JavaScript, consider the 10th character to be an alphabet. 1. Get the users First Name, Last Name and other required fields as input 2. Assume the last digit of the Pan Number to be an alphabet	**CO2,CO3**

	3. Validate the PAN Number	
7	Create an online Event Registration form and validate using JQuery b) Create an online video Player which will allow you to play videos from the system and also create a custom playlist using JQuery	**CO3,CO4**
8	Construct a JSON Structure for a bookstore and validate it using JSON Validator and parse the Json file to list the books under the category "Fiction".Use Javascript or JQuery for parsing.	**CO3,CO4**
9	Create a Single Page application allowing to search for a movie and displaying the trailer, poster for various movies. a. Create an admin login to upload the trailer, poster, keyword and détails of the movie.	**CO2,CO3,CO5**
10	Develop a Social Media Web Application using HTML5, CSS3, JQuery, AJAX**.**	**CO1,CO2,CO3**

S.No.	**List of Projects**	**Related Experiment**	**CO**
1.	Job Portal Web site	1 to 10	**CO1,CO2**
2.	Resume Builder Application	1,2,3	**CO1,CO2**
3.	Event Registration portal	1,2,3	**CO2,CO3**
4.	develop a App for E-Service	1 to 10	**CO2,CO3**
5.	Online Quiz	1 to 5	**CO3**
6.	E-Pancard verification Application	1,2,3,6,7,8	**CO3,CO4**
7.	Scientific Calculator Application	1,2,3,6,7,8	**CO3**
8.	Event Registration Application	1,2,3,5,6,7	**CO3,CO4**
9.	On line Book store	8,9,10	**CO4**
10.	E-Learn Portal	1 to 10	**CO3,CO4**
11.	Social Media Application	7,8,9,10	**CO3,**
12.	Movie Portal	8,9,10	**CO4**
13.	Bulk email & SMS service	1 to 10	**CO4**
14.	To develop an online system for electronic health records of the citizens of the country with previous medical history	1 to 10	**CO3,CO4**
15.	Graphical Password Authentication	1 to 7	**CO2,CO3**

Suggestive Assessment Methods

Continuous Assessment (20 Marks)	Formative Assessment Test (30Marks)	End Semester Exams (50Marks)
CAT 1 & CAT 2 – Descriptive type questions	**Unit 1:** MCQ's on Local Storage **Unit 2:** MCQ's on Basic syntax and structure **Unit 3:**Assignmentt Document Object Model **Unit 4:** MCQ's on Object-Oriented Techniques in JavaScript **Unit5:** Built-in Functions-jQuery **Lab: Assessment, Execution and viva, Demonstration of all programs and projects**	**Descriptive type question**

Outcomes

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

CO1	Summarize the concepts and architecture of the World Wide Web.
CO2	Develop a basic website using HTML and Cascading Style Sheets.
CO3	Write functions to embed dynamic scripting on client side Internet Programming
CO4	Design rich client presentation using Bootstrap
CO5	Develop jquery in dynamic web page.

Laboratory Requirements

Computers: 30 Systems

Software: Updated Browser, Notepad++

REFERENCE BOOKS

1. Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition, 2010
2. David Flanagan, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media, 2011
3. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013

WEB RESOURCES

1. **https://nptel.ac.in/courses/106105084**

CO Vs PO Mapping and CO Vs PSO Mapping

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

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Can u compare generation of Dynamic web page?

COURSE OUTCOME 2: Can you do upload the file using file transfer protocol?

COURSE OUTCOME 3: How to valid your form in JavaScript?

COURSE OUTCOME 4: How to apply oops techniques in JavaScript?

COURSE OUTCOME 5: What are the Built-in functions used JQUERY?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF WEEKS REQUIRED
1	Create your own Resume using HTML 5 Tags. Debug and validate your HTML document (Resume)	1
2	Create your own Resume and add Styles to your Resume using CSS 3 Properties. Add External, Internal and Inline CSS styles.	1
3	Create a student Registration form for Job Application and validate the form fields using JavaScript	1
4	Create a CGPA Calculator in Web Browser using HTML, CSS and JavaScript. Use functions in JavaScript.	1
5	Create a Quiz Program with adaptive questions using JavaScript	1
6	Create a Pan Card Validation form using Object Oriented JavaScript, consider the 10th character to be an alphabet. 1. Get the users First Name, Last Name and other required fields as input 2. Assume the last digit of the Pan Number to be an alphabet 3. Validate the PAN Number	1
7	Create an online Event Registration form and validate using JQuery b) Create an online video Player which will allow you to play videos from the system and also create a custom playlist using JQuery	1
8	Construct a JSON Structure for a bookstore and validate it using JSON Validator and parse the Json file to list the books under the category “poem”. Use Javascript or JQuery for parsing.	1

9	Create a Single Page application allowing to search for a movie and displaying the trailer, poster for various movies. a. Create an admin login to upload the trailer, poster, keyword and details of the movie.	1
10	Develop a Social Media Web Application using HTML5, CSS3, JQuery, AJAX.	1

21CA1111 DATA STRUCTURES LABORATORY

L	T	P	C
0	0	4	2

PREAMBLE:

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

Prerequisites for the course

- Programming in C Laboratory

Objectives

1. To experiment with the various skills of data structures and their applications.
2. To use linear, nonlinear and tree data structures.
3. To show the operations of linear data structures-List, Stack and Queue.
4. To experiment with the various sorting techniques using quick and merge sort.
5. To select the shortest path using Djikstra algorithm.

S. No	List of Experiments	CO
1	Array Implementation of Stack	**CO3**
2	Array Implementation of Queue	**CO3**
3	Linked List implementation of Stack	**CO3**
4	Linked list implementation of Queue	**CO3**
5	Infix to postfix conversion	**CO2**
6	Graph Traversals	**CO2**
7	Polynomial manipulation- addition, subtraction	**CO1**
8	Binary Tree Traversal	**CO1**
9	Quick Sort	**CO4**

10	Divide and conquer – Merge Sort	**CO4**
11	Shortest Path using Dijkstra‟s Algorithm	**CO5**
12	Minimum Spanning Tree using Prims Algorithm	**CO5**
13	Dictionary application using any of the data structure	**CO5**

S.No.	**List of Projects**	**Related Experiment**	**CO**
1.	Bank Management System	**1,2,3,4**	**CO3**
2.	Calendar Application	**1,2,3,4**	**CO3**
3.	Customer Billing System	**1,2,3,4**	**CO3**
4.	Cricket Score Sheet	**5,6**	**CO2**
5.	Hospital Management System	**5,6**	**CO2**
6.	Phonebook Application	**7,8**	**CO1**
7.	School Billing System	**7,8**	**CO1**
8.	Employee Record System	**7,8**	**CO1**
9.	Telecom Billing System	**7,8**	**CO1**
10.	Typing Tutor	**7,8**	**CO1**
11.	Library Management System	**9,10**	**CO4**
12.	Department Store Management System	**9,10**	**CO4**
13.	Student Record System	**11,12,13**	**CO5**
14.	Quiz Game	**11,12,13**	**CO5**
15.	Personal Dairy Management System	**11,12,13**	**CO5**

Suggestive Assessment Methods

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

Outcomes

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

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

Laboratory Requirements

Computers-30 no's

Software-Turbo C

Reference Books

R1. Anany Levitin "Introduction to the Design and Analysis of Algorithms" Pearson Education, 2015

R2. Harsh Bhasin, "Algorithms Design and Analysis", Oxford University Press 2015

R3. A.K. Sharma, "Data Structures using C", Pearson Education Asia, 2013.

R4. E. Horowitz, Anderson-Freed and S.Sahni, "Fundamentals of Data structures in C", University Press, 2007

R5. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education Asia, 2013

R6. E.Balagursamy," Data Structures using C", Tata McGraw Hill 2015 Reprint.

R7. Tanaenbaum A.S, Langram Y. Augestein M.J, " Data Structures using C", Pearson Education, 2004,

R8. Narasimha Karumanchi" Data Structure and algorithmic Thinking with Python Data Structure",2016, CareerMonk

R9. Hemanth Jain," Problem Solving in Data Structure and Algorithms using C",1st Edition,Taran Technologies Private Limited,2016

Web Recourses

1. https://nptel.ac.in/courses/106/106/106106231/
2. https://nptel.ac.in/courses/106/105/106105225/
3. https://nptel.ac.in/courses/106/106/106106145/
4. https://nptel.ac.in/courses/106/106/106106133/
5. https://nptel.ac.in/courses/106/106/106106127/

CO Vs PO Mapping and CO Vs PSO Mapping

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

COURSE LEVEL ASSESSMENT QUESTIONS

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

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

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

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

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

COURSE CONTENT AND LECTURE SCHEDULE

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

21CA1912	COMMUNICATION AND SOFT SKILLS LABORATORY	L	T	P	C
		0	0	2	2

Preamble

This course is offered to the MCA programme as an Employability Enhancement Course. This course emphasizes on improving Listening and Speaking skills in English Language. This course provides practice in general classroom conversation and academic speaking activities. This course supports the students to make effective presentations, participate in Group Discussions and face interviews with ase.

Prerequisites for the course

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

Objectives

1. To develop listening skills, and enhance the ability of comprehending.
2. To communicate confidently in varied real life situations.
3. To widen the basic reading skills of the first year Engineering and Technology students.
4. To master vocabulary, sentence structure and to write articles.
5. To master soft skills and interview etiquette.

Module I	**SHARING BASIC INFORMATION**	**12**

Listening - listening to short formal and informal conversations; Speaking- Formal Self-Introduction – Etiquette – Phrases to be used highlighting the characteristics, strengths and weaknesses - Conversation Practice; Language development - Framing Yes/No questions, Question tag.

Suggested Activities	Evaluation Method
i) Listening to Conversations from suggested app/prescribed modules - Submission of 5 Recorded Conversations. ii) Introducing oneself to the audience in a professional way - Video Recording to be submitted. iii) Reading 3 Passages on Technology and answering questions through Google forms. iv) Teaching of Grammar Contents	i) Listening & Speaking: Submitted Conversation will be assessed for a) Language style as that of the sample audio. b) Pronunciation c) Intonation ii) Introduction: Submitted Video Recording will be assessed for a) Communication Etiquettes b) Language Style c) Sentence Construction Activities iii and iv will be assessed through Google form tests/ written tests.

Module II	**SHARING TECHNICAL INFORMATION**	**12**

Listening - Listening to technical lectures by native speakers; Speaking - explaining the installation process of a software / hardware; Language development - framing 'Wh' Questions

Suggested Activities	Evaluation Method
i) Listening to Technical Lectures - Suggested YouTube channels a) Google Cloud b) Eduonix ii) Presentation on the installation procedure. iii) Presentation on assembling and dismantling of electrical / electronic / mechanical gadgets iv) Teaching of Grammar Contents	i) Listening skills will be tested through a) MCQs ii)Speaking: Submitted Video Recording/Presentation during class hours will be assessed for a) Language Style & Fluency b) Creation of Google Slides / Canva Slides c) Content delivery Activities iv will be assessed through Google form tests/ written tests.

Module III	**UNDERSTANDING TECHNOLOGY**	**12**

Listening - listening to technical talks on emerging trends and filling in the blanks – cloze test; Speaking - asking for opinions about technical gadgets – presentation of reviews on software products / adaptation of emerging software in Industry: Writing - email etiquette - drafting emails with a professional touch; Language development - Direct Speech and Indirect Speech – Framing Indirect Questions - Prepositions – Articles

Suggested Activities	Evaluation Method
i) Listening to Technical talks on emerging trends - Suggested YouTube channels a) Bernard Marr b) Concerning Reality c) Ideas and Inspiration ii) Speaking / submitting video recording / classroom presentation on giving reviews about software. iii) Reading articles -Extracts from reputed journals/ online sources iv) Teaching of Grammar Contents	i) Listening skills will be tested through a) Cloze Test - 2 Sets ii)Speaking: Submitted Video Recording/classroom presentation will be assessed for a) Inquisitiveness b) Analytical skills c) Presentation Skills iii) Email : Sending a professional email - seeking permission or approval.

Module IV	**INTERVIEW SKILLS**	**12**

Listening- listening to interview skills - UPSC interviews - TED talks; Speaking -Presentation Skills - Answering Interview Questions - Interview Skills- Personal Interview - answering questions focussing on pronunciation of words and sentence structure; Language development- Tenses, Phrasal Verbs.

Suggested Activities	Evaluation Method
i) Speaking / submitting video recording / classroom presentation on Technical issues faced in a gadget and expressing suitable solutions. ii) Attending mock interview iii) Teaching of Grammar Contents	i) Speaking: • Clarity of expression • Language skills • Vocabulary usage Activities iii will be assessed through Google form tests/ written tests/ written exercises.

Module V	**SOFT SKILLS AND PROFESSIONAL GROOMING**	**12**

Listening - Listening to types of Personality; Speaking - Group Discussion - Sentence Starters - Strategies to be followed - Agreeing - Disagreeing - Adding a point - Interruption - Conclusion; Reading - Decision Making – Social Behaviour – Emotion – Language and Consciousness; Writing - Job Application - Resume; Language development - modal verbs, Fixed and Semi-Fixed Expressions.

Suggested Activities	Evaluation Method
i) Watching videos on types of Personality. ii) Group Discussion iii) Resume Building iv) Teaching of Grammar Contents	i) Listening skills will be tested through - mcq ii)Participating in GD • Use of strategies • Delivery of content • Body language iv) Activities iii to v will be assessed through Google form tests/ written tests/ written exercises

S. No	**List of Experiments**	**CO**
1.	Conversation Recording using the suggested app	CO 1
2.	Self Introduction Video	CO 1
3.	Installation of a software procedure.	CO 2
4.	Drafting an email seeking permission or approval	CO 2
5.	Listening - Cloze Test	CO 3
6.	Reviewing a Product - Video Submission	CO 3
7.	Personal Interview	CO 4
8.	Paper Presentation	CO 4
9.	Job Application & Resume	CO 5
10.	Group Discussion	CO 5
	Total Periods	**60 Lab**

Laboratory Requirements for a batch of 30 Students

Software: Glob arena

1. Teacher console and 30 systems for students.

2. English Language Lab Software

3. Career Lab Software

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) Written Tests

Lab Components Assessments (50 Marks)	**End Semester Exams (50 Marks)**
Completion of Suggested Lab Exercises	EXTERNAL: 50 MARKS Online Exam – 20 Marks. Group Discussion – 20 Marks. Personal Interview Questions - 10 marks

Outcomes

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

CO 1	Share basic information using communication etiquettes on par with international communication standards.
CO 2	Express fundamental technical concepts in English language giving importance to syntax.
CO 3	Comprehend advanced varied technical concepts in the current scenario and emerging trends and invent new concepts.
CO 4	State solutions for problems identified using the exact vocabulary and structure without grammatical errors as expected by the corporate world.
CO 5	Contribute their ideas during Group Discussions following the etiquettes in a way accepted by the interviewers.

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

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO3
1				1		1		1		3	1	2			
2						1		1	1	3	1	2			
3							2	1		3	2	2			
4							1	3	1	3	2	2			
5							1	3	1	3	1	2			

21CA1M01 PHP PROGRAMMING

L	T	P	C
0	0	2	1

PREAMBLE:

This course is offered in 1st semester of MCA programme in the department of Computer Applications as a professional core subject. This course offers a server side programming language. In this course it reveals the versatile need and usage of web page creation.

Prerequisites for the course

- Problem solving and Programming in c

Objectives

1. To create a server-side programming works on the web.
2. To identify PHP Basic syntax for variable types for complex problems
3. To demonstrate the storing of data in arrays.
4. To Compare PHP built-in functions and custom functions.

5. To examine POST and GET in form submission.

S.No	List of Experiments	CO
1	Introduction to PHP programming, XAMPP Tool and Dreamweaver Editor. Write a Simple hello Program in PHP by Installing & Configuring XAMPP with Dreamweaver	**CO1**
2	Write a Program in PHP for type Casting of a Variables, Study of Control Structure & Loops in PHP	**CO1,CO2**
3	Write a Program in PHP to Display Multiplication Table Using Nested ForLoop	**CO1,CO2,CO3**
4	Study of Array and Function In PHP. Write a program In PHP to Sort an array using function	**CO2,CO3**
5	Study of Form handling In PHP: Design a personal Information form , then Submit & Retrieve the Form Data. Using $_GET(), $_POST() and $_REQUEST() Variables	**CO3**
6	Study of Server Side Validation and Page Redirection In PHP.Design A Login Form and Validate that Form using PHP Programming	**CO2,CO3**
7	Study of Cookies And Sessions In PHP.Create Admin Login,Logout form using session variables.	**CO3,CO4**
8	Study of MYSQL DDL, DML, DCL Commands. Installation of MYSQL 5.5 on windows and write a PHP Code to make database connection, Create Data Base, Create Table in Mysql	**CO3,CO4**
9	Study of MYSQL Data Base Operation. Write a PHP code Insert, Delete, Update, Select the Data From Data Base	**CO2,CO3,CO5**
10	Mini Project in PHP	**CO1,CO2,CO3**
		Total Hours:30

S.No.	List of Projects	Related Experiment	CO
1.	Network Monitoring System Project	1 to 10	**CO1,CO2**
2.	Crime Reporting System	1,2,3	**CO1,CO2**
3.	Clinic Management System	1,2,3	**CO2,CO3**
4.	Online Chat System	1 to 10	**CO2,CO3**

5.	Attendance Management System	1 to 5	**CO3**
6.	Online examination system	1,2,3,6,7,8	**CO3,CO4**
7.	Online Music Library	1,2,3,6,7,8	**CO3**
8.	Recruitment Management System	1,2,3,5,6,7	**CO3,CO4**
9.	Student Information System	8,9,10	**CO4**
10.	Book shop management system	1 to 10	**CO3,CO4**
11.	University management system	7,8,9,10	**CO3,**
12.	Rental Car management system	8,9,10	**CO4**
13.	Project management system	1 to 10	**CO4**
14.	Hostel reservation system	1 to 10	**CO3,CO4**
15.	Stock investing Management system	1 to 7	**CO2,CO3**

Suggestive Assessment Methods

Formative Assessment Test (60 Marks)	**End Semester Exams - Internal (40 Marks)**
Unit 1: MCQ's on server side programming **Unit 2:** Write functions for a given complex problems **Unit 3:** Implementation of PHP arrays **Unit 4:** MCQ's on functions in PHP **Unit5:** Building solutions for a complex problem using PHP **Demonstration of project**	**Lab Components – End semester, Project with Viva** **(40 Marks)**

Suggested Activities

1) Demonstration of server-side scripting using for loops.
2) Assignments on functions with a scenario
3) Comparative study of PHP arrays
4) Demonstration of Functions
5) Industrial visit to Osiz, Madurai

Outcomes

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

CO1 Write functions for server side programming.

CO2 Build a solution for complex problem

CO3 Solve storing of data in arrays.

CO4 Construct PHP built-in functions and custom functions.

CO5 Develop a PHP application

Laboratory Requirements

Software: XAMPP/ WAMP

Reference Books

R1. Bruce Berke, "Learn PHP: The Complete Beginner's Guide To Learn PHP Programming (PHP Guide)" Copyright 2017."

R2. Lynn Beighley and Michael Morrison, "Head First PHP & MySQL: A Brain-Friendly Guide" O Reilly First Edition, 2018

R3. Robin Nixon,"Learning PHP, MySQL & JavaScript",5th edition,O'Reilly

R4. Larry Ullman, PHP for the Web,5th edition,Peachpit Press

R5. Luke Welling ,"PHP and MySQL Web Development",5th edition,Addison-Wesley

R6. Alan Forbes ,"The Joy of PHP",6th edition,BeakCheck LLC

Web Recourses

1. https://www.w3schools.com/php/
2. https://www.php.net/

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

CO Vs PO Mapping and CO Vs PSO Mapping

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Can u compare generation of Dynamic web page?

COURSE OUTCOME 2: Can you do upload the file using file transfer protocol?

COURSE OUTCOME 3: How to valid your form in GET and POST?

COURSE OUTCOME 4: How to Use PHP Built Functions in Customization forms?

COURSE OUTCOME 5: Could You Compare DML and DCL in MySQL?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF WEEKS REQUIRED
1	Introduction to PHP programming, XAMPP Tool and Dreamweaver Editor. Write a Simple hello Program in PHP by Installing & Configuring XAMPP with Dreamweaver	1
2	Write a Program in PHP for type Casting of a Variables, Study of	1

	Control Structure & Loops in PHP	
3	Write a Program in PHP to Display Multiplication Table Using Nested For Loop	1
4	Study of Array and Function In PHP. Write a program In PHP to Sort an array using function	1
5	Study of Form handling In PHP: Design a personal Information form, then Submit & Retrieve the Form Data. Using $_GET(), $_POST() and $_REQUEST() Variables	1
6	Study of Server Side Validation and Page Redirection In PHP. Design A Login Form and Validate that Form using PHP Programming	1
7	Study of Cookies And Sessions In PHP. Create Admin Login ,Logout form using session variables.	1
8	Study of MYSQL DDL, DML, DCL Commands. Installation of MYSQL 5.5 on windows and write a PHP Code to make database connection, Create Data Base, Create Table in Mysql	1
9	Study of MYSQL Data Base Operation. Write a PHP code Insert, Delete, Update, Select the Data From Data Base	1
10	Mini Project in PHP	1

SECOND SEMESTER

21CA2101	**PROGRAMMING WITH JAVA**	**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 core subject. This course offers programming knowledge of Java language. In this course it reveals the versatile need and usage of dynamic web page.

PRE-REQUISITE:

- Object Oriented Programming

OBJECTIVES:

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

UNIT I JAVA FUNDAMENTALS 9

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

UNIT II COLLECTIONS AND ADVANCE FEATURES 9

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

UNIT III ADVANCED JAVAPROGRAMMING 9

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

UNIT IV OVERVIEW OF DATA RETRIEVAL & ENTERPRISE APPLICATION DEVELOPMENT 9

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

UNIT V JAVA INTERNALS AND NETWORKING 9

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

Datagrams.

TOTAL HOURS: 45

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

Suggested Activities:

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

Outcomes

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

CO1 Study about the fundamental concepts in Core Java.

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

CO3 Build a program for database applications using Servlets.

CO4 Illustrate attractive web applications using JSP/Servlets.

CO5 Apply the networking concepts in Java.

REFERENCE BOOKS

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

4. E Balagurusamy," Programming with Java", McGraw-Hill Education, 2019.

WEB RESOURCES

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

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA2102 PYTHON PROGRAMMING L T P C

3 1 0 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 Data Scientist. The course taught Data Structures in Python Programming. Database connectivity and Multi-Threading

PRE-REQUISITE:

- Problem solving and Programming in C

OBJECTIVES:

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

UNIT I BASIC PROGRAMMING CONSTRUCTS 9+3

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

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

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters - Tuples: tuple assignment, tuple as return value - Dictionaries: operations and methods - Files and exec Files and exception - Text files, reading and writing files, format operator - command line arguments, errors and exceptions - Python Exception Handling - Avoiding code break using exception handling - Safe guarding file operation using exception handling

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

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

UNIT IV DATABASE CONNECTIVITY AND NETWORK FUNDAMENTALS 9+3

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

UNIT V CASE STUDIES 9+3

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

TOTAL HOURS: 45+15

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
1) CAT1 – Descriptive 2) CAT2 – Descriptive	**Unit–1** Online Quiz in Talently. **Unit-2** MCQ's on data types **Unit-3** Programming contest in Indiabix **Unit – 4** Mini Projects **Unit – 5** Case studies in Python Programming	1) Written Test

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 Hindustan HR, 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. Taneja Sheetal, 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. Vaibhav Gondaliya, "Programming With Python, Class & Objects, Inheritance, Data File Handling", 2019.
4. Albert Lukaszewski PhD MySQL for Python: Database Access Made Easy Paperback ,December 2010

WEB RESOURCES

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

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA2103	**ADVANCED DATABASES AND DATA MINING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PREAMBLE:

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

PRE-REQUISITE:

- Database Management Systems

OBJECTIVES:

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

UNIT I **RELATIONAL MODEL** **9**

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

UNIT II **DATA MINING & DATA PREPROCESSING** **9**

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

UNIT III **ASSOCIATION RULE MINING** **9**

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

UNIT IV **CLASSIFICATION & PREDICTION** **9**

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

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

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

TOTAL HOURS: 45

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Unit 1:** In what condition a relational schema is in 3NF? **Unit 2:** Illustrate the exploration stage in Data Mining. **Unit 3:** Illustrate the mining item set with or without generation. **Unit 4:** Explain the classification of back propagation algorithm. **Unit 5:** Describe the applications of clustering methods.	**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	PO9	PO 10	PO1 1	PO12	PSO1	PSO2
1	2	2	1	3	1	1		1				1	1	
2	2	2	1	3	1	1		1				1	1	
3	2	2	1	3	1	1		1				1	1	
4	2	2	1	3	1	1		1				1	1	
5	2	2	1	3	1	1		1				1	1	

21CA2105 FUNDAMENTALS OF ACCOUNTING L T P C

3 1 0 4

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

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+3

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

UNITII FINAL ACCOUNTS 9+3

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

UNIT III **FINANCIAL STATEMENT ANALYSIS** **9+3**

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

UNIT IV **MANAGEMENT AND COSTACCOUNTING** **9+3**

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

UNIT V **BUDGETARY CONTROL** **9+3**

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

Total Hrs.: 45+15

Suggestive Assessment Methods

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

Suggested Activities

Unit 1 - Study about the basic principles of accounts.

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

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

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

Unit 5 –Develop different types of budgets.

Outcomes

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

CO1 Understand the basic concepts of Accounting standards.

CO2 Prepare the final accounts of a business entity.

CO3 Make critical analysis of Financial Statements.

CO4 Understand the utility of Management and Cost accounting.

CO5 Prepare the different types of budgets.

REFERENCE BOOKS

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

WEB RESOURCES

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

CO Vs PO Mapping and CO Vs. PSO Mapping

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

21CA2104 WEB APPLICATION DEVELOPMENT FRAMEWORKS L T P C

3 0 2 4

PREAMBLE:

To automate the overhead associated with common activities performed in web development.

PRE-REQUISITE:

- NIL

OBJECTIVES:

1. To understand the architecture of J2EE
2. To describe recent platforms in developing Web services
3. To implement an interactive web application
4. To understand IDE
5. To experiment better Web apps more quickly and with less code

UNIT I J2EE PLATFORM 9

Introduction -Enterprise Architecture Styles -J2EE Architecture - Containers - J2EE Technologies -Developing J2EE Applications - Naming and directory services - Using JNDI - JNDI Service providers - Java and LDAP - LDAP operations - Searching an LDAP server - Storing and retrieving java objects in LDAP - Application Servers - Implementing the J2EE Specifications - J2EE packaging and Deployment - J2EE packaging overview - Configuring J2EE packages

UNIT II SPRING WEB SERVICES 9

Web Services - Consuming a RESTFulWeb Service Java desktop application /JSP. Building REST Service with spring– Accessing relational data using JDBC with spring- Uploading Files using spring application- Validating form input - Handling form submission -Creation of Batch Service -Securing web application -Integrating Data – Accessing with SQL- Creating asynchronous method – Using web socket build an interactive web application

UNIT III ANGULAR 9

Creating and preparing Angular project – adding bootstrap CSS Package – Development tools – Html Page – Adding Angular features – Creation of data model – Template – Component – Two way binding – Adding to do items

UNIT IV STRUTS AND HIBERNATE 9

Introduction to Struts – MVC framework- Struts Architecture – Business Service – Parameter Passing – Action class & configuration files – Struts.xml Tags – Namespace & Wildcards HIBERNATE ORM-Persistence-Relational Database-The object relational impedance mismatch -Using Native Hibernate API‟s and hbm.xml-Using the java persistence API‟s- Hibernate Validator – HIBERNATE OGM – configuration of tools -HIBERNATE SEARCH - Enabling full text search capabilities in entities -Indexing-Searching -Introduction to Full text search.

UNIT V DJANGO 9

Introduction to Django- Django model layer – View layer – Template Layer – Forms – Automated admin interface – Django Security – Internationalization and localization – Django Web application tools

TOTAL 45 HRS

S.No	List of Experiments	CO
1	A car showroom inventory web application with 2-tier architecture. Use JSP and JDBC.	**CO1**
2	A real estate web application with n-tier architecture. Use JSP, Servlets and JDBC. The application should be able to add and search all properties such as rental/own, individual/ apartment and duplex/semi-duplex.	**CO1,CO2**
3	Simple Spring MVC application to implement Form validation	**CO1,CO2,CO3**
4	Database application using Spring JDBC with CUR functionality.	**CO2,CO3**
5	Online bookstore using Spring MVC.	**CO3**
6	Customer HTML UI – Directives and Interpolation in Angular	**CO2,CO3**
7	Develop a web application for with database connectivity using Struts framework	**CO3,CO4**
8	DIY: Hello World project	**CO3,CO4**

9	Develop the following using Struts/Spring/Angular/Django a. Network Packet Sniffer b. RSS Feed Reader	**CO2,CO3,CO5**
10	Develop the following using Struts/Spring/Angular/Django a) Supply chain management system	**CO1,CO2,CO3**

S.No.	**List of Projects**	**Related Experiment**	**CO**
1	Sound node	1 to 10	**CO1,CO2**
2	Notepad application	1,2,3	**CO1,CO2**
3	Angular Hello World project	1,2,3	**CO2,CO3**
4	Angular Bare Bones project	1 to 10	**CO2,CO3**
5	Data binding in forms	1 to 5	**CO3**
6	Angular projects on local storage	1,2,3,6,7,8	**CO3,CO4**
7	Customer service manager	1,2,3,6,7,8	**CO3**
8	Admin Panel Framework	1,2,3,5,6,7	**CO3,CO4**
9	Angular in Patterns	8,9,10	**CO4**
10	Standard chat application	1 to 10	**CO3,CO4**
11	Electronic musical instrument	7,8,9,10	**CO3,**
12	Angular 2 chess game	8,9,10	**CO4**
13	URL shortener	1 to 10	**CO4**
14	Interactive tables and grids in Angular	1 to 10	**CO3,CO4**
15	Angular Maps (AGM)	1 to 7	**CO2,CO3**

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	**Formative Assessment Test (30Marks)**	**End Semester Exams (50Marks)**
CAT 1 & CAT 2 – Descriptive type questions	**Unit 1:** MCQs on J2EE Platforms **Unit 2:** Quiz on Spring Web Service **Unit 3:** Problems on Angular **Unit 4:** Write functions to Struts and Hibernate. **Unit 5:** MCQs on Django.	**Descriptive type question**

Suggested Activities:

Unit 1: Learn the J2EE Platforms and process of the Architecture.

Unit 2: Assignment 1- Build the new web page using spring web services.

Unit 3: Assignment 2 - Added Angular features and development the web page.

Unit 4: Backend process and validation function using struts and hibernate.

Unit 5: Secure the web page using the Django.

Outcomes

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

CO1 Define the web applications using J2EE
CO2 Perform the Spring Web Services.
CO3 Illustrate Angular components in web applications
CO4 Demonstrate the components in Struts and Hibernate Framework.
CO5 Demonstrate various IDEs.

Laboratory Requirements

Computer – 30 Systems
Software Front End : Eclipse, Spring boot, Angular, Python, Hibernate 6.1.4

REFERENCE BOOKS

1. A.A. Puntambekar, "Web Application Development", Technical Publication, 2022.
2. Aidas Bendoraitis, "Django 3 Web Development Cookbook", Fourth Edition, 2020.

WEB RESOURCES

1. https://youtube.com/playlist?list=PLC3y8-rFHvwhBRAgFinJR8KHIrCdTkZcZ
2. https://youtube.com/playlist?list=PL52YGOP636JOwC2MgRvxqxU0H1QIX1Wix

CO Vs PO Mapping and CO Vs PSO Mapping

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

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Can you compare generation of Java Server Page?

COURSE OUTCOME 2: Can you do access the data using JDBC connectivity?

COURSE OUTCOME 3: How to using the interpolation concept works in Angular?

COURSE OUTCOME 4: How to apply the spring maven dependencies?

COURSE OUTCOME 5: How to communicate the data with secure process in Django?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF WEEKS REQUIRED

1	To develop a car showroom inventory web application with 2-tier architecture. Use JSP and JDBC.	1
2	Develop a real estate web application with n-tier architecture. Use JSP, Servlets and JDBC. The application should be able to add and search all properties such as rental/own, individual/ apartment and duplex/semi-duplex.	1
3	Develop Simple Spring MVC application to implement Form validation.	1
4	Develop a Database application using Spring JDBC with CURD functionality.	1
5	Online bookstore using Spring MVC.	1
6	Create a Customer HTML UI – using Directives and Interpolation in Angular.	1
7	Develop a web application for with database connectivity using Struts framework	1
8	Create a new DIY: Hello World project.	1
9	Develop the following using Struts/Spring/Angular/Django a. Network Packet Sniffer b. RSS Feed Reader	1
10	Develop the following using Struts/Spring/Angular/Django Supply chain management system	1

21CA2111 PROGRAMMING WITH JAVA LABORATORY

L	T	P	C
0	0	4	2

Preamble:

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

Prerequisites for the course

- Object Oriented Programming Laboratory

Objectives

1. To apply the basic programming constructs in java.
2. To develop window-based GUI applications using applets.
3. To experiment with applications using collection classes.
4. To practice server-side programming for Web Applications.

5. To write a program using advanced features like RMI, Swing, JavaBeans and Sockets.

S.No	List of Experiments	CO
1	Writing Java programs by making use of class, interface, package, etc for the following a. Different types of inheritance study b. Uses of "this" keyword c. Polymorphism d. Creation of user specific packages e. Creation of jar files and using them f. User specific exception handling	**CO1**
2	Writing window-based GUI applications using frames and applets such as Calculator application, Fahrenheit to Centigrade conversion etc.	**CO1**
3	Application of threads examples.	**CO2**
4	Create a Personal Information System using Swing	**CO2**
5	Reading and writing text files.	**CO3**
6	Writing an RMI application to access a remote method.	**CO3**
7	Writing a Servlet program with database connectivity for a web-based application such as students result status checking.	**CO4**
8	Creation and usage of Java bean.	**CO4**
9	Create an Application to search Phone Number using contact Name Using Hash Map.	**CO5**
10	Create an Application which displays in E-mail contacts using Set Interface.	**CO5**
11	FTP Using Sockets.	**CO5**
		Total Hours:60

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

6	Temperature Converter.	**2**	**CO1**
7	Exam Seating Arrangement System.	**1,2,3**	**CO2, CO3**
8	Supermarket Billing Software.	**2,4,7**	**CO2, CO3**
9	Online Hotel Reservations	**2,4,7**	**CO1,CO2,CO4**
10	School Management Software	**2,4,7**	**CO1,CO2,CO4**
11	Data Visualization Software	**9,10**	**CO5**
12	Email Client Software.	**6,11**	**CO3,CO5**
13	Web Medical Management System.	**2,4,7**	**CO1,CO2,CO4**
14	Supply Chain Management System.	**5,6,11**	**CO3,CO4,C05**
15	Network Packet Sniffer.	**6,11**	**CO4,CO4**

Suggestive Assessment Methods

Continuous Assessment Test (50 Marks)	**End Semester Exams (50-Marks)**
Lab Components Assessments (50 Marks)	**Lab Components – End semester (50 Marks)**

Suggested Activities

1. Write a program to perform a basic Java features.
2. Develop 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.

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

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

Laboratory Requirements

Computers-30 nos

Front-end- Java Development Kit
Backend- Mysql

Server-Apache Tomcat IDE- Netbeans/Eclipse

REFERENCE BOOKS

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

WEB RESOURCES

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

CO Vs PO Mapping and CO Vs PSO Mapping

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

COURSE LEVEL ASSESSMENT QUESTIONS

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

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

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

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

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

COURSE CONTENT AND LECTURE SCHEDULE

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

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

21CA2912 TECHNICAL SEMINAR AND REPORT WRITING

L	T	P	C
0	0	2	1

PREAMBLE:

This course is offered to MCA programme to expose their report writing. This course is to give the knowledge for students to improve their paper writing and content writing. This course is very useful for Journal publications. This course is to improve the student's content making skill.

PRE-REQUISITE:

- NIL

OBJECTIVES:

1. To identify the research area with a well-defined set of research subjects.
2. To classify the findings concisely in a paper of scientific quality.
3. To relate the current issues in the domain.
4. To establish a comparative study with file reference papers.
5. To discover the new finding in a Technical Forum

Procedures:

1. Every student selects a topic related to current trends and the same should be approved by the respective committee. This selection should have at least 5 distinct primary sources.

2. Every student must write a short review of the topic and present it to fellow students and faculty (discuss the topic – expose the flaws – analyze the issues) every week.
3. The paper will be evaluated based on the ability to understand a topic, communicate it and identify the issues.
4. Results from this term paper will be presented to fellow students and a committee of faculty members.
5. The faculty should evaluate the short review and award marks with respect to the following.

a. Has the student analyzed – not merely quoted – the most significant portions of the primary sources employed?

b. Has the student offered original and convincing insights?

c. Plagiarism to be checked.

6. Every student should re-submit and present the review article including issues/ comments/ Conclusions which had arisen during the previous discussion.
7. Every student should submit a final paper as per project specifications along with all short Review reports (at least 4 internal reviews) and corresponding evaluation comments.
8. Every student should appear for a final external review exam to defend themselves.

Total Hrs: 30

Suggestive Assessment Methods	
Formative Assessment Test **(50 Marks)**	**End Semester Internal** **(50 Marks)**
1. Identify the IEEE Scopus paper similar to their paper. **2. Explain the title of the project.** **3. Design a use case diagram for your paper.**	**Final paper submission**
Laboratory Requirements Computer – 30 Systems Internet facility	
Suggested Activities **Task 1:** To select the title of the paper in SIH titles. **Task 2:** Explain the abstract of your title of the paper. **Task 3**: Illustrate the introduction of the paper. **Task 4:** Identify the reference paper similar to your paper title. **Task 5:** Draw Use case diagram and ER-diagram.	
Outcomes	

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

CO1 Define the current research trends.

CO2 Summarize the issues in the domain selected.

CO3 Present the findings with scientific quality

CO4 Survey the different reference papers.

CO5 Survey the current ideas.

WEB RESOURCES:

1. https://ieeexplore.ieee.org/Xplore/home.jsp
2. https://dl.acm.org

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA2913 DOTNET PROGRAMMING LABORATORY L T P C

0 0 2 1

Preamble

This course is offered to MCA programme as a Practical Courses. This Course provides.net framework designing and developing applications skill. This course will also concentrate on Programming concepts in .Net Framework

Prerequisites for the course **Total Hours: 30**

- Web Front End Essentials

Objectives

1. To observe MS.NET framework developed by Microsoft.
2. To experiment with XML in C#.NET specifically ADO.NET and SQL server.
3. To make use of C# basics, Objects and Types, Inheritance in DOT NET Programming.
4. To develop applications with C#.
5. To experiment with various Component Services, Threading, Remoting , Windows services, web.

S.No	List of Experiments	CO
1	Online shopping a) HTML Controls b) Web Controls c) ADO.NET d) AJAX e) Master Pages	CO1
2	Job portal Website (Eg. Naukri.com) a) CSS3 b) SQL Queries c) Data List Controls d) SQL Data Adapter e) Data Set	CO1,CO2
3	Online video player using html5 and bootstrap (Ex: YouTube) a) HTML5 b) UI Design c) Player Controls d) Player Integration e) Embedding Video	CO1,CO2,CO3
4	Creation of a weather control web service a) IIS b) Creating Website c) Enabling web service d) Dynamic Data e) Prediction	CO1,CO2,CO3
5	Mobile based food ordering system using bootstrap a) Bootstrap b) Navigation bar c) Grid Controls d) Dynamic Location e) Data Process	CO3

S.No.	List of Projects	Related Experiment	CO
1.	E-Gift Shoppy	1,2,3	CO1,CO2,CO3
2.	Examination Branch System.	1	CO1,CO2,CO3

3.	Fleet Manager System	1 to 5	CO1,CO2,CO3, CO4
4.	Instant Interact system	1 ,2	CO1,CO2,CO3, Co4
5.	Web based Mail Service	3,4	CO1,CO2,CO3, CO4
6.	Agriculture Assist portal	4,5	CO1,CO2,CO3, CO4
7.	Donate Village system	1,2	CO1,CO2,CO3, CO4
8.	Ware House Executor	2,3	CO1,CO2,CO3, CO4
9.	World Recipe Management	3,4	CO1,CO2,CO3
10.	Hospital management System	5	CO2,CO3,CO4, CO5
11.	Mobile payment system	2,3,4	CO3,CO4, CO5
12.	Client Query Track	1 to 3	CO2,CO3,CO4, CO5
13.	Client Server System	3,4	CO3,CO4, CO5
14.	Movie World portal	1,2,3	CO3,CO4, CO5
15.	Task Manager	3,4	CO2,CO3, CO4.CO5
16.	Write a program to accept a number from the user and throw an exception if the number is not an even number.	1	CO1
17.	Program to display the addition, subtraction, multiplication and division of two number using console application.	1,2	CO1,CO2
18.	Write a program to simple calculator using windows application.	1 to3	CO1,CO2,CO3
19.	Define a class salary" which will contain member variable Basic, TA, DA, HRA. i. Write a program using Constructor with default values for DA and HRA and calculate the salary of employee.	2,3	CO2,CO3
20.	Write a program to implement single inheritance from following figure. Accept and display data for one table. vii. Class Furniture 1. Data Members : material ,price viii. Class Table	3	CO3

	2. Data Members : Height ,surface area		

Suggestive Assessment Methods

Formative Assessment Test (50 Marks)	**Continuous Assessment Test (50 Marks)**
Assessment, Execution and viva	**Practical exam**

Outcomes

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

CO1 Define various tools in Dot net.

CO2 Demonstrate the Wizards in the Dot net framework

CO3 Illustrate the functionalities of Dot net framework

CO4 Perform the various components in the framework

CO5 Demonstrate an application of their own

Laboratory Requirements

Computer – 30 Nos.

Software – Microsoft Visual Studio 2010

Reference Books

R1. Mark J. Price "C# 9 and .NET 5 - Modern Cross-Platform Development - Fifth Edition: Build Intelligent Apps, Websites, and Services with Blazor, ASP.NET Core, and Entity Framework Core Using Visual Studio Code", Packt Publication, 2020

R2. Christian Nagel "Professional C# and .NET" ,Wrox Publications, 2021

R3. Andrew Troelsen and Philip Japikse" C# 6.0 and the .NET 4.6 Framework" Apress Publications, 2017

R4. Adam Freeman "Pro ASP.NET Core Identity", Apress Publications, 2021

R5. Ian Griffiths" Programming C# 8.0: Build Cloud, Web, and Desktop Applications",Oreilly Publications, 2019

R6. Andreas Helland, Jeffrey Chilberto, and Vincent Maverick Durano "ASP.NET Core 5 for Beginners: Kick-start Your ASP.NET Web Development Journey with the Help of Step-by-step Tutorials and Examples", 2020

Web Recourses

1. https://stackify.com/learn-asp-net-tutorials/
2. https://dotnet.microsoft.com/en-us/learn
3. https://dotnettutorials.net/
4. https://www.guru99.com/asp-net-tutorial.htm

CO Vs PO Mapping and CO Vs PSO Mapping

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

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1 : Can u verify and Validate Master Page??

COURSE OUTCOME 2 : How to get weather access from third party site??

COURSE OUTCOME 3 : Can you differ web app and web service?

COURSE OUTCOME 4 : Can you embedding external applications in Dot Net Framework?

COURSE OUTCOME 5 : Really dot net framework essential for web applications?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF WEEKS REQUIRED
1	Online shopping a) HTML Controls b) Web Controls c) ADO.NET d) AJAX e) Master Pages	1
2	Job portal Website (Eg. Naukri.com) a) CSS3 b) SQL Queries c) Data List Controls d) SQL Data Adapter e) Data Set.	1
3	Online video player using html5 and bootstrap (Ex: Youtube) a) HTML5 b) UI Design c) Player Controls	1

	d) Player Integration e) Embedding Video	
4	Creation of a weather control web service a) IIS b) Creating Website c) Enabling web service d) Dynamic Data e) Prediction	1
5	Mobile based food ordering system using bootstrap a) Bootstrap b) Navigation bar c) Grid Controls d) Dynamic Location e) Data Process	1

21CA2M01	**APTITUDE SKILL DEVELOPMENT**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**0**

Preamble:

This course offered in the second semester as a mandatory course. This course imparts the knowledge about the aptitude and skill development.

Prerequisites for the course

- Basic Mathematics

Objectives

1. To make sense of problems, develop strategies to find solutions, and persevere in solving them.
2. To identify reason, model, and draw conclusions or make decisions with mathematical, statistical, and quantitative information.
3. To critique and evaluate quantitative arguments that utilizes mathematical, statistical, and quantitative information.
4. To use appropriate technology in a given context.

UNIT I	**MODULE I**	**15**

Square roots and cube roots, Percentage, Profit, loss and discount, Average, Ratio and Proportion, simple interest, Compound interest, Growth and depreciation

UNIT II	**MODULE II**	**15**

Time and distance, Trains, Boats and Streams, Races. Clocks, Calendar, Area of plane figures, Volume and surface area of solid figures.

UNIT III	**MODULE III**	**15**

Quadratic equations, Progression. Permutation and combination, Probability, Data interpretation, Data sufficiency	
Total Periods	**45**

Suggestive Assessment Methods	
Continuous Assessment Test (40 Marks)	**Formative Assessment Test (60 Marks)**
1. DESCRIPTIVE QUESTIONS **2. FORMATIVE MULTIPLE CHOICE QUESTIONS**	**1.ASSIGNMENT** **2. ONLINE QUIZZES** **3. PROBLEM-SOLVING ACTIVITIES**

Outcomes

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

CO1: Solve real-life problems requiring interpretation and comparison of complex numeric summaries which extend beyond simple measures of center.

CO2: Solve real-life problems requiring interpretation and comparison of various representations of ratios

CO3: Distinguish between proportional and non proportional situations and, when appropriate, apply proportional reasoning.

CO4: Develop an answer to an open-ended question requiring analysis and synthesis of multiple calculations, data summaries, and/or models.

CO5: justify and communicate their conclusions in ways appropriate to the audience.

Reference Books

1. Quantitative Aptitude for Competitive Examinations | 7thEdition (Paperback, Abhijit Guha)
2. https://myupsc.com/wp-content/uploads/2020/11/Quantitative-Aptitude-for-Competitive-Examinations-by-Dinesh-Khattar-z-lib.org_.pdf
3. Quantitative Aptitude for Competitive Examinations – Quantitative Aptitude by rsgrawal with 0 Disc. (English, Paperback, Aggarwal R. S.) Revised, 2021

Web Recourses

1. https://pdf.bankexamstoday.com/raman_files/Quant%20Formula.pdf
2. https://ugcportal.com/raman-files/QT-TRICKS.pdf
3. https://www.javatpoint.com/aptitude/quantitative#speed-and-distance
4. https://www.indiabix.com/aptitude/questions-and-answers/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO1 0	PO 11	PO 12	PSO1	PSO2	

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

THIRD SEMESTER

21CA3101	**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:

- Data Mining

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)**
1) CAT1 – Descriptive 2) CAT2 – Descriptive	**Unit 1:** Solutions for Problems on Data Analysis **Unit 2:** Simulated output using Hadoop **Unit 3:** Simulation screens in R Programming **Unit 4:** Quiz on Page Rank **Unit 5**: Quiz on Databases	1) Written Test

Suggested Activities

Unit 1: Data Analytic tools comparison
Unit 2: Practical on Map Reduce application for word counting on Hadoop cluster
Unit 3: Predictive Analytics using R Programming
Unit 4: Assignment 1: Apply Page Rank algorithm to bring you own website to the first sited website.
Unit 5: Simulation using python environment

Outcomes

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

CO1 Understand the fundamentals of big data analysis techniques

CO2 Design efficient algorithms for mining the data from large volumes

CO3 Understand the basics of R programming.

CO4 Calculate page ranks for web pages.

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

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

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12	PSO1	PSO2
1	3	2	2	2	1			1	1		1	2	2	
2	3	2	2	1	1			1	1		1	2	2	
3	2	2	2	1	1			1	1		1	2	2	
4	2	2	2	1	1			1	1		1	2	2	
5	2	2	1	1	1			1	1		1	2	2	

21CA3102 MOBILE COMPUTING 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 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**

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
1) CAT1 & CAT -2 Descriptive	**Unit 1**: MCQs on Mobile Multiplexing concepts **Unit 2**: Quiz on WLAN Technologies **Unit 3**: Problems on TCP/IP protocol **Unit 4**: Write functions to implement an android applications. **Unit 5**: MCQs on auto layout in mobile applications technology.	1) Written Test

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

1. Raj Kamal, "Mobile Computing", Oxford Publication, 2019.

WEB RESOURCES

1. https://youtube.com/playlist?list=PLV8vIYTIdSnZMKTQSTxWbx4NGNfxyZq_N

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA3103 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:

- Software Engineering

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: 45

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

CAT 1 & CAT 2 - Descriptive type questions	**Unit 1:** MCQs on different types of testing and test case design **Unit 2:** Problems on error detection, Levels of testing **Unit 3:** Quiz on testing in different environments **Unit 4:** Write functions to implement a testing automation. **Unit 5:** Quiz on Quality Assurance in Testing	**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 Write 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. Besterfiled, “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	PO9	PO	PO1	PO12	PSO1	PSO2

										10	**1**			
1		2	2	1	3		1	1	1	1		2	1	1
2		2	2	1	3		1	1	1	1		2	1	1
3		2	2	1	3		1	1	1	1		2	1	1
4		2	2	1	3		1	1	1	1		2	1	1
5		2	2	1	3		1	1	1	1		2	1	1

21CA3104 INTERNET OF THINGS AND CLOUD COMPUTING L T P C

3 0 2 4

PREAMBLE

This course is offered in 3rd semester of 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:

- Computer Networks.

OBJECTIVES:

1. To design IoT platform with different architectures
2. To understand about the basics of IOT protocols
3. To create a small low-cost embedded system using Raspberry Pi.
4. To study about IoT cases in the real-world applications.
5. To use the various cloud architectures and models.

UNIT I IoT ARCHITECTURE 9

Internet of things - M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture - Characteristic and challenges, WSN vs Adhoc Networks, Sensor node architecture, Physical layer and transceiver design considerations in WSNs.

UNIT II IoT PROTOCOLS 9

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP – Security.

UNIT III BUILDING IoT WITH RASPBERRY PI & ARDUINO 9

Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms - Arduino.

UNIT IV CASE STUDIES AND REAL-WORLD APPLICATIONS 9

Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT – Lidar – Drown System

UNIT V CLOUD ARCHITECTURE AND MODEL 9

Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models: - Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

TOTAL HOURS: 45 HRS

LIST OF EXPERIMENTS: 30 HRS

S.No	List of Experiments	CO
1	First program on ARDUINO IDE. Digital output as LED glows.	**C01**
2	Interfacing sensor with NODE MCU.	**CO1**
3	Usage of DHT 11 Temperature and Humidity Sensor.	**CO2**
4	Creating a Web server using NodeMCU and ESP Module.	**CO2**
5	Creating a Web page and control Home Appliances through Wifi.	**CO3**
6	Program Node MCU to read and update sensor data over cloud.	**CO3**
7	Creating account on ThingSpeak and connecting temperature and humidity sensor.	**CO4**
8	Creating a twitter app on Thingspeak.	**CO4**
9	Speed Checker to detect rash driving on vehicles using Arduino	**CO5**
10	Object Detection using Arduino	**CO5**

S.No.	List of Projects	Related Experiment	CO
1.	Blinking a LED on Pico Using Micro Python	**1,2,3**	**C01, CO2**

2.	Install Add-ons, Read 1-Wire Sensor Data	**1,2,3**	**CO1,CO2**
3.	Weather Monitoring system.	**1,2,3**	**CO1, CO2**
4.	Air Quality Monitor.	**1,2,3**	**CO1, CO2**
5.	IOT based Intelligent Gas Leakage Detector Using Arduino	**1,2,3**	**CO1, CO2**
6.	Home Automation System.	**4,5**	**CO2, CO3**
7.	Power Monitoring System.	**4,5**	**CO2, CO3**
8.	Home Automation with Node-RED and Raspberry Pi: Control Lights & Read DHT11 Data	**4,5**	**CO2, CO3**
9.	Battery Powered Attendance system using Face Recognition on ESP32-CAM Board	**6**	**CO3**
10.	IoT Based GPS Location Tracker using Node MCU and GPS Module – Save GPS co-ordinates and view on Google Maps	**6**	**CO3**
11.	Health Monitoring System using 7-Segment Display & Atmega Microcontroller.	**6**	**CO3**
12.	Wireless Communication between Arduino & Raspberry Pi using LoRa Module SX1278	**6**	**CO3**
13.	Women's Safety Device With GPS Tracking & Alerts	**7,8**	**CO4**
14.	Low Power IoT Based Compact Soil Moisture Monitoring Device	**7,8**	**CO4**
15.	Arduino Based System To Measure Solar Power.	**7,8**	**CO4**
16.	Speed Detector.	**9,10**	**CO5**
17.	Traffic Light Controller.	**9,10**	**CO5**
18.	Car Parking System.	**9,10**	**CO5**
19.	Attendance System	**9,10**	**CO5**
20.	Visitor Counter with Room Light Controller	**9,10**	**CO5**
21.	Raspberry Pi based Object Detection using Tensor Flow and OpenCV.	**9,10**	**CO5**
			TOTAL HOURS: 30 HRS

Suggestive Assessment Methods

Continuous Assessment Test (20Marks)	**Formative Assessment Test (30Marks)**	**End Semester Exams (50Marks)**

CAT 1 & CAT 2 – Descriptive type questions	**Lab Experiments, Demo Presentation** **Unit – 1 –** MCQs on types of IoT Architectures. (IoT – A). **Unit – 2 –** Quiz on Various IoT Protocols. **Unit –3–** Write a programs to implement a simple IoT platforms. **Unit – 4 –** MCQs on IoT applications in real worlds. **Unit – 5 –** Assignments to write the IoT applications project ideas for cloud data management	**Descriptive type question**

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:

CO1	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 Madisetti, “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	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	2	1	3		2	1	1	1	2	1		3
2	2	3	2	1	3		2	1	1	1	2	1		3
3	2	3	2	1	3		2	1	1	1	2	1		3
4	2	3	2	1	3		2	1	1	1	2	1		3
5	2	3	2	1	3		2	1	1	1	2	1		3

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?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF WEEKS REQUIRED
1	First program on ARDUINO IDE. Digital output as LED glows.	1
2	Interfacing sensor with NODE MCU.	1
3	Usage of DHT 11 Temperatures and Humidity Sensor.	1
4	Creating a Web server using NodeMCU and ESP Module.	1
5	Creating a Web page and control Home Appliances through Wifi.	1
6	Program Node MCU to read and update sensor data over cloud.	1
7	Creating account on ThingSpeak and connecting temperature and humidity sensor.	1

8	Creating a twitter app on Thingspeak.	1
9	Speed Checker to detect rash driving on vehicles using Arduino	1
10	Object Detection using Arduino	1

21CA3111 MOBILE APPLICATION DEVELOPMENT LABORATORY

L	T	P	C
0	0	4	2

Preamble:

This subject given to develop system and application level software in the wireless network connection.

Prerequisites for the course **Total Hours:60**

- Programming with Java Laboratory

Objectives

1. To recognize the components and structure of mobile application development frameworks like Android /windows /ios.
2. To understand how to work with various mobile application development Frameworks.
3. To implement the basic and important design concepts and issues of development of mobile applications.
4. To examine the capabilities and limitations of mobile devices.
5. To develop applications for the platforms used, simulate them, and test them on the mobile hardware where possible.

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

S.No.	List of Projects	Related Experiment	CO
1	Android-based Function Generator	1 to 10	**CO1,CO2**
2	Software-defined Radio.	1,2,3	**CO1,CO2**
3	Home Automation System Application.	1,2,3	**CO2,CO3**
4	IoT-based Notification System.	1 to 10	**CO2,CO3**
5	Android Bluetooth-based Chatting App.	1 to 5	**CO3**
6	Smart Travel Guide Application	1,2,3,6,7,8	**CO3,CO4**
7	Surveillance CameraControll App.	1,2,3,6,7,8	**CO3**
8	Android Controlled Robot.	1,2,3,5,6,7	**CO3,CO4**
9	Home Automation System	8,9,10	**CO4**
10	Students Communication App.	1 to 10	**CO3,CO4**
11	Timetable Manager.	7,8,9,10	**CO3,**
12	Parental Control Application.	8,9,10	**CO4**
13	Unit Converter Application.	1 to 10	**CO4**
14	Notes of the student app.	1 to 10	**CO3,CO4**
15	Fingerprint authentication secured Android Notes.	1 to 7	**CO2,CO3**

Suggestive Assessment Methods

Lab Components Assessments (60 Marks)	**End Semester Exams (40 Marks)**
Assessment, Execution and viva	**End Semester Practical exam**

Outcomes

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

CO1 Understand the installation and configuration of Android application development tools.

CO2 Develop knowledge and experience in user Interfaces for the Android platform.

CO3 Apply Java programming concepts to Android application development.

CO4 Implement new technologies and business trends impacting mobile applications.

CO5 Evaluate Mobile Computing applications

Laboratory Requirements

Computer – 30 Systems

Software Front End:Eclipse, Android Software and Kotlin

Reference Books

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

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

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

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

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

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

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

Web Recourses

1. https://www.youtube.com/watch?v=5kBknJWi71Q
2. https://www.minigranth.com/mobile-computing/
3. https://www.javatpoint.com/mobile-communication-tutorial

CO Vs PO Mapping and CO Vs PSO Mapping

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

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Can youdevelop an application to solve the real time problem?
COURSE OUTCOME 2: How to interact the user using the toast?
COURSE OUTCOME 3: Can you develop an application using moving numerous?
COURSE OUTCOME 4: How to determine a location and to track the user using GPS?
COURSE OUTCOME 5: How to protect the transfer data in mobile application?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF WEEKS REQUIRED
1	Develop an application that uses Layout Managers.	1
2	Develop an application that uses event listeners.	1
3	Develop an application that uses Adapters, Toast.	1

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

21CA3912 **MINI PROJECT** **L T P C**

0 0 4 2

PREAMBLE:

This course is offered to MCA programme to develop their technology. This course is to improve their technical, software development. This course is used to develop their application development and also convert project to product development. This project is also convert to paper.

PRE-REQUISITE:

- Software development life cycle

OBJECTIVES:

1. To use research knowledge in various domains
2. To finalize the domain and area of interest
3. To design the project using any software
4. To Compare the results
5. To demonstrate the application which is socially relevant

TASKS:

- Team Project – only 2 members are allowed
- Individual evaluation needed
- Students shall select a domain and develop an application with social relevance
- Documentation is to be based on the standards
- Evaluation pattern is like Lab examination
- Need to submit a report, presentation with demo.

- User Based Testing and feedback from the benefited society required
- The students can undergo an internship with an industry for a minimum period of 2 weeks

TOTAL HOURS: 60

Suggestive Assessment Methods	
Lab Components Assessments (60 Marks)	**End Semester Exams (40 Marks)**
Assessment, Execution and viva 1. Identify the project topic in SIH. 2. Select the individual domain of your project. 3. Design a use case diagram for your paper.	**End Semester Practical exam**

Suggested Activities

Task 1: Write an abstract for your project title.

Task 2: Draw an ER diagram of their individual project.

Task 3: Select the Front End and Back End applications

Task 4: Documentation should be standard.

Task 5: Prepare a Power point presentation for the project viva.

Laboratory Requirements

Computers-30 nos

IDE: Any IDE,POSTMAN API Platform

Outcomes

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

CO1	Identify the research areas
CO2	Gather the requirements of a domain
CO3	Develop the project
CO4	Compare the data
CO5	Cultivate the presentation skills

REFERENCE BOOK(S):

1. Terry Schmidt", Strategic Project Management Made Simple: Practical Tools for Leaders and Teams"
2. Stephen Barker", Brilliant Project Management: What the Best Project Managers Know, Do and Say"

WEB RESOURCE(S):

1. https://www.elprocus.com/computer-science-projects-engineering-students/
2. https://www.hackerearth.com

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA3913 INTERNET MARKETING AND ANALYTICS L T P C

0 1 2 2

PREAMBLE:

This course offered in the third semester as a industry supported course It imparts the basic knowledge of marketing. It includes an overview of marketing, marketing concepts, marketing mix, consumer and organizational behaviour, marketing management and entrepreneurship.

PRE-REQUISITE:

- NIL

OBJECTIVES:

1. To gain an overall understanding of Digital Marketing
2. To develop insight on Current Trends–Digital and Social Statistics(Infographics)
3. To provide an introduction to Digital Marketing Platforms like Face book, Twitter, YouTube, Pinterest,etc.
4. To Introduce the Advance levels of Search Engine Optimization(SEO)and Mobile Marketing
5. To IntroducetovariousstrategiesinvolvedinMarketingproductsandServicesDigitally

UNIT I Introduction to Digital Marketing 6

Introduction of the digital marketing- Digital vs. Real Marketing- Digital Marketing Channels- Creating initial digital marketing plan- Content management- SWOT analysis- Web design- Optimization of Web sites

UNIT II Search Engine Optimization (SEO) 6

Introduction and need for SEO – How to use internet & search engines - searchengineanditsworkingpattern,-On-pageandoff-pageoptimization,SEOTactics- History & Growth of SEO- On page optimization- Off Page optimization- Keywords- Organic Marketing Strategy for E-Commerce- Writing the SEO content

UNIT III Pay Per click(PPC) 6

Introduction To Google Ads- Search Engine Marketing- Pay for Search Advertisements, -Ad Placement, Ad Ranks, Creating Ad Campaigns, Campaign -Report Generation -Display marketing: Types of Display Ads- Buying Models- Programmable Digital Marketing- Analytical Tools- YouTube Ads

UNIT IV **Social Media Marketing(SMM)** **6**

Introduction of Social Media Marketing- Creating a Face book page- Visual identity of a Face book page- Business opportunities and Instagram options- Optimization of Instagram profiles- Face book Ads- Instagram Ads

UNIT V **Digital Marketing Budgeting &Analytics** **6**

Resource planning- cost estimating- cost budgeting- Google Analytics- Google webmaster- Budget planning for B2B&B2C

S.No	List of Projects	Related Experiment
1	Digital Marketing Webpage	Unit1,CO1
2	Blogging	Unit1,CO1
3	Search Engine Optimization of websites	Unit2,CO2
4	E-Commerce portal	Unit2,CO2
5	Promotional banner through Canva	Unit3,CO3
6	Face book Promotion using banners	Unit3,CO3
7	YouTube Channel for Marketing	Unit4,CO4
8	Twitter Marketing	Unit4,CO4
9	Email Marketing	Unit4,CO5
10	Promo page for event marketing	Unit5,CO5
11	Web Analytics Report	Unit5,CO5
12	Google Analytics	Unit5,CO5
13	Google webmaster	Unit5,CO5
14	Web Traffic Analysis	Unit5,CO5
15	Creating Ad Campaigns	Unit4,CO4

Suggestive Assessment Methods	
Lab Components Assessments (60 Marks)	**End Semester Exams (40 Marks)**
Assessment, Execution and viva	**End Semester Practical exam**

Laboratory Requirements

Computers-30 nos
Tools: Digital marketing tools

Outcomes

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

TOTAL HOURS: 30

CO1	Understand the digital marketing optimization
CO2	Analyze the search engines available
CO3	Develop pay per click ads
CO4	Implement digital marketing platforms
CO5	Understand digital budgeting

REFERENCES

1. Seema Gupta,", Digital Marketing,",Mc-Graw Hill,1st Edition - 2017
2. Ian Dodson,", The Art of Digital Marketing,",Wiley,Latest Edition
3. Puneet Singh Bhatia,", Fundamentals of Digital Marketing,",Pearson,1st Edition - 2017
4. Vandana Ahuja,",Digital Marketing,",Oxford University,Latest Edition
5. Philip Kotler,", Marketing 4.0: – Moving from Traditional to Digital,",Wiley,2017
6. Melissa S. Barker, Donald I. Barker, Nicholas F. Bormann, Debra Zahay, Mary Lou Roberts,",Social Media Marketing: A Strategic Approach ,",Cengage,Latest Edition
7. Hanson ,KirthiKalyanam,", Internet Marketing & e- Commerce ,",Cengage,Latest Edition
8. Roberts andZahay,",Internet Marketing: Integrating Online & Offline Strategies,",Cengage,Latest Edition
9. Dr.Ragavendra K. and Shruthi P.,", Digital Marketing ,",Himalaya Publishing House Pvt. Ltd.,Latest Edition
10. Prof. Nitin C. Kamat, Mr.ChinmayNitinKamat,",Digital Social Media Marketing,",Himalaya Publishing House Pvt. Ltd.,Latest Edition

WEB RESOURCE(S):

1. https://mailchimp.com/marketing-glossary/digital-marketing/
2. https://en.wikipedia.org/wiki/Digital_marketing
3. https://disruptiveadvertising.com/marketing/digital-marketing/
4. https://neilpatel.com/what-is-digital-marketing/

CO Vs PO Mapping and CO Vs PSO Mapping

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

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

21CA3M02 REASONING SKILL ENHANCEMENT L T P C

1 0 0 0

Preamble:

This course offered in the third semester as a mandatory course. This course impart the knowledge about the skill enhancement, Job opportunities in social media marketing.

Prerequisites for the course

- Verbal Ability

Objectives

1. To strengthen the social network by the effective use of social media and social interactions.
2. To identify own true potential and build a very good personal branding
3. To develop critical thinking to solve real world problems and competitive exam problems for students

UNIT I Social Media 9

Effective use of social media - Types of social media, Moderating personal information, Social media for job/profession, Communicating diplomatically. Networking on social media - Maximizing network with social media, How to advertise on social media.

UNIT II Social Interaction 9

Event management - Event management methods, Effective techniques for better event management. Influencing - How to win friends and influence people, Building relationships, Persistence and resilience, Tools for talking when stakes are high

Conflict resolution - Definition and strategies ,Styles of conflict resolution

UNIT III Non Verbal Communication 9

Proximecs - Types of proximecs, Rapport building. Reports and Data Transcoding - Types of reports. Negotiation Skill - Effective negotiation strategies. Conflict Resolution - Types of conflicts.

UNIT IV Interpersonal Skill 9

Social Interaction - Interpersonal Communication, Peer Communication, Bonding, Types of social interaction. Responsibility - Types of responsibilities, Moral and personal responsibilities. Networking - Competition, Collaboration, Content sharing. Personal Branding - Image Building, Grooming, Using social media for branding. Delegation and compliance - Assignment and responsibility, Grant of authority, Creation of accountability

UNIT V Reasoning Ability 9

Analytical Reasoning Data Arrangement(Linear and circular & Cross Variable Relationship), Blood Relations, Ordering/ranking/grouping, Puzzle test, Selection Decision table

Total Periods 45

Suggestive Assessment Methods	
Continuous Assessment Test (60 Marks)	**Formative Assessment Test (40 Marks)**
1. DESCRIPTIVE QUESTIONS **2. FORMATIVE MULTIPLE CHOICE QUESTIONS**	**1.ASSIGNMENT** **2. ONLINE QUIZZES** **3. PROBLEM-SOLVING ACTIVITIES**

Outcomes

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

CO1: Understand the various strategies of conflict resolution among peers and supervisors and respond appropriately

CO2: Acquire wide knowledge on social interaction

CO3: Improve speaking skills in academic and social contexts

CO4: Improve interpersonal communication through proper pronunciation.

CO5: Interpret the analytic reasoning ability which would help them in their professional career.

Reference Books

1. Kerry Patterson, Joseph Grenny, Ron McMillan, Al Switzler, Crucial Conversations: Tools for Talking When Stakes are High, 2001,1st edition McGraw Hill Contemporary, Bangalore.
2. Dale Carnegie, How to Win Friends and Influence People, Latest Edition,2016. Gallery Books, New York

Web Recourses

1. https://www.fresherslive.com/online-test/logical-reasoning-test/questions-and-answers
2. https://www.indiabix.com/non-verbal-reasoning/questions-and-answers/
3. https://www.indiabix.com/logical-reasoning/questions-and-answers/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO 8**	**PO 9**	**PO1 0**	**PO 11**	**PO 12**	**PSO1**	**PS O2**	
1	2	2		3						3		3	2		
2	2	2		3						3		3	2		
3	2	2		3						3		3	2		
4	2	2		3						3		3	2		
5	2	2		3						3		3	2		

FOURTH SEMESTER

21CA4911	**PROJECT WORK**	**L**	**T**	**P**	**C**
		0	**0**	**24**	**12**

OBJECTIVES:

1. To classify research knowledge in various domains
2. To demonstrate the domain and area of interest
3. To design the project using any software
4. To Compare the results
5. To present and demonstrate the work in the viva voce examination and conferences

PRE-REQUISITE:

- Software development life cycle and documentation

TASKS:

- Three Stages In Project adjudication:

  Stage I: Presentation of Concept Note & Problem Approval by Guide

  Stage II: Progress Approval by System Demonstration with results Internal

  Stage III: Final Presentation with Documentation
- Candidates can do their project work within the department or in any industry/research organization in the Fourth semester. In case of project done in an industry/research organization, one advisor (Supervisor) should be from the department and one advisor(External guide) should be from the industry/research organization.
- A publication of a paper on the project work in a National/International Conference proceedings with presentation certificate or a paper on the project work be communicated to a National/International Journal & accepted for publication for the submission of thesis at the end of 4thsemester is desirable
- The external examiner shall be nominated by the Chairman, Board of Examinersas per the norms of the University.

Suggestive Assessment Methods	
Reviews **(60 Marks)**	**End Semester Exams** **(40 Marks)**
Assessment, Execution and viva	**End Semester Practical exam**
Laboratory Requirements	

Computers-30 nos

IDE: Any IDE

Outcomes

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

CO1 Classify the research areas

CO2 Gather the requirements of a domain

CO3 Develop the project

CO4 Compare the data

CO5 Cultivate the presentation skills

REFERENCE BOOK(S):

1. Terry Schmidt, "Strategic Project Management Made Simple: Practical Tools for Leaders and Teams"
2. Stephen Barker, "Brilliant Project Management: What the Best Project Managers Know, Do and Say"

WEB RESOURCE(S):

1. https://www.elprocus.com/computer-science-projects-engineering-students/
2. https://www.hackerearth.com

CO Vs PO Mapping and CO Vs PSO Mapping

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

VALUE ADDED COURSES

		L	T	P	C
21CA1V01	**JAVASCRIPT FOR WEB DEVELOPMENT**	**0**	**0**	**2**	**1**

Prerequisites for the course

- NIL

Objectives

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

Module I **9**

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

Module II **9**

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

Module III **12**

7. Create an object called person with properties name, age, and gender. Assign appropriate values to these properties and print them to the console.
8. Implement a program that reads JSON data from a file and dynamically generates an image gallery using DOM manipulation. Display the images on the web page with captions and provide navigation buttons for scrolling through the gallery.
9. Create a function that simulates an asynchronous API call. It should accept a callback function as a parameter and invoke the callback after a delay of 2 seconds. Test it by passing a callback function that logs a message when invoked.
10. Write a program that prompts the user to enter two numbers and divides the first number by the second number. Implement error handling to catch any potential division by zero errors and display an appropriate error message.

Total Periods **30**

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

Text Books

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

Reference Books

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

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

Web Recourses

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

CO Vs PO Mapping and CO Vs PSO Mapping

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

4		3	3	1	3		1	1	1		3			3

Test Projects:

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

21CA1V02 **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 **9**

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

Module II **9**

4. Design a test case to tests the limits of your application's functionality. For example, test the minimum and maximum values that can be entered into a field, or test the maximum number of characters that can be entered into a field.
5. Design to divide the application's functionality into equivalence classes, and then testing

each class. For example, divide the functionality of a login page into two equivalence classes: valid logins and invalid logins. Test each class by entering valid and invalid login credentials.

6. Apply code to test the different states of the application. For example, test the state of a shopping cart when it is empty, when it contains one item, and when it contains multiple items.

Module III **12**

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

Total Periods **30**

Laboratory Requirements	
Computers-30 nos **Software: Selenium**	
Suggestive Assessment Methods	
Lab Components Assessments (50 Marks)	**Internal Lab Components Assessments (50 Marks)**
Assessment, Execution and viva – Each module	**Project demonstration**
Outcomes	
Upon completion of the course, the students will be able to:	
CO1: Understand the automation testing concepts and different testing scenarios. CO2: Develop practical skills in creating, designing, and implementing automated test scripts. CO3: Enhance students' employability in the software testing field CO4: Automate repetitive and time-consuming test cases and exploratory testing activities. CO5: Ensure that tests are executed automatically and providing fast feedback.	

Text Books

1. Software Test Automation Paperback by Dorothy Graham, Mark Fewster– 28 June 1999.
2. "JUnit in Action" by Petar Tahchiev, Felipe Leme, Vincent Massol, and Gary GregorySecond

Edition, 2010

3. "Java Testing with Spock" by Konstantinos Kapelonis

Reference Books

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

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

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

Web Recourses

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

CO Vs PO Mapping and CO Vs PSO Mapping

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

Test Projects:

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

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

3 Implement test cases for both positive and negative scenarios, including error handling, validation checks, and order processing.

4 Automate the testing of a web application across multiple browsers and versions using Selenium Web Driver.

5 Write test scripts that cover common functionality and ensure consistent behavior across different browsers (e.g., Chrome, Firefox).

6 Include scenarios that validate UI elements, CSS styling, responsiveness, and browser-specific functionalities.

7 Create a test project that demonstrates data-driven testing techniques using a framework like TestNG or JUnit.

8 Read test data from external sources (e.g., Excel, CSV, or databases) and execute the same test cases with different data sets.

9 Implement data parameterization, data validation, and data manipulation in your test scripts.

10 Integrate your automation tests with version control, build scripts, and reporting tools to achieve a streamlined testing process.

		L	T	P	C
21CA1V03	**CLOUD PLATFORMS**	**0**	**0**	**2**	**1**

Prerequisites for the course

- Knowledge about virtual Machine VMware or virtual box app.

Objectives

1. To provide a wide range of services that can help businesses innovate faster.
2. To reduce their IT costs by providing a pricing model.
3. To know comprehensive set of security features that can help businesses.
4. To increase their agility by providing a scalable and elastic platform.
5. To improve their global reach by providing a global network of data centers.

Module I **9**

1. Building and Configuring a VPC:
    a. Create a Virtual Private Cloud (VPC) and configure subnets, route tables, and security groups.
    b. Launch EC2 instances within the VPC and configure network connectivity.
2. Integrating with Other GCP Services:
    a. Utilize Dataproc in conjunction with BigQuery for data processing and analysis.
    b. Transfer data between Dataproc and Cloud Storage or Cloud Pub/Sub.
    c. Explore integration options with other GCP services based on your use case.
    d. Streaming Data Processing:
3. Develop a streaming Dataflow pipeline to process real-time data from a source (e.g., Pub/Sub).
    a. Apply transformations and filters to the streaming data.

Module II **9**

4. Creating a GCP Account:
    a. Sign up for a new GCP account using the GCP Console.
    b. Set up billing and configure billing alerts or budgets.
    c. Enable multi-factor authentication (MFA) for added security.
5. Managing Access and Permissions:
    a. Create a new GCP project and assign project roles to users or service accounts.
    b. Explore different IAM roles and create custom roles.
    c. Grant and revoke access to resources within your project.
6. Monitoring Resource Usage and Costs:
    a. Set up billing exports and usage reports to monitor resource usage and costs.
    b. Analyze and interpret billing data to optimize resource utilization.
    c. Set up budget alerts to monitor and control spending.

Module III **10**

7. Performance Optimization and Scaling:
    a. Optimize a Dataflow pipeline's performance by fine-tuning resources and parallelism settings.
    b. Evaluate the impact of adjusting windowing and triggering configurations on pipeline performance.
    c. Test and observe the scaling behavior of a Dataflow pipeline under varying workloads.
8. Performance Optimization and Scaling:
    a. Optimize a Dataflow pipeline's performance by fine-tuning resources and parallelism settings.
    b. Evaluate the impact of adjusting windowing and triggering configurations on pipeline performance.
    c. Test and observe the scaling behavior of a Dataflow pipeline under varying workloads.
9. Setting Up and Configuring AWS Lambda Functions:
    a. Create an AWS Lambda function using the AWS Management Console.
    b. Configure triggers and define function code in the chosen programming language (Node.js, Python, etc.).
    c. Test and monitor the execution of the Lambda function.
10. Configuring and Monitoring AWS Cloud Watch:
    a. Set up Cloud Watch Alarms to monitor specific metrics and trigger notifications.
    b. Create custom dashboards to visualize and analyze resource metrics.
    c. Configure Cloud Watch Events for automated response to events in your AWS environment.

Total Periods 30

Suggestive Assessment Methods	
Lab Components Assessments (50 Marks)	**Lab Components Assessments (50 Marks)**
Assessment, Execution and viva	**Assessment, Execution and viva**

Outcomes

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

CO1: Create and manage GCP account and the different GCP services.

CO2:Build and deploy applications on GCP.

CO3: Implement security measures on GCP

Text Books

1. Cloud Computing: Concepts, Technology & Architecture.
2. Google Cloud Platform Architecting and Managing Solutions by Thomas Erl and Juval Lowy.
3. Google Cloud Platform Fundamentals by Will Kurtz.
4. Google Cloud Platform Recipes by J. Chris Anderson and Chris McDonough.

Reference Books

1. Cloud Computing: Concepts, Technology & Architecture.
2. Google Cloud Platform Fundamentals by Will Kurtz
3. Google Cloud Platform in Action by JJ Geewax

Web Recourses

1. **Google Cloud documentation:**
2. **Google Cloud blog**
3. **Google Cloud community**

CO Vs PO Mapping and CO Vs PSO Mapping

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

Test Projects:

1	**Creating a simple web application:** This is a great way to learn the basics of GCP, such as how to create a project, create a virtual machine (VM), and deploy an application.
2	**Building a large-scale data warehouse:** This is a more challenging project that will teach you how to use GCP's data warehousing services, such as Big Query and Cloud Dataproc.
3	**Developing a machine learning model:** This is a cutting-edge project that will teach you how to use GCP's machine learning services, such as Cloud ML Engine and Cloud AutoML.
4	**Building a containerized application:** This is a great way to learn about containerization and how to use GCP's container services, such as Kubernetes Engine and Cloud Run.
5	**Deploying an application to production:** This is a critical skill for any developer who wants to deploy their applications to the cloud. GCP offers a variety of services that can help you deploy your applications to production, such as Cloud Deployment Manager and Cloud Run.

		L	T	P	C
21CA2V01	**MVC Framework**	**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 (50 Marks)	**Internal Lab Components Assessments (50 Marks)**
Assessment, Execution and viva – Each module	**Project demonstration**
Laboratory Requirements	
Computers-30 nos **IDE: Microsoft Visual Studio 2010**	
Outcomes	
Upon completion of the course, the students will be able to:	
CO1: Build ASP.Net MVC applications that use the MVC architectural pattern. CO2: Implement authentication and authorization using ASP.Net Identity. CO3: Build and deploy ASP.Net MVC applications.	
Text Books	
1. **Programming Microsoft ASP.NET MVC** by Dino Esposito, Third Edition.	
Reference Books	

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

Web Recourses

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

CO Vs PO Mapping and CO Vs PSO Mapping

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

Test Projects:

1	Task Management System
2	Blogging Platform
3	E-commerce Website
4	Social Media Application
5	Issue Tracking System

21CA2V02 **DATA ANALYTICS TOOLS**

L	T	P	C
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 (50 Marks)	**Internal Lab Components Assessments (50 Marks)**
Assessment, Execution and viva – Each module	**Project demonstration**
Laboratory Requirements	
Computers-30 nos **Software: Excel, python, tableau, PowerBI**	
Upon completion of the course, the students will be able to:	

CO1: Understanding the basic concepts and terminology of Tableau.

CO2: Connect to and prepare various types of data sources for analysis in Tableau.

CO3: Understand the purpose of Power BI and the various components of the software.

CO4: Create data visualizationsand maps to display data in a meaningful way.

Text Books

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

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

Reference Books

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

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

Web Recourses

1. https://help.tableau.com/current/guides/en-us//tableau-help.htm
2. https://docs.microsoft.com/en-us/power-bi/guided-learning/-

CO Vs PO Mapping and CO Vs PSO Mapping

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

Test Projects:

1. Patient Risk Healthcare Dashboard
2. Sales Forecast Analysis Dashboard
3. Marketing Campaign Dashboard
4. Crime Analysis Dashboard
5. Air Quality and Pollution Analysis Dashboard
6. Climate Change dashboard
7. Airport Authority Performance dashboard
8. Product Sales Data Analysis
9. Marketing Campaign Insights Analysis
10. Financial Performance Analysis

		L	T	P	C
21CA2V03	**INTELLIGENT SYSTEMS AND DATA ANALYSIS**	**0**	**0**	**4**	**2**

Prerequisites for the course

- Python Programming

Objectives

1. To understand the core packages in python
2. To develop machine learning model
3. To apply machine learning algorithm for a given complex problem

Module I – Python for Machine Learning **20**

Data Preprocessing:

- Load a dataset using pandas.
- Handle missing values by imputation or removal.
- Perform feature scaling on numerical variables.
- **Encode categorical variables using techniques like one-hot encoding or label encoding**

Supervised Learning:

- Split the dataset into training and testing sets.
- Implement and train various supervised learning algorithms, such as linear regression, logistic regression, decision trees, random forests, or support vector machines.
- Evaluate model performance using appropriate metrics like accuracy, precision, recall, or mean squared error.
- Visualize model predictions and evaluation results.

Module II - Basic Statistics for Machine Learning **20**

Unsupervised Learning:

- Apply clustering algorithms like k-means or hierarchical clustering to group similar data points together.
- Perform dimensionality reduction using techniques such as principal component analysis (PCA) or t-distributed stochastic neighbor embedding (t-SNE).
- Visualize clusters and reduced-dimensional representations of the data.

Exploratory Data Analysis (EDA):

- Perform a thorough analysis of a dataset using descriptive statistics, histograms, box plots, and correlation matrices.
- Identify trends, outliers, and relationships between variables.
- Gain insights into the data to inform feature selection, preprocessing, or model building.

Module III - Data Processing for Machine Learning **20**

Hypothesis Testing:

- Formulate a hypothesis about a relationship between variables in a dataset.
- Apply statistical tests such as t-tests or chi-square tests to evaluate the hypothesis.
- Use the results to make inferences or guide decision-making in the context of a machine learning problem.

Feature Selection:

- Use statistical techniques such as correlation analysis or mutual information to identify relevant features for a machine learning task.
- Compare different feature selection methods and evaluate their impact on model performance.
- Build machine learning models using selected features and assess their performance.

Model Evaluation and Comparison:

- Implement resampling techniques like cross-validation or bootstrapping to estimate model performance.
- Compare multiple machine learning algorithms using statistical tests or confidence intervals.
- Determine the best-performing model based on statistical measures like accuracy, precision, recall, or F1 score.

Total Periods 60

Suggestive Assessment Methods	
Lab Components Assessments (50 Marks)	**Internal Lab Components Assessments (50 Marks)**
Assessment, Execution and viva – Each module	**Project demonstration**
Laboratory Requirements	
Computers-30 nos **Software: jupyter notebook, google colab**	
Outcomes	
Upon completion of the course, the students will be able to:	
CO1: Transform data using python CO2: Be proficient in using Python for machine learning tasks CO3: Develop, evaluate, and deploy machine learning models for various applications.	

Text Books

1. "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by AurélienGéron:

Reference Books

1. "Python Machine Learning" by Sebastian Raschka and VahidMirjalili:
2. "Pattern Recognition and Machine Learning" by Christopher M. Bishop
3. "Deep Learning" by Ian Goodfellow, YoshuaBengio, and Aaron Courville

4. "Python for Data Analysis" by Wes McKinney

Web Recourses

1. **https://www.activestate.com/blog/top-10-python-machine-learning-algorithms/**
2. **https://data-flair.training/blogs/machine-learning-algorithms-in-python/**
3. **https://www.codingninjas.com/codestudio/library/12-most-used-machine-learning-algorithms-in-python**

CO Vs PO Mapping and CO Vs PSO Mapping

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

Test Projects:

1. Sentiment Analysis: Build a sentiment analysis model that can classify text documents or social media posts as positive, negative, or neutral. Use a dataset with labeled sentiments and apply techniques like natural language processing (NLP) and text preprocessing to train a machine learning model.
2. Recommendation System: Develop a recommendation system that suggests items (movies, books, products) to users based on their preferences or historical data. Implement collaborative filtering or content-based filtering techniques to create personalized recommendations.
3. Fraud Detection: Create a fraud detection system that can identify fraudulent transactions or activities. Train a machine learning model using labeled data that includes both normal and fraudulent instances, and use techniques like anomaly detection or supervised learning to detect and flag potential fraud.
4. Image Captioning: Build a model that can generate captions for images. Use a deep learning approach by combining convolutional neural networks (CNN) for image feature extraction and recurrent neural networks (RNN) for sequence generation to create descriptive captions for images.
5. Handwritten Digit Recognition: Develop a model that can recognize handwritten digits. Use popular datasets like MNIST or create your own dataset by collecting handwritten digit images. Implement techniques like convolutional neural networks (CNN) to train a model that accurately predicts the digit written in an image.
6. Stock Price Prediction: Build a machine learning model to predict stock prices. Gather historical stock price data and use regression techniques, time series analysis, or deep learning models to forecast future prices. Evaluate the model's performance by comparing the predicted values with actual stock prices.
7. Disease Diagnosis: Create a diagnostic model that can predict the likelihood of a disease based on patient data. Use a dataset with patient records and medical attributes, and train a machine

learning model (e.g., decision trees, support vector machines) to classify patients as having a particular disease or not.

8. Object Detection: Develop an object detection system that can identify and localize objects in images or videos. Use deep learning techniques like convolutional neural networks (CNN) and frameworks like TensorFlow or PyTorch to train a model capable of detecting and drawing bounding boxes around objects.

		L	T	P	C
21CA3V01	**NODE.JS AND EXPRESS.JS ESSENTIALS**	**0**	**0**	**2**	**1**

Prerequisites for the course

- **Web Front End Essentials**

Objectives

1. To Understand the Node.js framework
2. To Learn asynchronous programming
3. To Build HTTP Server with Node.js using HTTP APIs
4. To Understand Buffers, Streams, and Events.

Module I **9**

1 Implement a Node.js script that reads a text file specified as a command-line argument and logs its content to the console.

2 Create a Node.js web server that handles different routes. Add an HTTP header to each response to include the "Access-Control-Allow-Origin" header, allowing cross-origin resource sharing (CORS) for all domains.

3 Implement a file upload functionality in an Express.js application. Use middleware like Multer to handle file uploads and save the uploaded files to the server. Create a route to display the uploaded files.

Module II **9**

4 Create an Express.js application with a route that performs a time-consuming operation, such as calculating Fibonacci numbers. Use console.log statements to observe how the call stack behaves while the operation is running.

5 Create an Express.js application that consumes a third-party API and handles pagination. Make multiple requests to fetch paginated data and aggregate the results. Customize the HTTP requests by setting the page number or limit.

6 Create an authentication middleware in Express.js that checks if a user is logged in before allowing access to certain routes. Apply this middleware to protect sensitive routes and display appropriate error messages when authentication fails.

Module III **12**

7 Implement a Node.js script that reads a binary file (e.g., image, video) using the readFile

method and performs some processing on the binary data. Write the processed data to a new binary file asynchronously using the writeFile method.

8 Create an Express.js route that opens a text file using the fs module's readFile method. Read the contents of the file and send the content as the response to the client.

9 Implement a route that reads a CSV file using the fs module's createReadStream method and processes the CSV data asynchronously. Perform some operations on the CSV data, such as filtering, transforming, or aggregating it, and send the processed results as the response to the client.

10 Debug error handling in an Express.js application using the core Node.js debugger. Set a breakpoint inside an error handling middleware or use the debugger statement in a catch block. Trigger an error condition and observe how the debugger handles the error flow

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 **Software: node.js**	
Outcomes	
Upon completion of the course, the students will be able to:	
CO1: Implement both server side and client side scripting. CO2: Develop micro services using NodeJS. CO3:Apply Call back and HTTP function in the script. CO4:Implement API on Node.JS environment. CO5: Develop a system with secured database connectivity.	
Text Books	
1. Ethan Brown, "Web Development with Node & Express",Oreilly.	
Reference Books	
1. "Learning Node.JS", Stack Overflow contributors. 2. Mark Wandschneider, Learning Node.JS, Addison-Wesley.	

Web Recourses

1. https://www.edureka.co/nodejs-certification-training
2. https://www.w3schools.com/nodejs
3. https://nodejs.org/en/

CO Vs PO Mapping and CO Vs PSO Mapping

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

Test Projects:

1 Realtime chat application
2 Battleships Multiplayer Gaming Application
3 Email Sender
4 QR Code Generator-Discord Bot
5 Generate Random Design-Web app
6 Sleep Tracker App
7 Twitter Bot
8 The online photo collage tool
9 Books Directory
10 Test Projects:
11 Video Streaming Platform
12 Web Security
13 Email Sender
14 Gaming
15 Basic Users System

		L	T	P	C
21CA3V02	**ANGULAR FOR MODERN WEB DEVELOPMENT**	**0**	**0**	**2**	**1**

Prerequisites for the course

- Web frontend Essentials

Objectives

- To develop a Web Application Development Architecture.
- To create Angular applications using Angular CLI commands
- To create Angular components using TypeScript
- To Perform form-validation

Module 1 ANGULAR JS BASICS 10

1 Create a new Angular JS application using the Angular JS framework

2 Implement data binding between the model and view to automatically update the UI when the data changes

3 Implement form validation using Angular JS's built-in form validation directives and custom validation rules.

Module 2 ANGULAR EXPRESSIONS 10

4 Create an Angular JS application and define the required modules and controllers.

5 Implement sorting functionality on one or more columns using ng-click directive.

6 Create an array of objects representing the data to be displayed in the table.

Module 3 ANGULAR JS MODULES AND SERVICES 10

7 Implement the custom filter by creating a JavaScript function that accepts input data and returns the filter output

8 Create a form with fields and use Angular JS's input validation features to enforce data validation rules, such as required fields or minimum/maximum value constraints.

9 Develop a custom service by creating a JavaScript function or object that encapsulates reusable functionality or data manipulation.

10 Apply the custom filter to display the filtered data in the UI, such as transforming text to uppercase or applying custom number formatting.

Total hours 30

Suggestive Assessment Methods	
Lab Components Assessments (50 Marks)	**Internal Lab Components Assessments (50 Marks)**
Assessment, Execution and viva – Each module	**Project demonstration**
Upon completion of the course, the students will be able to:	
CO1: Understand the fundamentals of Angular Forms and its architecture	
CO2: Use Expressions and filters in a form creation	
CO3: Build forms and setpages	
CO4: Apply filters and validations in forms	

Reference Books

R1. "Angular 6 for Enterprise-Ready Web Applications: Deliver production-ready and cloud-scale" Angular web apps 1st Edition, Kindle Edition DoguhanUluca.

R2. "AngularJS Essentials" Copyright © 2014 Packt Publishing, First published: August 2014

R3. "AngularJS: Up And Running" by Shyam Seshadri and Brad Green,2014 Shyam Seshadri

and Brad Green.

R4. Angular JS: "A Code Like a Pro Guide" For AngularJS Beginners Kindle Edition.

R5. “Learning AngularJS: A Guide to AngularJS Development” 1st Edition, Kindle Edition.

R6. “Node.js, MongoDB and Angular Web Development” 2nd Edition by Brad Dayley.

R7. "Mastering Angular Reactive Forms", BPB Publications; 1st edition (August 11, 2021)FanisProdromou.

Web Recourses

1. https://www.udemy.com
2. https://docs.angularjs.org/tutorial/
3. https://docs.angularjs.org/guide

CO Vs PO Mapping and CO Vs PSO Mapping

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

S.No	Test Projects:
1	URL shortener
2	Translate Application
3	Chart Application
4	Maps Application
5	Interactive tables and grids in Angular
6	Weather Application
7	Timer Application
8	Leaflet Application
9	Search Tab
10	Standard chat application
12	Angular CLI
13	Admin Panel Framework
14	Nav Menu
15	Electronic musical instrument

21CA3V03 CROSS-PLATFORM MOBILE L T P C

DEVELOPMENT WITH REACT NATIVE 0 0 2 1

Prerequisites for the course

- NIL

Objectives

1. To understand the fundamentals of React Native.
2. To develop native mobile apps using React Native.
3. To deploy React Native apps to the App Store and Google Play.

Module I **10**

1. Create a simple to-do list app UI with React Native. Use a TextInput component for adding new tasks, a Button for submitting tasks, and a View component to display the list of tasks. Use Text components to render the task items and apply styling to differentiate completed tasks.
2. Build a chat application UI using React Native. Use a View component to display the chat messages and a TextInput for sending new messages. Apply styling to differentiate between the sender and receiver of each message using different colors or alignment.
3. Create a simple navigation stack using React Navigation in React Native. Set up two screens: a home screen and a details screen. Implement a navigation button on the home screen that navigates to the details screen when clicked.

Module II **10**

4. Create a basic list view using React Native's FlatList component. Render a list of items with basic information such as a title and description. Implement functionality to highlight or change the styling of a selected item when it is tapped.
5. Create a form in React Native to submit data to an API endpoint. Use React Native's TextInput and Button components to capture user input and make a POST request to the API when the form is submitted.
6. Implement data caching for offline usage using React Native's AsyncStorage API. Modify an existing app to cache API responses locally and display the cached data when the device is offline or when a network request fails.

Module III **10**

7. Implement a feature in a React Native app that allows users to search for nearby places based on their current location. Use a third-party API, such as Google Places API, to fetch nearby places and display them in a list or on a map.
8. Develop a pedometer app in React Native that uses the device's accelerometer sensor to track the user's steps. Implement step detection logic based on accelerometer data and display the number of steps taken.

9. Build a release version of a React Native app for Android. Generate an APK file using the appropriate build commands and configure the necessary settings to optimize the app for production.
10. Configure error tracking and monitoring in a React Native app using tools like Sentry or Bugsnag. Set up error tracking to receive real-time notifications when errors occur in the app and gather detailed error reports for debugging.

Total Hours 30

Suggestive Assessment Methods	
Lab Components Assessments (50 Marks)	**Internal Lab Components Assessments (50 Marks)**
Assessment, Execution and viva – Each module	**Project demonstration**
Laboratory Requirements	
Computers-30 nos **Software: Nuclide,Sublime Text,Visual Studio Code**	
Upon completion of the course, the students will be able to:	
CO1: Understand the fundamentals of React Native. CO2: Create user interfaces, handle user input, and work with data. CO3: Identify and fix errors in React Native code CO4: Write unit tests and integration tests for React Native apps and deploy the app.	

Text Books

T1. Learning React Native: Building Native Mobile Apps with JavaScript", Bonnie Eisenman, 2017

Reference Books

R1. "React Native in Action" Author: Nader Dabit Published Year: 2018

Web Recourses

1. **https://www.reactnative.express/**
2. **https://github.com/jondot/awesome-react-native**
3. **https://reactnative.dev/docs/**

CO Vs PO Mapping and CO Vs PSO Mapping

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

3		3	3	1	3		1	1	1		3			3
4		3	3	1	3		1	1	1		3			3

Test Projects:

1 Weather App

2 Movie Catalog

3 Recipe Finder

4 Task Tracker

5 Social Media Feed

6 Music Player

7 Expense Tracker

8 Chat Application

9 Fitness Tracker

10 E-commerce App

PROFESSIONAL ELECTIVE I

21CA2201	**CRYPTOGRAPHY AND NETWORK SECURITY**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PREAMBLE

This course is offered to MCA programme as a Theory Elective Courses. This course offers cryptography techniques. This course will also concentrate on network security concepts

PRE-REQUISITE:

- Computer Networks

OBJECTIVES:

1. To observe the basics of cryptography.
2. To identify the vulnerabilities in programs and to overcome them.
3. To classify the different kinds of security threats in networks and its solution.
4. To categorize the different kinds of security threats in databases and solutions available.
5. To correlate the various models and standards for security.

UNIT I ELEMENTARY CRYPTOGRAPHY 9

Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms- Data Encryption Standard- AES Encryption Algorithm – Public Key Encryption – Cryptographic Hash Functions – Key Exchange – Digital Signatures.

UNIT II PROGRAM SECURITY 9

Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code – Controls Against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project Flaws - Electronic CodeBook (ECB)

UNIT III SECURITY IN NETWORKS 9

Threats in networks – Virtual Private Networks – PKI – SSL – IPSec – Content Integrity – Access Controls – Honeypots – Traffic Flow Security – Firewalls – Intrusion Detection Systems – Secure e-mail- Cipher Block Chaining (CBC)

UNIT IV SECURITY IN DATABASES 9

Security requirements of database systems – Reliability and Integrity in databases – Redundancy – Recovery – Concurrency/ Consistency – Monitors – Sensitive Data – Types of disclosures – Inference-finding and confirming sql injection- Information Security Project Ideas - Blowfish

UNIT V SECURITY MODELS AND STANDARDS 9

Secure SDLC – Security architecture models – Bell-La Padula Confidentiality Model – Biba Integrity Model – Graham-Denning Access Control Model – Harrison-Ruzzo-Ulman Model – Secure Frameworks – COSO – CobiT – Security Standards - ISO 27000 family of standards – NIST.

TOTAL HOURS: 45

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 Descriptive CAT 2 Descriptive	Unit1:Mcq on Public Key Encryption Unit2:McqElectronic Code Book (ECB) Unit 3: Assignment on Honeypots Unit4:McqReliability and Integrity in databases Unit5:Mcq on Bell-La Padula Model	Descriptive type questions

Suggested Activities

Unit 1: Assignment onData Encryption Standard

Unit 2: Discussion on User Authentication

Unit 3: brainstorming about Concurrency/ Consistency

Unit 4:comparative study- Types of Firewalls

Unit 5: Assignment-– Security architecture models

Outcomes

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

CO1 Define cryptographic algorithms for encrypting and decryption for secure data transmission.

CO2 Illustrate the importance of Digital signature for secure e-documents exchange.

CO3 Demonstrate about the security services available for internet and web applications.

CO4 Demonstrate data vulnerability and sql injection.

CO5 Present the various security models and published standards.

REFERENCE BOOKS

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing",Fourth Edition, Pearson, 2018
2. William Stallings, "Cryptography and Network security Principles and Practices", Pearson/PHI,2017.

CO Vs PO Mapping and CO Vs PSO Mapping

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

4	1	1	1	1	1					1	-	1	1	
5	1	2	1	2	1					1	2	1	1	

21CA2202 INFORMATION SECURITY AND AUDIT L T P C

3 0 0 3

PREAMBLE

An information security and audit is an audit on the level of information security in an organization. It is an independent review and examination of system how the roles and responsibilities are followed in an organization or any field.

OBJECTIVES:

1. To define the fundamental concepts in network security
2. To relate the latest trend of computer attack and defense
3. To experiment withserver side security concepts.
4. To make use of auditing security in organization
5. To practice with the various approaches in audit

PRE-REQUISITE:

- Computer networks

UNIT I OVERVIEW 9

A model for Internetwork security-Conventional Encryption Principles & Algorithms (DES, AES, RC4, Blowfish), Block Cipher Modes of Operation, Location of Encryption Devices, Key Distribution. Public key cryptography principles, public key cryptography algorithms (RSA, Diffie-Hellman, ECC), public Key Distribution

UNIT II APPROACHES OF MESSAGE AUTHENTICATION 9

Approaches of Message Authentication-Secure Hash Functions (SHA-512, MD5) and HMAC, Digital Signatures, Kerberos, X.509 Directory Authentication Service, Email Security: Pretty Good Privacy (PGP) IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT III WEB SECURITY 9

Web Security-Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). Firewalls: Firewall Design principles, Trusted Systems, Intrusion Detection Systems

UNIT IV AUDITING FOR SECURITY 9

Auditing For Security:Introduction, Basic Terms Related to Audits, Security audits, The Need for Security Audits in Organization, Organizational Roles and Responsibilities for Security Audit, Auditors Responsibility In Security Audits, Types Of Security Audits.

UNIT V **APPROACHES IN AUDITING** **9**

Approaches to Audits, Technology Based Audits Vulnerability Scanning And Penetration Testing, Resistance to Security Audits, Phase in security audit, Security audit Engagement Costs and other aspects, Budgeting for security audits, Selecting external Security Consultants, Key Success factors for security audits

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	Unit 1: MCQs on different types algorithms like (AES, RSA, etc.,) Unit 2: Problems on encryptions and decryptions Unit 3: Quiz on Web Security, SSL, TLS, TES. Unit 4: Write down the Roles and Responsibilities of Audit. Unit 5: Quiz on key success factors on security Audit.	**Descriptive type questions**
Suggested Activities **Unit 1: Identifying the difference between different algorithms.** **Unit 2: Assignment 1- Solving a problem using RSA algorithm.** **Unit 3: Demonstrate web security measures.** **Unit 4: Assignment 2 – Importance of security audit.** **Unit 5: Implementation of external security persons.**		
Outcomes		
Upon completion of the course, the students will be able to:		

CO1 Define fundamental concepts of information security and systems auditing

CO2 Demonstrate the latest trend of computer security threats and defence

CO3 Present security weaknesses in information systems, and rectify them with appropriate security mechanisms

CO4 Illustrate the security controls in the aspects of physical, logical and operational security control

CO5 Present thevariousapproaches in audit.

REFERENCE BOOKS

1. William Stallings ,"Cryptography and Network Security - Principles and Practice" Seventh Edition, Pearson 2017.
2. Behrouz A. Forouzan&Debdeep Mukhopadhyay, "Cryptography And Network Security"

Third Edition, Mc Graw Hill 2015

WEB RESOURCES

1. https://intigrow.com/information-security-audits.html
2. https://itglobal.com/services/info-security/security-audit/

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA2203 DIGITAL IMAGE PROCESSING L T P C

3 0 0 3

PREAMBLE

This course is offered in 3rd semester of MCA programme in the department of Computer Applications as a professional elective theory subject. This course offers the knowledge about the image processing techniques.

PRE-REQUISITE:

- **NIL**

OBJECTIVES:

1. To study the basic principles of digital image processing.
2. To develop an algorithm for image transformation and enhancement.
3. To experiment with the techniques of image restoration and construction.
4. To develop an algorithm for image compression and Segmentation.
5. To examine the concepts of Multispectral image processing and its algorithms.

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Introduction: Digital Image- Steps of Digital Image Processing Systems-Elements of Visual Perception -Connectivity and Relations between Pixels. Simple Operations- Arithmetic, Logical, Geometric Operations. Mathematical Preliminaries - 2D Linear Space Invariant Systems - 2D Convolution - Correlation 2D Random Sequence - 2D Spectrum.

UNIT II IMAGE TRANSFORMS AND ENHANCEMENT 9

Image Transforms: 2D Orthogonal and Unitary Transforms-Properties and Examples. 2D DFT-FFT – DCT - Hadamard Transform - Haar Transform - Slant Transform - KL Transform -Properties And Examples. Image Enhancement: - Histogram Equalization Technique- Point Processing-Spatial Filtering-In Space And Frequency - Nonlinear Filtering-Use Of Different Masks.

UNIT III IMAGE RESTORATION AND CONSTRUCTION 9

Image Restoration: Image Observation And Degradation Model, Circulant And Block Circulant Matrices and Its Application In Degradation Model - Algebraic Approach to Restoration- Inverse By Wiener Filtering – Generalized Inverse-SVD And Interactive Methods - Blind Deconvolution-Image Reconstruction From Projections.

UNIT IV IMAGE COMPRESSION & SEGMENTATION 9

Image Compression: Redundancy And Compression Models -Loss Less And Lossy. Loss Less-Variable-Length, Huffman, Arithmetic Coding - Bit-Plane Coding, Loss Less Predictive Coding, Lossy Transform (DCT) Based Coding, JPEG Standard - Sub Band Coding. Image Segmentation: Edge Detection - Line Detection - Curve Detection - Edge Linking And Boundary Extraction, Boundary Representation, Region Representation And Segmentation, Morphology-Dilation, Erosion, Opening And Closing. Hit And Miss Algorithms Feature Analysis

UNIT V COLOR AND MULTISPECTRAL IMAGE PROCESSING 9

Color Image-Processing Fundamentals, RGB Models, HSI Models, Relationship Between Different Models. Multispectral Image Analysis - Color Image Processing Three Dimensional Image Processing-Computerized Axial Tomography-Stereometry-Stereoscopic Image Display-Shaded Surface Display.

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Unit – 1 –** MCQs on fundamentals of Image processing. **Unit – 2 –** Quiz on Transformations & Editing of image. **Unit –3–** Assignments on Image restorations & Creations. **Unit – 4 –** MCQs on Image compression & segmentations.	**Descriptive type question**

	Unit – 5 – Assignments to write techniques for processing the color image processing.	

Suggested Activities

Unit 1 – study about the Image processing fundamentals.

Unit 2 – How to transform and edit the images?

Unit 3 - Study and practice the image restorations & creations.

Unit 4 –Demonstration on compress and segment the image while processing

Unit 5 -Connect the cloud for IoT applications.

Outcomes

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

CO1 Define fundamental concepts of digital image processing system.

CO2 Demonstrate images in the frequency domain using various transforms and enhancement.

CO3 Perform the techniques for image enhancement and image restoration.

CO4 Present various compression techniques and interpret Segmentation.

CO5 Surveythe colors and various techniques of Image Processing.

REFERENCE BOOKS

1. Rafael C.Gonzalez, Richard E Woods, Digital Image Processing, Pearson Education, 4th edition, March 2017.
2. William K. Pratt , Introduction to Digital Image Processing, 1 st Edition, Sep 2013
3. Maria M. P. Petrou, Costas Petrou, Image Processing: The Fundamentals, Wiley , 2nd Edition, 2010

WEB RESOURCES

1. https://nptel.ac.in/courses/117/105/117105079/

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA2204 AUGMENTED REALITY AND VIRTUAL REALITY **L T P C**

3 0 0 3

PREAMBLE

The course introduces the application of the Augmented Reality (AR) and. Virtual Reality (VR) in the design process to efficiently incorporate userexperience, identifying and resolving conflicts in real life like settings andsaving on costs etc. The course further dwells into prospects of 3D and walkthroughtechnology in architectural and engineering applications which can bedirectly automated to create AR-VR environments through guided sitevisits to World's famous places.

PRE-REQUISITE:

- NIL

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 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials** **Unit – 1 –** MCQs on fundamental concepts of VR **Unit – 2 –** Quiz on haptic interaction. **Unit –3–** Assignments on processes of operating systems. **Unit – 4 –** MCQs General solution for calculating geometric & illumination Consistency in the augmented environment. **Unit – 5 –** Assignments to write the applications project ideas with developments tools	**Descriptive type question**

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:

CO1 Design and Create user environment

CO2 Demonstrate VR through simple applications

CO3 Have Familiarity with Augmented Reality and Mixed Reality Development platforms

CO4 Use techniques to combine AR and VR to generate Augmented Virtuality

CO5 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	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1	3	3	2							3		2		3
2	3	3	2		3					3		2		3
3	3	3	2		3					3		2		3
4	3	3	2		3					3		2		3
5	3	3	2		3					3		2		3
6	3	3	2		3					3		2		3

21CA2205 REAL TIME EMBEDDED SYSTEMS L T P C

3 0 0 3

PREAMBLE:

This course is offered in 3rd semester of MCA programme in the department of Computer Applications as a professional elective theory subject. This course offers the knowledge about the real time embedded system techniques and building internet of things.

PRE-REQUISITE:

- Problem solving in Programming with C

OBJECTIVES:

1. To understand the concepts of embedded system design and analysis
2. To learn the architecture and programming of ARM processor
3. To understand the challenges in developing operating systems for embedded systems
4. To apply the concept of Internet of Things in real world scenario.
5. To deploy IOT application and connect to the cloud

UNIT I INTRODUCTION TO EMBEDDED SYSTEM DESIGN 9

Complex systems and microprocessors– Embedded system design process –Design example: Model train controller- Design methodologies- Design flows – Requirement Analysis – Specifications- System analysis and architecture design – Quality Assurance techniques - Designing with computing platforms – consumer electronics architecture.

UNIT II ARM PROCESSOR AND PERIPHERALS 9

ARM Architecture Versions – ARM Architecture – Instruction Set – Stacks and Subroutines – Features of the LPC 214X Family – Peripherals – The Timer Unit – Pulse Width Modulation Unit – UART – Block Diagram of ARM9 and ARM Cortex M3 MCU .

UNIT III **PROCESSES AND OPERATING SYSTEMS** **9**

Introduction – Multiple tasks and multiple processes – Multirate systems- Preemptive real time operating systems- Priority based scheduling- Interprocess communication mechanisms – Evaluating operating system performance- power optimization strategies for processes – Example Real time operating systems-POSIX-Windows CE. - Distributed embedded systems – MPSoCs and shared memory multiprocessors

UNIT IV **FUNDAMENTAL OF IOT** **9**

Introduction and Characteristics – Physical and Logical Design – IoT Protocols: Link Layer Protocols, Network Layer Protocols, Transport Layer and Application Layer Protocols – IoT Levels – IoT versus M2M – Sensors and Actuators – Power Sources

UNIT V **BUILDING IOT & APPLICATIONS** **9**

Open Hardware Platforms: Interfaces, Programming, APIs and Hacks – Web Services – Integration of Sensors and Actuators with Arduino/ Raspberry Pi/ Other Light Weight Boards . Complete Design of Embedded Systems – Smart Cities: Smart Parking, Smart Traffic Control, Surveillance. Cloud Storage and Communication APIs: WAMP

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials** **Unit – 1 –** MCQs Embedded system design. **Unit – 2 –** Quiz on ARM process and peripherals. **Unit –3–** Assignments on processes of operating systems. **Unit – 4 –** MCQs on IoT fundamentals in real worlds. **Unit – 5 –** Assignments to write the IoT applications project ideas for cloud data management	**Descriptive type question**

Suggested Activities

Unit 1 – How to create the embedded system design?
Unit 2 – How to create an ARM processes?
Unit 3 - Study about the process of various operating systems.
Unit 4 - Create an IoT projects with basic fundamentals.

Unit 5 - To connect the cloud for IoT applications.

Outcomes

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

CO1 Outline the concepts of embedded systems

CO2 Describe the architecture and programming of ARM processor

CO3 Explain the concepts in the design of operating systems

CO4 Familiarize with fundamentals of IoT

CO5 Develop applications of IoT in real time scenario.

REFERENCE BOOKS

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015.
2. David Hanes, "IoT Fundamentals, Networking Technologies, Protocols, and Use cases for the Internet of Thing", Cisco Press, 2017
3. Rajkamal, "Embedded Systems: Architecture, Programming and Design" , Third edition , McGraw Hill ,2011
4. Peter Marwedel, "Embedded system design",4th Edition Springer 2021.

WEB RESOURCES

1. https://nptel.ac.in/courses/108105057

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA2206 SOFTWARE PROJECT MANAGEMENT L T P C

3 0 0 3

PREFACE:

This subject is provide a framework that enables the manager to make reasonable estimates of resources, cost, and schedule.

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.

PRE-REQUISITE:

- Software Engineering

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

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

CAT 1 & CAT 2 – Descriptive type questions	**Unit 1:** MCQs on software project planning **Unit 2:** Evaluating the software like top-down and bottom-up methods. **Unit 3:** Estimate the software project using the decomposition technique. **Unit 4:** Identification and analysis for the software project to reduce the risk. **Unit 5**: MCQ's on Challenges in building global teams	**Descriptive type question**

Outcomes

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

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

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

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

CO4 Survey the various risks available in the Software Management.

CO5 Demonstrate the Global standards and social impacts on globalization.

REFERENCE BOOKS

1. Project Management Tool Box_ Tools and Techniques for the Practicing Project Manager.

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc19_cs70/preview

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA2207 RESEARCH METHODOLOGY AND IPR

L	T	P	C
3	0	0	3

PREAMBLE:

This course is offered in 3rd semester of MCA programme in the department of Computer Applications as a professional elective theory subject. This course offers the knowledge about the research methodologies and building a patents.

PRE-REQUISITE:

NIL

OBJECTIVES:

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

UNIT I **RESEARCHDESIGN** **9**

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

UNITII **DATA COLLECTION AND SOURCES** **9**

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

UNIT III **DATA ANALYSIS AND REPORTING** **9**

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

UNIT IV **INTELLECTUAL PROPERTY RIGHTS** **9**

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

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

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

TOTAL HOURS: 45 HRS

Suggestive Assessment Methods		
Continuous Assessment Test (30Marks)	**Formative Assessment Test (20Marks)**	**End Semester Exams (50Marks)**
CAT 1 & CAT 2 – Descriptive type	**Unit – 1 –** MCQ's on Qualitative research methods. **Unit – 2 –** Problems on	**Descriptive type question**

questions	measuring the data samplings. **Unit –3–** MCQ's on multivariate analysis & hypothesis testing on data. **Unit – 4 –** MCQ's on rights & common rules of IPR. **Unit – 5 –** MCQ's on Grant & licencing of patent.	

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.

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA2208 Principles in Programming Languages

L	T	P	C
3	0	0	3

PREAMBLE:

This course is offered to the MCA programme as a Principles of Programming Languages explore language design complexities, syntax, semantics, and pragmatics, offering a roadmap for robust, efficient software systems.

PRE-REQUISITE:

- NIL

OBJECTIVES:

6. To understand and describe syntax and semantics of programming languages
7. To understand data, data types, and basic statements
8. To understand call-return architecture and ways of implementing them
9. To understand object orientation, concurrency, and event handling in programming languages
10. To introduce DevOps terminology, definition & concepts

UNIT I **SYNTAX AND SEMANTICS** **9**

Evolution of programming languages – describing syntax – context-free grammars – attribute grammars – describing semantics – lexical analysis – parsing – recursive-descent – bottom-up parsing

UNIT II **DATA, DATA TYPES, AND BASIC STATEMENTS** **9**

Names – variables – binding – type checking – scope – scope rules – lifetime and garbage collection – primitive data types – strings – array types – associative arrays – record types – union types – pointers and references – Arithmetic expressions – overloaded operators – type conversions – relational and boolean expressions – assignment statements – mixed mode assignments – control structures – selection – iterations – branching – guarded statements

UNIT III **SUBPROGRAMS AND IMPLEMENTATIONS** **9**

Subprograms – design issues – local referencing – parameter passing – overloaded methods – generic methods – design issues for functions – semantics of call and return – implementing simple subprograms – stack and dynamic local variables – nested subprograms – blocks – dynamic scoping

UNIT IV **OBJECT ORIENTATION, CONCURRENCY, AND EVENT HANDLING** **9**

Object-orientation – design issues for OOP languages – implementation of object-oriented

constructs – concurrency – semaphores – monitors – message passing – threads – statement level concurrency – exception handling – event handling

UNIT V INTRODUCTION TO DEV OPS 9

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

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (61 Marks)**
CAT 1 & CAT 2 – Descriptive type questions	**Unit – 1** Online Quiz in lexical analysis **Unit –2 MCQs** on primitive data types **Unit – 3** Write functions to the semantics of call and return **Unit–4** Assignments on statement-level concurrency **Unit – 5 MCQs** MCQs on AWS,GCP,Azure and version control tools.	**Descriptive type question**

Suggested Activities

Unit – 1 Logical Thinking demonstration
Unit – 2 Demonstration of arrays and operators
Unit – 3 Hands-on training on Stack
Unit – 4 Assignments on Semaphores and Exception Handling
Unit – 5 Studying about the various version control tools.

Outcomes

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

CO1	Describe the syntax and semantics of programming languages
CO2	Explain data, data types, and basic statements of programming languages
CO3	Design and implement subprogram constructs
CO4	Apply object-oriented, concurrency, and event-handling programming constructs and Develop programs in Scheme, ML, and Prolog
CO5	Understand different actions performed through Version control tools like Git.

REFERENCE BOOKS

6. Robert W. Sebesta, "Concepts of Programming Languages", Twelfth Edition (Global Edition), Pearson, 2022.
7. Michael L. Scott, "Programming Language Pragmatics", Fourth Edition, Elsevier, 2018.
8. R. Kent Dybvig, "The Scheme programming language", Fourth Edition, Prentice Hall, 2011.

9. Jeffrey D. Ullman, "Elements of ML programming", Second Edition, Pearson, 1997.
10. Roberto Vormittag, "A Practical Guide to Git and GitHub for Windows Users: From Beginner to Expert in Easy Step-By-Step Exercises", Second Edition, Kindle Edition, 2016.

WEB RESOURCES

2. https://nptel.ac.in/courses/106102067
3. https://www.section.io/engineering-education/understanding-fundamentals-programming-principles/
4. https://github.com/webpro/programming-principles
5. 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	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	3	2	1	-	-	-	-	-	-	3	2	3
2	3	3	3	2	2	-	-	-	-	-	-	3	2	3
3	3	3	3	2	2	-	-	-	-	-	-	3	2	3
4	3	3	3	3	2	2	-	-	-	-	-	-	3	2
5	3	3	3	2	3	-	-	-	-	-	-	-	2	2

PROFESSIONAL ELECTIVE II

21CA3201 E COMMERCE AND BUSINESS INTELLIGENCE

L	T	P	C
3	0	0	3

PREAMBLE:

This course provides the crucial role of Business Intelligence in e-commerce industries and how it transforms and improves data management and proficiency.

PRE-REQUISITE:

- Internet management

OBJECTIVES:

1. To learn about the basics in E Commerce.
2. To understand the infrastructure.
3. To use the marketing strategies
4. To be familiar with business intelligence
5. To experiment handling of data.

UNIT I INTRODUCTION TO E-COMMERCE **9**

Electronic commerce and physical commerce - Economic forces – advantages – myths - business models

UNIT II TECHNOLOGY INFRASTRUCTURE 9

Internet and World Wide Web, internet protocols - FTP, intranet and extranet - cryptography, information publishing technology- basics of web server hardware and software

UNIT III BUSINESS APPLICATIONS 9

Consumer oriented ecommerce – retailing and models - Marketing on web – advertising, e-mail marketing, e-CRM; Business oriented ecommerce – E-Government, EDI on the internet, SCM; Web Auctions, Virtual communities and Web portals

UNIT IV BUSINESS INTELLIGENCE ESSENTIALS 9

Introduction, Creating Business Intelligence Environment, Business Intelligence Landscape, Types of Business Intelligence, Business Intelligence Platform, Dynamic roles in Business Intelligence, Roles of Business Intelligence in Modern Business- Challenges of BI

UNIT V STARTUP METHODOLOGY 9

Business Model Canvas and Lean Start up Methodology-creating a business model canvas for start up ideas-Lean start up principles and iterative product development-Validating ideas through minimum viable products (MVPs) and prototypes-Product Market Fit Methodology.

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	Unit 1: MCQs on E-Commerce basics and myths. Unit 2: Importance of hardware software and client server modules. Unit 3: Quiz on Applications available in the market. Unit 4: Implementation of Business Intelligence. Unit 5: Quiz on startup prototypes	Descriptive type questions
Suggested Activities **Unit 1: Importance of E-commerce in business.** **Unit 2: Assignment 1- Hardware and Software and Client & Server.** **Unit 3: Give example E-commerce Applications or websites.**		

Unit 4: Write an example scenario for implementing Business Intelligence. **Unit 5: Assignment 2- Start up ideas**
Outcomes
Upon completion of the course, the students will be able to:

CO1 Study E commerce strategies

CO2 Design the marketing etiquettes

CO3 Understand business processes

CO4 Apply business intelligence system

CO5 Create E commerce data modeling

REFERENCE BOOKS

1. Hentry Chan &el, "E-Commerce – fundamentals and Applications", Wiley India Pvt Ltd, 2007
2. Bharat Bhasker, "Electronic Commerce – Frame work technologies and Applications", 3rd Edition. Tata Mc Graw Hill Publications, 2008.
3. Cindi Howson, "Successful Business Intelligence: Secrets to Making BI a Killer App", McGraw Hill Professional, 17-Dec-2007 - Computers - 244 pages
4. G.Sreedhar, "Improving E-Commerce web applications through business intelligence techniques", IGI Global 2018

CO Vs PO Mapping and CO vs PSO Mapping

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

21CA3202 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:

- Computer Networks

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: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials** **Unit 1:** Block chain components **Unit2:** Centralization verses decentralization	**Descriptive type question**

	Unit 3: Hot and cold storage **Unit 4:** Mining pools **Unit5:**Applications considerations	

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 Understand the basics of cryptography and Block chain Technologies

CO2 Understand 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 Understand the tools used for mining bit coins and anonymity.

CO5 Understand the 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	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1	3	2	1	2	2	1								3
2	3	2	2	2	1	1								3
3	3	2	2	2	2	2								3
4	3	2	2	2	3									3
5	2	2	1	1	2	1								2

21CA3203 CYBER SECURITY AND FORENSICS L T P C

3 0 0 3

PREAMBLE

This course is offered to MCA programme as an Elective Course. This course will enable the students to acquire knowledge about Cyber Security fundamentals and explore the basics of Cyber security and Forensics

PRE-REQUISITE:

Network Security

OBJECTIVES:

1. To Understand the cyber security needs of an organization.
2. To practice software vulnerabilities and security solutions to reduce the risk of exploitation.
3. To Measure the performance and troubleshoot cyber security systems
4. To Implement cyber security solutions
5. To develop security architecture, strategies and policies for an organization.

UNIT I INTRODUCTION TO CYBER SECURITY 9

Overview of Cyber Security, Internet Governance – Challenges and Constraints - Cyber Threats:- Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage, Need for a Comprehensive Cyber Security Policy - Need for a Nodal Authority - Need for an International convention on Cyberspace.

UNIT II CYBER SECURITY VULNERABILITIES AND SAFEGUARDS 9

Cyber Security Vulnerabilities-vulnerabilities in software - System administration - Complex Network Architectures - Open Access to Organizational Data - Weak Authentication- Unprotected Broadband communications - Poor Cyber Security Awareness. Cyber Security Safeguards- Access control – Audit – Authentication – Biometrics – Cryptography- Deception - Denial of Service Filters - Man-in-the-middle attack - Ethical Hacking - Firewalls - Intrusion Detection Systems – Response – Scanning - Security policy - Social engineering attacks, Spoofing - Phishing cyber-attacks - Threat Management.

UNIT III INTRUSION DETECTION AND PREVENTION 9

Intrusion - Physical Theft - Abuse of Privileges - Unauthorized Access by Outsider - Malware infection - Intrusion detection and Prevention Techniques - Anti-Malware software - Network based Intrusion detection Systems - Network based Intrusion Prevention Systems - Host based Intrusion prevention Systems - Security Information Management - Network Session Analysis - System Integrity Validation.

UNIT IV CRYPTANALYSIS 9

Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography,

Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security - Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS - Security at Network Layer-IPSec.

UNIT V **CYBER FORENSICS** **9**

Introduction to Cyber Forensics - Handling Preliminary Investigations - Controlling an Investigation - Conducting disk-based analysis - Investigating Information-hiding - Scrutinizing E-mail - Validating E-mail header information - Tracing Internet access - Tracing memory in real-time.

TOTAL HOURS: 45

REFERENCE BOOK(S):

1. Bhushan Mayank, Fundamentals of Cyber Security, BPB Publications, 2020
2. Dr.Namrata Agrawal, Comdex Cyber Security A Complete Solution, Dreamtech Press.
3. Roger A. Grimes, Hacking the Hacker, Jonathan Todd Ross, Audio book.
4. Yuri Diogenes, ErdalOzkaya, Cybersecurity – Attack and Defense Strategies, 2nd Edition, Packt 2019
5. Gerard Johansen, Digital Forensics and Incident Response, 2nd Edition Paperback, 2020
6. NillakshiJain," Cyber Security and cyber law" Willey Publications 2020.

WEB RESOURCE(S):

1. https://www.nist.gov/topics/cybersecurity
2. https://www.sans.org/blog/
3. https://us-cert.cisa.gov/resources/cybersecurity-framework

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials** Unit1:Mcq on Cyber Threats Unit2:McqonWeak Authentication Unit3:AssignmentIntrusion detection Systems Unit 4: Mcq on VPN Security Unit5:Mcq on Scrutinizing E-mail	**Descriptive type question**

Suggested Activities

Unit 1: Assignment on Cyber terrorism

Unit 2: Discussion on Biometrics

Unit 3: brainstorming about Security Information Management

Unit 4: Seminar on Security Protocols

Unit 5: Assignment- disk-based analysis

Outcomes

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

CO1 An computing requirements appropriate to its solution.

CO2 Build a computer-based solution to meet a given set of computing requirements in the context of the discipline.

CO3 Implement effectively on teams to establish goals, plan tasks, meet deadlines, manage risk and produce deliverables.

CO4 Execute effectively with a range of audiences about technical information.

CO5 Apply security principles and practices to the environment, hardware, software, and human aspects of a system.

CO Vs PO Mapping and CO vs PSO Mapping

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

21CA3204 ADHOC AND SENSOR NETWORK L T P C

3 0 0 3

PREAMBLE:

This course is offered to MCA programme to improve the knowledge of sensor network. This course to provide the knowledge of connection based protocols. This course support the sensor network communication protocols. This course is to provide the students very well knowledge in sensor wireless network.

PRE-REQUISITE:

- Computer Networks

OBJECTIVES:

1. To create a Sensor network environment for different type of applications
2. To design ad-hoc and sensor network architectures using QoS and Congestion control mechanisms
3. To interpret the various control fields of the protocol in each layer
4. To select appropriate routing algorithms for different network environments
5. To deploy security mechanisms in the wireless ad-hoc and sensor networks.

UNIT I ADHOC NETWORKS FUNDAMENTALS & COMMUNICATIONPROTOCOLS 9

Fundamentals Of WLANs – IEEE 802.11 Architecture - Self Configuration and Auto Configuration-issues in Ad-Hoc Wireless Networks – MAC Protocols for Ad-Hoc Wireless Networks – Contention Based Protocols - TCP Over Ad-Hoc Networks-TCP Protocol Overview - TCP and MANETs – Solutions for TCP Over Ad-Hoc Networks

UNIT II ADHOC NETWORK ROUTING AND MANAGEMENT 9

Routing in Ad-Hoc Networks- Introduction -Topology based versus Position based Approaches – Proactive Routing - DSDV, WRP, TBRPF Reactive Routing – DSR,AODV, Hybrid Routing Approach ZRP, CBRP- Location services - DREAM – Quorums based Location Service – Forwarding Strategies – Greedy Packet Forwarding, LAR.

UNIT III SENSOR NETWORK COMMUNICATION PROTOCOLS 9

Introduction – Architecture - Single Node Architecture – Sensor Network Design Considerations – Energy Efficient Design Principles for WSN‟s – Protocols for WSN – Physical Layer - Transceiver Design Considerations – MAC Protocols for wireless sensor network – IEEE 802.15.4 Zigbee – Link Layer and Error Detection and Control Issues - Routing Protocols – Gossiping and agent based unicast forwarding, Energy efficient unicast –Transport Protocols &QoS – Congestion Control Issues – Application specific Support

UNIT IV SENSOR NETWORK MANAGEMENT AND PROGRAMMING 9

Sensor Management - Topology Control Protocols and Sensing Mode Selection Protocols - Time Synchronization - Localization and Positioning – Operating Systems and Sensor Network Programming – Sensor Network Simulators- Case study: Industrial automation and tsunami early warning system with wireless sensor networks

UNIT V ADHOC AND SENSOR NETWORK SECURITY 9

Security in Ad-Hoc and Sensor Networks – Key Distribution and Management – Software based Anti-tamper Techniques – Water Marking techniques – Defense against Routing Attacks - Secure Adhoc Routing Protocols – Broadcast Authentication WSN Protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS

TOTAL HOURS: 45

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	Unit 1: Write the applications of TCP/IP protocols. Unit 2: Identify the strategies can be used in adhoc network security management. Unit 3: List out an issues on routing protocols. Unit 4: Case Study: Tsunami early system with wireless sensor networks. Unit 5: Write the techniques can be used in an adhoc sensor network security.	**Descriptive type question**

Outcomes

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

CO1 Understand the basics of Ad-hoc & Sensor Networks

CO2 Learn various fundamental and emerging protocols of all layers in ad-hoc network

CO3 Study about the issues pertaining to major obstacles in establishment and efficient management of ad-hoc and sensor networks

CO4 Understand the nature and applications of ad-hoc and sensor networks

CO5 Understand various security practices and protocols of Ad-hoc and Sensor Networks

REFERENCE BOOKS

1. AD HOC & SENSOR NETWORKS Theory and Applications Carlos de Morais Cordeiro Dharma Prakash Agrawal
2. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2007
3. C.Siva Ram Murthy and B.S.Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2011

WEB RESOURCES

1. **https://nptel.ac.in/courses/106105160/**

CO Vs PO Mapping and CO vs PSO Mapping

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

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

21CA3205 HIGH PERFORMANCE COMPUTING L T P C

3 0 0 3

PREAMBLE:

This course is offered to MCA programme is used to network communication to synchronize transmission timing two or more systems. This course is depending on the network communication technology in use. It is used to create simulations, eliminating the need for physical tests.

OBJECTIVES:

1. To learn about Modern Processors and concepts
2. To understand the concepts of optimizations
3. To learn about Parallel Computers and Programming
4. To Study about Memory Parallel Programming using OpenMP.
5. To understand parallel programming with MPI.

PRE-REQUISITE:

- Computer Architecture

UNIT I MODERN PROCESSORS **9**

Stored Program Computer Architecture- General purpose cache-based microprocessor - Performance based metrics and benchmarks-Moore's Law – Pipelining –Super scalarity-SIMD Memory Hierarchies – Cache mapping – prefetch- Multicore processors-Mutithreaded processors - Vector Processors- Design Principles- Maximum performance estimates- Programming for vector architecture.

UNIT II BASIC OPTIMIZATION TECHNIQUES FOR SERIALCODE 9

Scalar profiling- Function and line based runtime profiling- Hardware performance counters- Simple measures large impact - Elimination of common sub expressions- Avoiding branches- Using SIMD instruction sets- The role of compilers – General optimization - Inlining – Aliasing- Computational Accuracy- Register optimizations Using compiler logs- C++ optimizations – Temporaries - Dynamic memory management- Loop kernels and iterators Data Access Optimization: Balance analysis and light speed estimates - Storage order.

UNIT III PARALLEL COMPUTERS 9

Taxonomy of parallel computing paradigms- Shared memory computers- Cache loherence- UMA – ccNUMA - Distributed-memory computers- Hierarchical systems- Networks Basic performance characteristics- Buses- Switched - and fat tree networks- Mesh networks- Hybrids Basics of parallelization– Data Parallelism – Function Parallelism - Parallel Scalability- Factors that limit parallel execution- Scalability metrics- Simple scalability laws - parallel efficiency – serial performance Vs Strong scalability- Refined performance models - Choosing the right scaling baseline

UNIT IV SHARED MEMORY PARALLEL PROGRAMMINGWITH OPENMP 9

Introduction to OpenMP – Parallel execution – Data scoping OpenMP work sharing for loops- Synchronization – Reductions - Loop Scheduling – Tasking – Case Study: OpenMP- parallel Jacobi algorithm- Advanced Open MPwavefront parallelization - Efficient Open MProgramming: Profiling OpenMP programs –Performance pitfalls

UNIT V DISTRIBUTED-MEMORY PARALLEL PROGRAMMINGWITH MPI 9

Message passing – Introduction to MPI- Messages and point-to-point communication - Nonblocking point-to-point communication- Virtual topologies –MPI parallelization of Jacobi solver - performance properties Efficient MPI programming: MPI performance tools- communication parameters - Synchronization, serialization, contention- Reducing communication - overhead optimal domain decomposition- Aggregating messages – Nonblocking Vs Asynchronous communication- Collective communication- Understanding intra node P-to-P communication.

TOTAL HOURS: 45

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Unit 1: Give the pipeline design of multi thread processors?** **Unit 2: Illustrate the techniques can be used for loop optimization.** **Unit 3: Explain the applications of parallel computing in HPC.** **Unit 4: Draw a neat diagram for Open MP program execution possibilities.** **Unit 5: Compare Open MP and MPI in distributed memory parallel programming**	**Descriptive type questions**

Suggested Activities

Unit 1: Draw a neat sketch for HPC architecture and system design.

Unit 2: Explain the balancing analysis and how to measure light speed.

Unit 3: Draw parallel computer networks as a mesh.

Unit 4: Case Study: Parallel Jacobi algorithm

Unit 5: Compare Non -blocking vs Asynchronous Communication.

Outcomes

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

CO1:Perform complex calculations.

CO2: Improve the time and space requirement of the generated target code.

CO3: Compare the parallelism techniques for different processors.

CO4: Understand parallel program techniques with OpenMP.

CO5: Understand distributed parallel programming with MPI.

REFERENCE BOOKS

1. Georg Hager, Gerhard Wellein, "Introduction to High Performance Computing for Scientists and Engineers", Chapman & Hall / CRC Computational Science series, 2011.

WEB RESOURCES

1. https://insidehpc.com/hpc-basic-training/what-is-hpc/

CO Vs PO Mapping and CO vs PSO Mapping

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

21CA3206 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 a professional elective theory subject. This course offers the knowledge about the real time applications 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:

- Internet of Things& Cloud Computing

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 & CAT 2 – Descriptive type questions	**Unit – 1 –** MCQ's on Qualitative research methods. **Unit – 2 –** Problems on measuring the data samplings.	**Descriptive type question**

	Unit –3– MCQ's on multivariate analysis & hypothesis testing on data. **Unit – 4 –** MCQ's on rights & common rules of IPR. **Unit – 5 –** MCQ's on Grant & licencing of patent.	

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 Provide the agent strategy to solve a given problem

CO2 Use appropriate search algorithms for any AI problem

CO3 Represent a problem using first order and predicate logic

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	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
1	2	2				2		3	3					2
2	2	2	3				3		3					2
3	2	2	2				2	2	3		3			2
4	2	2			2				3	3	2	2		2
5	2	2		2	2	3	2	2				2		2

21CA3207 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 to provide the knowledge of software development tools. This course support to helps better modularized, extensible, and flexible code. This course is to provide the students very well knowledge in software development process.

PRE-REQUISITE:

- Software Engineering

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 Clan 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 (30 Marks)**	**End Semester Exams (50 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Unit – 1** Assignment on Test Driven development. **Unit – 2** Development of Test Cases for complex projects **Unit – 3** MCQs on Existing system in TDD **Unit – 4** Development of test cases using TDD **Unit – 5** MCQ's on patterns	**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: Identify the concepts of existing types of testing.

CO4: Apply the TDD frameworks for a complex problem

CO5: Familiar with 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	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1	3			2	1		1							
2	2		1	1	2		1							
3	2		1	2	1		1							
4	2			1	1									
5	2	1	1		2		1							

21CA3215 UI & UX Design L T P C

3 0 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:

- **NIL**

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	**UNIT-1 - Evaluate final product of design thinking** **UNIT-2 – Evaluate the designs based on UI principles** **UNIT-3 – Customer problem assessment** **UNIT-4 – MCQ-User research by user story and scenarios** **UNIT-5- Assignment for wireframe by usability**	**Descriptive type**
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 (User stories, Scenarios), 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** Know 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	PO9	PO 10	PO11	PO12	PSO1	PSO2
1	3	3		3							2		3	
2	3	3		3							2		3	
3	3	3		3							2		3	
4	3	3		3							2		3	
5	3	3		3							2		3	

PROFESSIONAL ELECTIVE III

21CA3208 NATURAL LANGUAGE PROCESSING WITH PYTHON

L	T	P	C
3	0	0	3

PREAMBLE:

This course is offered in 3rd semester of MCA programme in the department of Computer Applications as a professional elective theory subject. This course introduces the fundamental concepts and techniques of Natural Language Processing (NLP). The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.

OBJECTIVES:

1. To understand the basics of natural language processing.
2. To demonstrate word level analysis
3. To apply syntactic analysis
4. To develop programs for language processing.
5. To develop programs for categorizing text.

PRE-REQUISITE:

- Python programming

UNIT I INTRODUCTION **9**

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular

Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization using python, Detecting and Correcting Spelling Errors, Minimum Edit Distance, Case Study: Word cloud using python

UNIT II WORD LEVEL ANALYSIS 9

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Back off – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and information-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models

UNIT III SYNTACTIC ANALYSIS 9

Context-Free Grammars, Grammar rules for English, Treebank's, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures.

UNIT IV SEMANTICS AND PRAGMATICS 9

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT V DISCOURSE ANALYSIS AND LEXICAL RESOURCES 9

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC). Case study: Stemming using Python

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Unit – 1** MCQ's on Probability and Statistics for NLP Problems. **Unit – 2** MCQ's on tagging and word analysing. **Unit – 3** Problems to find the Context free grammar. **Unit – 4**Problems to find the first order logic in Given scenarios. **Unit – 5** MCQ's on Discourse	**Descriptive type question**

	analysis.	

Suggested Activities:

Unit 1 -- Find the appropriate research methods for given problem.
Unit 2 –Study about the word analysing techniques.
Unit 3 – Group discussion on context free grammar.
Unit 4 – Assignment to study about first logic order Logics.
Unit 5 – Assignment to study about the Discourse analysis.

Outcomes

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

CO1 Understand the expressions in NLP.

CO2 Learn the Visualizing Embedding's

CO3 Design models for neural language.

CO4 Demonstrate python programs for processing text.

CO5 Develop programs for tagging text.

REFERENCE BOOKS

1. Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech", Pearson Publication, 2014.
2. Breck Baldwin, Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.
3. YuliVasiliev," Natural Language Processing with Python and Spacy" ,No Starch Press,2020

WEB RESOURCES

1. **https://archive.nptel.ac.in/courses/106/105/106105158**

CO Vs PO Mapping and CO vs PSO Mapping

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

21CA3209 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 a 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:

- Basic knowledge in graphics and designing principles

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: 45

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

CAT 1 & CAT 2 - Descriptive type questions	Assignments, MCQs, Tutorials **Unit 1:** Write the concepts of bump mapping and advanced texturing. **Unit 2:** Identify and apply principles of game design and game playing. **Unit 3:** MCQs on rendering concepts **Unit 4:** Can two game objects, each with only an sphere collider, both set as trigger and raise On Trigger Events? Explain **Unit 5:** What Are The Problems You Might Face	**Descriptive type question**

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 Illustrate an understanding of the concepts behind game programming techniques

CO2 Implement game programming techniques

CO3 Solve game development tasks.

CO4 Construct 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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
1	2	2	2	1	2	-	1	-	1	-	2	-		2
2	2	2	3	1	2	-	-	-	1	-	2	-		2
3	2	2	3	2	3	-	-	-	-	-	1	1		2
4	3	1	3	1	3	-	-	-	-	-	2	2		3
5	2	1	3	2	3	-	-	-	1	-	2	2		2

21CA3210 ENTERPRISE RESOURCE PLANNING L T P C

3 0 0 3

PREFACE:

This ERP subject gave the knowledge about to modernize and integrate business processes and systems.

PRE-REQUISITE:

- Internet Marketing and Analytics

OBJECTIVES:

1. To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology.
2. To focus on a strong emphasis upon practice of theory in Applications and Practical-oriented approach.
3. To train the students to develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.
4. To aim at preparing the students technological competitive and make them ready to self-upgrade with the higher technical skills.
5. To demonstrate an ability to work independently and in group.

UNIT I INTRODUCTION 9

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to be consider in planning design and implementation of cross functional integrated ERP systems - Case studies.

UNIT II ERP SOLUTIONS AND FUNCTIONAL MODULES 9

Overview of ERP software solutions- Small medium and large enterprise vendor solutions, BPR, Business Engineering and best Business practices - Business process Management. Overview of ERP modules -sales and Marketing, Accounting and Finance, Materials and Production management etc. -Case studies-Financial Management.

UNIT III ERP IMPLEMENTATION 9

Planning Evaluation and selection of ERP systems-Implementation life cycle - ERP implementation, Methodology and Frame work- Training – Data Migration. People Organization in implementation-Consultants, Vendors and Employees-Case studies-Logistic Management.

UNIT IV POST IMPLEMENTATION 9

Maintenance of ERP- Organizational and Industrial impact; Success and Failure factors of and ERP Implementation -case studies.

UNIT V EMERGING TRENDS ON ERP 9

Extended ERP systems and ERP bolt –on -CRM, SCM, Business analytics etc- Future trends in ERP systems-web enabled, Wireless technologies so on-Case studies.

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials** **Unit 1:** MCQs on software project planning **Unit 2:** Draw the UML diagrams for software project **Unit 3:** Problems analysis on business objects. **Unit 4:** Draw a project design using design class **Unit 5**: MCQs on Model View Controller process	**Descriptive type question**
Outcomes		
Upon completion of the course, the students will be able to:		

CO1 Make basic use of Enterprise software, and its role in integrating business functions

CO2 Select the strategic options for ERP identification and adoption

CO3 Design the ERP implementation strategies.

CO4 Develop reengineered business processes for successful ERP implementation.

CO5 Demonstrate an ability to work independently and in group.

REFERENCE BOOKS

1. Enterprise Resource Planning and Supply Chain Management_ Functions, Business Processes and Software for Manufacturing Companies

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc19_cs70/preview

CO Vs PO Mapping and CO vs PSO Mapping

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

21CA3211 MACHINE LEARNING AND DEEP 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 intends to provide insight into deep learning. This course is currently as much sought-after skill and is under active research. This course students have to refer appropriate research papers and multiple books to get in-depth knowledge about the topics.

PRE-REQUISITE:

- Data Mining Techniques

OBJECTIVES:

1. To understand basic concepts and techniques of Machine Learning.
2. To understand various domains
3. To become familiar with Dimensionality reduction Techniques
4. To acquire knowledge in clustering techniques
5. To understand the basics of deep networks.

UNIT I INTRODUCTION 9

A Simple Machine-Learning Task – 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 – Bayesian Learning - Information Based Learning – Learning under the Parsimony Principle.

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

Maximum Likelihood Estimation – Evaluating an Estimator: Bias and Variance – The Bayes' Estimator – Parametric Classification – Regression – Tuning Model Complexity – Model Selection Procedures.

UNIT IV 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.

UNIT V DEEP LEARNING 9

Linear Algebra – Statistics – Logistic Regression – Back propogation learning – Activation functions – Loss functions – Hyperparameters – Common Architectural principles of deep networks – Building blocks of deep networks – Building deep networks.

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials** **Unit 1:** Explain the challenges of machine learning and give the training sets of classifiers. **Unit 2**: Illustrate and how does SVM classify the data. **Unit 3:** How to achieve Bias and Variance Trade off using Machine Learning overflow. **Unit 4:** Describe the application	**Descriptive type question**

	of clustering algorithm. **Unit 5:** Explain the classification of back propagation algorithm	

Suggested Activities

Unit 1: Draw a Gaussian bell curve using normal distribution.

Unit 2: Group discussion on Regression

Unit 3: Compare the relationship between bias and variance.

Unit 4: Explain the k-means clustering algorithm.

Unit 5: Demonstration of deep neural network

Outcomes

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

CO1 Gain knowledge about basic concepts of Machine Learning

CO2 Solve the classifier issue

CO3 Know the dimensionality reduction techniques.

CO4 Design application using clustering techniques

CO5 Understand the construction of deep networks.

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	PO9	PO 10	PO1 1	PO1 2	PSO1	PSO2
1	3	2	2	2	1									3
2	3	2	2	2	1									3
3	3	2	2	2	1									3
4	3	2	2	2	1									3
5	3	2	2	2	1									3

21CA3212 SOFT COMPUTING TECHNIQUES L T P C

3 0 0 3

PREAMBLE:

This course offers in the third semester as an elective theory subject. It deals with an emerging approach to computing which parallel the remarkable ability of the human mind to reason and learn in an environment of uncertainty and imprecision.

OBJECTIVES:

1. To learn the key aspects of Soft computing
2. To know about the various knowledge representation methods
3. To understand the features of neural network and its implementation
4. To know about the components and building block hypothesis of Genetic algorithm.
5. To study about various data clustering methods

PRE-REQUISITE:

- Algorithm analysis

UNIT I INTRODUCTION TO SOFT COMPUTING 9

Evolution of Computing – Introduction to Artificial Intelligence – Example problems – tic – tac- toe – question answering – Turing test - Prepositional and Predicate Calculus Rule Based knowledge Representation - Knowledge acquisition – Expert system – Introduction – Example – MYCIN - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics – Case study : Simple artificial intelligence programs in PROLOG for diagnosis of a disease

UNIT II KNOWLEDGE REPRESENTATION METHODS 9

Introduction – rough sets – set approximation – analysis of decision tables – Application of LERS software – Type – 1 fuzzy sets – definition – basic operations on fuzzy sets – The extension principle – Triangular norms and negations – Fuzzy Relations – Approximate reasoning – fuzzy Inference systems – Application of fuzzy sets – Type – 2 fuzzy sets – Footprint of uncertainty – basic operations on fuzzy sets – Type – 2 fuzzy relations – Type reduction – type 2 fuzzy Inference systems – Comparison of Fuzzy Inference systems.

UNIT III NEURAL NETWORKS AND LEARNING ALGORITHMS 9

Machine learning using Neural Network, Adaptive Networks – Feed Forward Networks Defuzzification – Supervised Learning Neural Networks – back propagation Algorithm – Levenberg- Marquardt algorithm – Recurrent neural networks – BAM networks - Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Case Study : Neural Network explanation facility.

UNIT IV GENETIC ALGORITHMS 9

Introduction, Building block hypothesis, working principle, Basic operators and terminologies such as individual, gene, encoding, fitness function and reproduction, Genetic modelling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, bitwise operator, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (Travelling Salesman Problem), Differences & similarities between GA & other traditional methods, Applications of GA.

UNIT V DATA CLUSTERING METHODS AND ALGORITHMS 9

Introduction – Hard and fuzzy partitions – Distance Measures – Hard C- Means algorithm – Fuzzy C- Means algorithm – Possibilistic C- Means algorithm - Fuzzy Maximum Likelihood Estimates (FMLE) algorithm – Neuro Fuzzy systems - Mamdani Fuzzy Model – modelling problems - - Logical type - Takagi – Sugeno- Kang Fuzzy Model – comparison of neuro – fuzzy systems – Model evaluation criteria, complexity. Fuzzy Expert Systems – Fuzzy Decision Making – Case study: EEG spike detection.

TOTAL HOURS: 45

REFERENCE BOOK(S):

1. Leszek Rutkowski, "Computational Intelligence – Methods and Techniques", Springer, 2008.
2. Kwang H.Lee, "First course on Fuzzy Theory and Applications", Springer–Verlag Berlin Heidelberg, 2005
3. Mitsuo Gen and RunweiCheng,"Genetic Algorithms and Engineering Optimization", Wiley Publishers 2000.
4. Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.
5. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 2008.
6. Elaine Rich, Kevin Knight, Shiva Shankar B. Nair, "Artificial Intelligence", Tata McGraw hill Ltd, 2008.
7. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 2015.
8. Ross Timothy J, Fuzzy Logic with Engineering Applications, Wiley India Pvt Ltd, New Delhi, 2010
9. S.N.Sivanandam, S.N.Deepa, "Introduction to Genetic Algorithms", Springer, 2008.
10. Kaushik Kumar," Soft computing techniques for engineering optimization", CRC press,1st edition,2019.

11. DebeshMishra," Soft computing techniques and optimization techniques for sustainable agriculture", De Gruyter,1st edition,2022.

WEB RESOURCE(S):

1. https://towardsdatascience.com/soft-computing-6cef872f7704
2. http://www.soft-computing.de/def.html
3. https://www.igi-global.com/dictionary/soft-methods-automatic-drug-infusion/27620

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials** Unit 1: Illustrate an applications that can be used in soft computing? Unit 2: Comparison of fuzzy approach and classical approach. Unit 3: Which algorithm is best in soft computing for classification and image recognition? Unit 4: Evaluate the failure of gradient based method. Unit 5: How to choose the best clustering algorithm for high-dimensional, power-law and non-normal data**?**	**Descriptive type question**

Suggested Activities:

Unit 1: Simple artificial intelligence programs in PROLOG for diagnosis of a disease.

Unit 2: Give an operations on crisp relations.

Unit 3: Neural Network explanation facility.

Unit 4: Differences & similarities between GA and other application methods.

Unit 5: Case Study: EEG spike detection

Outcomes

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

CO1 Implement machine learning through neural networks.

CO2 Understand knowledge representation methods and apply approximate reasoning

CO3 Apply evolutionary algorithm to solve the optimization problem

CO4 Gain Knowledge to develop Genetic Algorithm and Support vector machine based machine learning system.

CO5 Gain research Knowledge to develop applications using hybrid systems

CO vs PO MAPPING

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

1→Low 2→Medium 3→High

21CA3213 CYBER LAWS AND IT ACTS L T P C

3 0 0 3

PREAMBLE:

Cyber law is important because it touches almost all aspects of transactions and activities on and involving the internet, World Wide Web and cyberspace. Every action and reaction in cyberspace has some legal and cyber legal perspectives. The IT acts supports software industry people to do development in their field.

PRE-REQUISITE:

- Information Security and Audit

OBJECTIVES:

1. To make Learner Conversant with the Social and Intellectual Property Issues Emerging from Cyberspace.
2. To explore The Legal And Policy Developments In Various Countries To Regulate Cyberspace
3. To develop The Understanding of Relationship between Commerce and Cyberspace.
4. To give Learners in Depth Knowledge of Information Technology Act and Legal Frame Work of Right to Privacy, Data Security and Data Protection.
5. To make Study on Various Case Studies on Real Time Crimes.

UNIT I INTRODUCTION 9

Overview of Computer and Web Technology- Need for Cyber Law- Introduction to UNICITRAL Model Law on E-Commerce Cyber Jurisprudence at International and Indian Level-Jurisdictional Aspects in Cyber Law-Issues of jurisdiction in cyberspace - Types of jurisdiction-Prerequisites of jurisdiction-The Test evolved Minimum Cont acts Theory, Sliding Scale Theory, Effects Test and International targeting-Jurisdiction under IT Act, 2000.

UNIT II CYBER CRIMES 9

Introduction to Cyber Crimes- Cyber Crimes Vs. Conventional Crime- Reasons for cyber crimes and cyber criminals- Cyber Crimes against Individuals, Institution and State- Cyber Crimes- Hacking-Digital Forgery-Cyber Stalking/Harassment-Cyber Pornography-Identity Theft and Fraud-Cyber Terrorism-Cyber Defamation-Salami attacks-Web Jacking- Denial of service attacks

UNIT III DIGITAL,ELECTRONIC SIGNATURE & E-CONTRACTING 9

Concept of public key and private key-Certification authorities and their role-Creation and authentication of digital signature-Concept of electronic signature certificates-Electronic Governance-Concept of electronic records and electronic signatures-Rules for attribution, acknowledgement and dispatch of such records-Salient features Of E-Contract- Formation of E-Contract and types-Email Contraction-Indian Approach on E-contracts

UNIT IV E COMMERCE & GOVERNANCE 9

E-Commerce Salient Features and advantages- Models of E-commerce like B2B, B2C-Indian laws on E-commerce- E Government and E Governance-Components of E governance- Types of interaction in E governance-G2G,G2B,G2C,G2E- Benefits of E Governance-E Governance challenges specific to India-Legal Framework for E Governance under IT Act- Initiatives taken in India (Various E Governance Programs)

UNIT V LEGAL FRAMEWORK 9

Right to Privacy and Data Protection on Internet- Concept of privacy, Threat to privacy on Internet, Ingredients to decide confidentiality of information, Breach of sensitive personal information and confidentiality under IT Act and penalties for the same, Right of Interception under IT Act- Different offences under IT Act, 2000.

TOTAL HOURS: 45

REFERENCE BOOK(S):

1. Karnika Seth, Computers, Internet and New Technology Laws, Lexis Nexis Butterworths Wadhwa Nagpur, (2013).
2. Nandan Kamath, Law Relating to Computer Network and E-commerce, Universal Law Publisher,(2012).
3. Apar Gupta, Commentary on Information Technology Act, 2000, Lexis Nexis, (2015).
4. Chris Reed & John Angel, Computer Law, OUP, New York, (2007). Justice yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012). Verma S, K, Mittal Raman, Legal Dimensions of Cyber Spa e, Indian Law Institute, New Delhi, (2004)
5. Sudhir Naib, The Information Technology Act, 2005: A Handbook, OUP, New York ,(2011)

6. S. R. Bhansali, Information Techno logy Act, 2000, University Book House Pvt . Ltd., Jaipur (2003).
7. Vasu Deva, Cyber Crimes and Law Enforcement, Common wealth Publishers, New Delhi, (2003).
8. Dr.JyotiRattan, "Cyber Laws and Information Technology" ,Bharath Law house pvt Ltd,9th edition,2022

WEB RESOURCE(S):

1. https://www.indiacode.nic.in/bitstream/123456789/1999/3/A2000-21.pdf
2. http://www.iibf.org.in/documents/cyber-laws-chapter-in-legal-aspects-book.pdf
3. https://www.researchgate.net/publication/335755909 CYBER LAW AND INFORMATION TECHNOLOGY

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials** Unit 1: MCQs on International And Indian Level-Jurisdictional Aspects. Unit 2: Understanding the Cyber Crimes and Cyber Pornography. Unit 3: Quiz on public key, private key and e-sign. Unit 4: Write down the functionality of electronic governance. Unit 5: Quiz on IT acts.	**Descriptive type question**

Suggested Activities:

Unit 1: Importance of Cyber Laws in IT Sector Jurisdiction under IT Act, 2000.

Unit 2: Assignment 1- Hacking-Digital Forgery and Denial of service attacks.

Unit 3: Give example for Concept of electronic records and electronic signatures.

Unit 4: Write the Legal Framework for E Governance under IT Act.

Unit 5: Assignment 2- Quality Assurance measures.

Outcomes

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

CO1 Make Learner Conversant With The Social And Intellectual Property Issues Emerging From 'Cyberspace.

CO2 Explore The Legal And Policy Developments In Various Countries To Regulate

Cyberspace.

CO3 Develop The Understanding Of Relationship Between Commerce And Cyberspace.

CO4 Give Learners In Depth Knowledge Of Information Technology Act And Legal Frame Work Of Right To Privacy, Data Security And Data Protection.

CO5 Make Study On Various Case Studies On Real Time Crimes.

CO vs PO MAPPING

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

21CA3214 OPERATIONS RESEARCH L T P C

3 0 0 3

PREAMBLE:

This course is offered in 3rd semester of MCA programme in the department of Computer Applications as a professional elective-III as a theory subject. This course offers the knowledge about the research process & experiment survey of operations.

PRE-REQUISITE:

NIL

OBJECTIVES:

1. To design the research process & observe the experiment surveys.
2. To provide the concept and an understanding of basic concepts in Operations Research techniques for Analysis and Modeling in Applications.
3. To understand, develop and solve mathematical model of linear programming problems.
4. To understand , develop and solve mathematical model of Transport and assignment problems
5. To Understand network modeling for planning and scheduling the project activities

JNITI LINEAR PROGRAMMINGMODELS 9

Formulation of LPP, Graphical solution of LPP. Simplex Method, Artificial variables: big-method, degeneracy and unbound solutions.

UNIT II TRANSPORTATION AND ASSIGNMENT MODELS 9

Formulation - Methods for finding basic Feasible Solution - Optimality Test - MODI method - Degeneracy in Transportation Problem -Unbalanced Transportation Problem. Assignment Method: Mathematical formulation of assignment models – Hungarian Algorithm – Variants of the Assignment problem

UNIT III SCHEDULING BY PERT AND CPM 9

Introduction - Rules to frame a Network - Fulkerson's Rule to numbering of events - Activity, Times - Critical Path Computation - Slack and Float - PERT- Steps and computing variance, Merits and demerits of PERT, CPM- Time estimating & Limitations, Comparison between PERT&CPM.

UNIT VI QUEUEING MODELS 9

CharacteristicsofQueueingModels–PoissonQueues-(M/M/1):(FIFO/∞/∞),(M/M/1): (FIFO/N/∞),(M/M/C):(FIFO/∞/∞),(M/M/C):(FIFO/N/∞)models.

UNIT V GAME THEORY 9

Competitive game, rectangular game, saddle point, minimax (maximin) method of optimalstrategies- value of the game. Solution of games with saddle points, dominance principle.Rectangulargameswithoutsaddlepoint–mixedstrategyfor2X2games.

TOTAL HOURS: 45 HRS

REFERENCE BOOK(S):		**Unit I**	**Unit II**	**Unit III**	**Unit IV**	**Unit V**
R1	TahaH.A.,"OperationsResearch:AnIntroduction",10thEdition,PrenticeHallofIndia,New Delhi,2017	Ch -1	Ch-4,5	Ch -8	Ch -	Ch - 10
R2	KantiSwarup,P.K.Gupta,ManMohan,"OperationsResearch",15thRevisedEdition,		Ch – 4-7			
R4	RonaldLRardin,OptimizationInOperationsResearch,2ndEdition,PearsonEducation,India,2018				Ch -2	Ch - 5

Suggestive Assessment Methods		
Continuous Assessment Test (30Marks)	**Formative Assessment Test (20Marks)**	**End Semester Exams (50Marks)**
CAT 1 & CAT 2 – Descriptive type questions	**Unit – 1 –** MCQ's on Qualitative research methods. **Unit – 2 –** Problems on measuring the data samplings. **Unit –3–** MCQ's on multivariate analysis & hypothesis testing on data. **Unit – 4 –** MCQ's on rights & common rules of IPR.	**Descriptive type question**

	Unit – 5 – MCQ's on Grant & licencing of patent.	

Suggested Activities

Unit 1 –Do some research on nutrients that are essential for a balanced diet? Select three or four nutrients and constraints on it. Explore the framework of LPP. Formulate an LPP with suitable objective function and constraints

Unit 2 – Identify some electricity distribution centres and areas which have requirements. Think of the objective and try to provide the solution framework.

Unit 3 – Break down the stages of completing a construction of a house (like Start, Framing, Plumbing etc…)and find the minimum days to complete the construction.

Unit 4 – Try to observe the customer arrival rate in a departmental store near your residence for a week. Also the service rate rendered. Make your inference on appointing an extra salesgirl.

Unit 5 – Decision making is very crucial. Consider the situation where two companies share a market, in which they currently make Rs 50, 00,000 each. Both need to determine whether they should advertise. For each company advertising costs Rs20, 00,000and captures Rs 30, 00, 000 from the competitor provided the competitor doesn't advertise .What should the companies do?

Outcomes

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

CO1	Understand and apply linear program into solve operational problem with constraints
CO2	Apply transportation and assignment models to find optimal solution
CO3	Prepare project scheduling using PERT and CPM.
CO4	Identify appropriate queuing model storeduce the waiting Time inqueue.
CO5	Choose the best strategy using decision making methods under game theory.

REFERENCE BOOKS

1. TahaH.A.,"OperationsResearch:AnIntroduction",10thEdition,PrenticeHallofIndia,New Delhi,2017
2. KantiSwarup,P.K.Gupta,ManMohan,"OperationsResearch",15thRevisedEdition,
3. RonaldLRardin,OptimizationInOperationsResearch,2ndEdition,PearsonEducation,India,2018

CO Vs PO Mapping and CO vs PSO Mapping

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

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

21CA2208 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:

- NIL

OBJECTIVES:

1. To understand the fundamentals of TCP vs UDP, HTTP
2. To understand the concepts of Software testing, software engineering principles
3. To understand the asynchronous vs Synchronous programming
4. To understand object orientation, concurrency, and event handling in programming
5. To develop programs backend leaking Postgres database connection

UNIT I **BACKEND COMMUNICATION DESIGN PATTERNS** **9**

Introduction- Request Response- Synchronous vs Asynchronous workloads- Push- Polling- Long Polling – Server Sent Events- Publish Subscribe (Pub/Sub)-Multiplexing vs Demultiplexing (h2 proxying vs Connection Pooling)- Stateful vs Stateless.

UNIT II **PROTOCOLS** **9**

The OSI Model- TCP Vs UDP- Hyper Text Transfer Protocol - HTTP 1.0, 1.1, HTTP/2, HTTP/3- Symmetrical vs asymmetrical Encryption

UNIT III **RELATIONAL DATABASE SYSTEM** **9**

Relational Database ACID Transactions- Primary Key vs Secondary Key- B-Tree vs B+Tree in Production Database Systems.

UNIT IV **BACKEND EXECUTION PATTERNS** **9**

Introduction- Reading and Sending Socket Data- The Listener, The Acceptor and the Reader- Single Listener, Acceptor and Reader Thread Execution Pattern- Single Listener, Acceptor and Multiple Readers Thread Execution Pattern-Single Listener, Acceptor, Reader with Message

Load Balancing Execution Pattern- Multiple Accepter Threads on a Single Socket Execution Pattern- Multiple Listeners, Acceptors and Readers with Socket Sharding Execution Pattern- Backend Idempotency- Nagle's Algorithm

UNIT V PROXYING AND LOAD BALANCING 9

Proxy vs Reverse Proxy- Layer 4 vs Layer 7 Load Balancers- How ChatGPT uses Server Sent Events- The design of a software- The Journey of a Request to the Backend

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (62 Marks)**
CAT 1 & CAT 2 – Descriptive type questions	**Unit – 1** Online Quiz in synchronous and asynchronous patterns **Unit –2** MCQs on Protocols like TCP, UDP, HTTP **Unit – 3** Write functions of the primary key and secondary key **Unit–4** Assignments on statement-level concurrency **Unit – 5** MCQs on Proxy server and Load balancing .	**Descriptive type question**

Suggested Activities

Unit – 1 Studying about the various design patterns
Unit – 2 Hands on training on protocols
Unit – 3 Studying about the Database systems
Unit – 4 Assignments on Backend execution
Unit – 5 Demonstration of designing software

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	Ability to do configuration of socket execution pattern
CO5	Understand and adopt 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	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	3	2	1	-	-	-	-	-	-	3	2	3
2	3	3	3	2	2	-	-	-	-	-	-	3	2	3
3	3	3	3	2	2	-	-	-	-	-	-	3	2	3
4	3	3	3	3	2	2	-	-	-	-	-	-	3	2
5	3	3	3	3	3	3	2	2	1	3	1	3	3	3

BRIDGE COURSES- FIRST SEMESTER

21CA1B01 DIGITAL LOGIC AND COMPUTER ORGANIZATION L T P C

3 1 0 4

OBJECTIVES:

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

PRE-REQUISITE:

- Number systems and their conversions.

UNIT I DIGITAL FUNDAMENTALS AND LOGIC GATES 9+3

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

UNIT II COMBINATIONAL AND SEQUENTIAL LOGIC 9+3

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

UNIT III BASIC STRUCTURE OF COMPUTER SYSTEM 9+3

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

UNIT IV PROCESSOR DESIGN 9+3

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

UNIT V MEMORY MANAGEMENTAND I/O SYSTEMS 9+3

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

TOTAL HOURS: 45+15 HRS

REFERENCE BOOK(S):

1. M. Morris Mano, Michael D. Ciletti," Digital Design ", Fourth Edition.
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky and NaraigManjikian, "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 Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials**	**Descriptive type question**

Outcomes

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

CO1 List conversions and arithmetic operations in various number systems.

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

CO3 Summarize the basic operations that happens in a CPU.

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

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

CO vs PO MAPPING

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

21CA1B02 PROBLEM SOLVING AND PROGRAMMING IN C L T P C

3 0 0 3

PRE-REQUISITE:

- Basic programming constructs

OBJECTIVES:

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

UNIT I INTRODUCTION TO COMPUTER PROBLEM SOLVING 9

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

UNIT II **INTRODUCTION TO C** **9**

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

UNIT III **FUNCTIONS AND ARRAYS** **9**

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

UNIT IV **POINTERS AND STRUCTURES** **9**

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

UNIT V **FILE PROCESSING AND PREPROCESSORS** **9**

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

TOTAL HOURS: 45

REFERENCE BOOK(S):

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

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/106104128/
2. https://www.programiz.com/c-programming
3. https://www.guru99.com/c-programming-language.html

Suggestive Assessment Methods	
Lab Components Assessments (50 Marks)	**End Semester Exams (50 Marks)**
Demonstration of the programs	**Demonstration of the programs**

Outcomes

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

CO1 Define a computational solution for a given problem

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

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

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

CO5 Identify basic file concepts operations.

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA1B03 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. Anany Levitin, Introduction to the Design and Analysis of algorithms, 3rd Edition, 2011.
3. Sandeep Sen, 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://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/
3. https://www.coursera.org/specializations/algorithms

Suggestive Assessment Methods		
Continuous Assessment Test	**Formative Assessment Test**	**End Semester Exams**

(20 Marks)	**(20 Marks)**	**(60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials**	**Descriptive type question**

Outcomes

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

CO1 Define the time and space complexities of algorithms

CO2 Demonstrate algorithms based on divide and conquer method.

CO3 Find a solution for the problem based on dynamic programming

CO4 Demonstrate algorithms for back tracking and Branch and Bound.

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

CO Vs PO Mapping and CO Vs PSO Mapping

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

21CA1B11 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/
2. https://www.programiz.com/c-programming
3. https://www.guru99.com/c-programming-language.html

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials**	**Descriptive type question**
Lab Requirements: **Computers – 30 Nos** **Software – Turbo C / Open Software**		
Outcomes		
Upon completion of the course, the students will be able to:		

CO1 Define a computational solution for a given problem

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

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

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

CO5 Identify basic file concepts operations.

CO Vs PO Mapping and CO Vs PSO Mapping

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

BRIDGE COURSE - SECOND SEMESTER

21CA2B01	**DATABASE MANAGEMENT SYSTEMS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. To define the fundamentals of data models and conceptualize and depict a database system using ER diagram.
2. To make use of SQL and relational database design.
3. To develop the knowledge of transaction processing to monitor the performance of the DBMS.
4. To observe the techniques of searching using files and indexing.
5. To infer about the design and management of database connectivity.

PRE-REQUISITE:

Elementary set theory, concepts of relations and functions, propositional logic data structures (trees, Graphs, dictionaries) & File Concepts.

UNIT I INTRODUCTION **9**

File systems versus Database systems – Data Models – DBMS Architecture – Data Independence – Data Modeling using Entity – Relationship Model – Enhanced E-R Modeling

UNIT II RELATIONAL MODEL AND QUERY EVALUATION **9**

Relational Model Concepts – Relational Algebra – SQL – Basic Queries – Complex SQL Queries – Views – Triggers - Constraints – Relational Calculus – Tuple Relational Calculus – Domain Relational Calculus – Functional Dependencies – Normal Forms – 1NF – 2NF-3NF-BCNF – 4NF-5NF.

UNIT III TRANSACTION PROCESSING **9**

Transaction Processing – Properties of Transactions - Serializability – Transaction support in SQL - Locking Techniques – Time Stamp ordering – Validation Techniques – Granularity of Data Items – Recovery concepts – Shadow Paging - Log Based Recovery.

UNIT IV FILES AND INDEXING **9**

File operations – Hashing Techniques – Indexing – Single level and Multi-level Indexes – B+ tree – Static Hashing - Indexes on Multiple Keys-FAT 32,NTFS.

UNIT V QUERY IMPLEMENTATION **9**

For a given set of relation schemes, Develop tables and perform Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate, functions (group by and having clause), Queries involving- Date Functions, String Functions , Math Functions - Join Queries- Inner Join, Outer Join Sub queries- With IN clause, With EXISTS clause - Creating Views (with and without check option), Dropping views, Selecting from a view

TOTAL HOURS: 45

REFERENCE BOOK(S):

1. Abraham Silberschatz, Henry F.Korth and S.Sundarshan "Database System Concepts", Sixth Edition, McGraw Hill, 2010.
2. C.J. Date, "An Introduction to Database Systems", Eight Edition, Pearson Education Delhi, 2003.
3. Frank. P. Coyle, "XML, Web Services And The Data Revolution", Pearson Education,2012.
4. Lee Chao, "Database Development and Management", Auerbach Publications, 2010
5. Peter Rob, Carlos coronel , "Database System Concepts",Ceange Learning 2008
6. Ramez Elamassri and Shankant B-Navathe, "Fundamentals of Database Systems",Sixth Edition, Pearson Education Delhi, 2010.
7. Raghu Ramakrishnan, —Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.

WEB RESOURCE(S):

1. https://www.tutorialspoint.com/dbms/index.htm
2. https://www.w3schools.in/dbms
3. https://www.guru99.com/dbms-tutorial.html

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (50 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials**	**Descriptive type question**

Outcomes

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

CO1 Define the basic concepts of the database and data models.

CO2 Execute a database and normalize the relations

CO3 Demonstrate the transaction processing, concurrency control techniques and recovery procedures.

CO4 Define the Files and Indexing.

CO5 Infer the advanced level database applications.

CO Vs PO Mapping and CO Vs PSO Mapping

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

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

21CA2B02 OBJECT ORIENTED PROGRAMMING USING C++ L T P C

3 0 0 3

OBJECTIVES:

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

PRE-REQUISITE:

- Basics of C programming.

UNIT I FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING 9

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

UNIT II IMPLEMENTING ENCAPSULATION 9

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

UNIT III POLYMORPHISM 9

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

UNIT IV TEMPLATES AND FILE HANDLING 9

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

UNIT V INHERITANCE 9

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

TOTAL HOURS: 45

Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (50 Marks)**
CAT 1 & CAT 2 - Descriptive type questions	**Assignments, MCQs, Tutorials**	**Descriptive type question**

Outcomes

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

COURSE OUTCOME(S):

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

CO.2 Use proper class protection mechanism.

CO3 Demonstrate the use of virtual functions to implement polymorphism.

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

CO5 Reuse the code with different categories of Inheritance.

REFERENCE BOOK(S):

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

WEB RESOURCE(S):

1. https://www.edureka.co/blog/object-oriented-programming/
2. https://launchschool.com/books/oo_ruby/read/the_object_model
3. https://www.learncpp.com/cpp-tutorial/81-welcome-to-object-oriented-programming/

CO Vs PO Mapping and CO Vs PSO Mapping

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