Master of Computer Applications (MCA)

I & II Year SCHEME & SYLLABUS

Autonomous Scheme 2023

ST JOSEPH ENGINEERING COLLEGE

AN AUTONOMOUS INSTITUTION

Vamanjoor, Mangaluru - 575028

MOTTO

Service and Excellence

VISION

To be a global premier Institution of professional education and research

MISSION

- Provide opportunities to deserving students of all communities, the Christian students in particular, for quality professional education

- Design and deliver curricula to meet the national and global changing needs through student-centric learning methodologies

- Attract, nurture and retain the best faculty and technical manpower

- Consolidate the state-of-art infrastructure and equipment for teaching and research activities

- Promote all-round personality development of the students through interaction with alumni, academia and industry

- Strengthen the Educational Social Responsibilities (ESR) of the Institution

ST JOSEPH ENGINEERING COLLEGE

An Autonomous Institution

Vamanjoor, Mangaluru

Master of Computer Applications (MCA)
First and Second Year Scheme and Syllabus
Autonomous Scheme 2023

Program Outcomes

PO1 Foundation Knowledge: Apply knowledge of mathematics, programming logic and coding fundamentals for solution architecture and problem solving.

PO2 Problem Analysis: Identify, review, formulate and analyse problems for primarily focussing on customer requirements using critical thinking frameworks.

PO3 Development of Solutions: Design, develop and investigate problems with as an innovative approach for solutions incorporating ESG/SDG goals.

PO4 Modern Tool Usage: Select, adapt and apply modern computational tools such as development of algorithms with an understanding of the limitations including human biases.

PO5 Individual and Teamwork: Function and communicate effectively as an individual or a team leader in diverse and multidisciplinary groups. Use methodologies such as agile.

PO6 Project Management and Finance: Use the principles of project management such as scheduling, work breakdown structure and be conversant with the principles of Finance for profitable project management.

PO7 Ethics: Commit to professional ethics in managing software projects with financial aspects. Learn to use new technologies for cyber security and insulate customers from malware.

PO8 Life-long learning: Change management skills and the ability to learn, keep up with contemporary technologies and ways of working.

21	23MC206A	Software Project Management	**59**
22	23MC206B	Artificial Intelligence	**61**
23	23MC206C	Principles of User Interface Design	**63**
24	23MC206D	Distributed Operating Systems	**66**
25	23MC206E	Natural Language Processing	**69**
26	23MCL207	Data Analytics Laboratory with Mini Project	**72**
27	23MCL208	Enterprise Java Laboratory	**75**
28	23MCL209	Mobile Applications Laboratory	**78**
29	23MCS210	Research / Technical Seminar	**80**
30	23ITP211	Industry Oriented Training II **(Problem Solving Skills)**	**81**
31	23MCA301	Advances in Web Technologies	**84**
32	23MCA302	Programming using C#.NET	**87**
33	23MCA303	Computer Networks	**90**
34	23MC304A	Blockchain Technology	**93**
35	23MC304B	Cloud Computing	**96**
36	23MC304C	Digital Marketing	**99**
37	23MC304D	Introduction to Drone Technologies	**102**
38	23MC304E	NoSQL	**105**
39	23MC305A	Deep Learning	**108**
40	23MC305B	Big Data Analytics	**111**
41	23MC305C	Internet of Things	**114**
42	23MC305D	Cryptography and Network Security	**117**

43	23MC305E	Salesforce Administrator	**120**
44	23MCL306	Advances in Web Technologies Laboratory	**124**
45	23MCL307	Programming using C#.NET Laboratory	**126**
46	23MCL308	Computer Network Laboratory	**129**
47	23INT309	Summer Internship - I	**132**
48	23AEC401	MOOC	**134**
49	23MCP402	Project Work	**136**
50	23INT403	Industry Internship for 12 weeks	**138**

SI. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Theory Lecture L	Tutorial T	Practical/ Drawing P	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
			I Semester MCA										
1	PCC	23MCA101	Computer Fundamentals and Operating System	MCA	MCA	04	-	-	03	50	50	100	04
2	PCC	23MCA102	Data Structures with Algorithms	MCA	MCA	04	-	-	03	50	50	100	04
3	PCC	23MCA103	Introduction to Web Technologies	MCA	MCA	03	-	-	03	50	50	100	03
4	PCC	23MCA104	Database Management Systems	MCA	MCA	03	-	-	03	50	50	100	03
5	BSC	23MCA105	Discrete Mathematics and Statistics	MCA	MCA	03		-	03	50	50	100	03
6	PCC	23MCA106	Research Methodology & IPR	MCA	MCA	02	-	-	03	50	50	100	02
7	PCC	23MCL107	Data Structures with Algorithms Laboratory	MCA	MCA	01		02	03	50	50	100	02
8	PCC	23MCL108	Web Technologies Laboratory	MCA	MCA	01		02	03	50	50	100	02
9	PCC	23MCL109	Database Management Systems Laboratory	MCA	MCA	01		02	03	50	50	100	02
10	SDC	23ITM110	Industry-Oriented Training- I (Mathematical Skills)	MCA	MCA	-	02	-	02	50	-	50	-
11	PCC	23MCA111	Fundamentals of Programming (Bridge Course)	MCA	MCA		02	-	-	50	-	50	-
Total						**22**	**04**	**06**	**29**	**550**	**450**	**1000**	**25**

II Semester MCA

SI. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	PCC	23MCA201	Software Engineering and Testing	MCA	MCA	04	-	-	03	50	50	100	04
2	PCC	23MCA202	Data Analytics using Python	MCA	MCA	04	-	-	03	50	50	100	04
3	PCC	23MCA203	Enterprise Java	MCA	MCA	04	-	-	03	50	50	100	04
4	PCC	23MCA204	Machine Learning	MCA	MCA	03		-	03	50	50	100	03
5	PEC	23MC205X	Elective-1	MCA	MCA	03	-	-	03	50	50	100	03
6	PEC	23MC206X	Elective-2	MCA	MCA	03	-	-	03	50	50	100	03
7	PCC	23MCL207	Data Analytics Laboratory with Mini Project	MCA	MCA	01		02	03	50	50	100	02
8	PCC	23MCL208	Enterprise Java Laboratory	MCA	MCA	01		02	03	50	50	100	02
9	PCC	23MCL209	Mobile Applications Laboratory	MCA	MCA	01		02	03	50	50	100	02
10	SDC	23MCS210	Research / Technical Seminar	MCA	MCA	-	02	-	02	50	-	100	01
11	SDC	23ITP211	Industry Oriented Training II **(Problem Solving Skills)**	COM			02		02	50	-	50	-
Total						**24**	**04**	**06**	**31**	**550**	**450**	**1050**	**28**

Elective I		Elective II	
23MC205A	Cyber Security	23MC206A	Software Project Management
23MC205B	Data Mining and Business Intelligence	23MC206B	Artificial Intelligence
23MC205C	Enterprise Resource Planning	23MC206C	Principles of User Interface Design
23MC205D	Parallel Computing	23MC206D	Distributed Operating Systems
23MC205E	Devops	23MC206E	Natural Language Processing

III Semester MCA

SI. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	PCC	23MCA301	Advances in Web Technologies	MCA	MCA	04	-	-	03	50	50	100	04
2	PCC	23MCA302	Programming using C#.NET	MCA	MCA	04	-	-	03	50	50	100	04
3	PCC	23MCA303	Computer Networks	MCA	MCA	04	-	-	03	50	50	100	04
4	PEC	23MC304X	Elective-III	MCA	MCA	03	-	-	03	50	50	100	03
5	PEC	23MC305X	Elective-IV	MCA	MCA	03	-	-	03	50	50	100	03
6	PCC	23MCL306	Advances in Web Technologies Laboratory	MCA	MCA	01	-	02	03	50	50	100	02
7	PCC	23MCL307	Programming using C#.NET Laboratory	MCA	MCA	01	-	02	03	50	50	100	02
8	PCC	23MCL308	Computer Network Laboratory	MCA	MCA	01	-	02	03	50	50	100	02
9	INT	23INT309	Summer Internship - I							50	50	100	03
Total						**21**	**00**	**06**	**24**	**450**	**450**	**900**	**27**

Elective III		Elective IV	
23MC304A	Blockchain Technology	23MC305A	Deep Learning
23MC304B	Cloud Computing	23MC305B	Big Data Analytics
23MC304C	Digital Marketing	23MC305C	Internet of Things
23MC304D	Introduction to Drone Technologies	23MC305D	Cryptography and Network Security
23MC304E	NoSQL	23MC305E	Salesforce Administrator

Summer Internship: All the students admitted shall have to undergo a mandatory summer internship of minimum 04 weeks during II and III semester vacation. Summer Internship shall include Inter / Intra Institutional activities. Internship examination shall be conducted during III semesters and the prescribed credit shall be included in III semesters. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent examination after satisfying the internship requirements.

IV Semester MCA

SI. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tuto rial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	SDC	23AEC401	MOOC	MCA	Any MOOC topic (Choices are given by the department) with minimum 16 weeks to be completed between I Sem to IV Sem							100	04
2	SDC	23MCP402	Project Work	MCA	MCA	-	-	-	02	50	50	100	07
3	INT	23INT403	Industry Internship for 12 weeks			-	-	-	03	50	50	100	09
	Total					**00**	**00**	**00**	**05**	**100**	**100**	**300**	**20**

Note: PCC: Professional Core Course; PEC = Professional Elective Course; BSC: Basic Science Course SDC = Skill Development Course; INT =Internship	
Definition of Credit:	One-hour Lecture (L) per week per semester = 1 Credit Two-hour Tutorial (T) per week per semester = 1 Credit Two-hour Practical/Laboratory/Drawing (P) per week per semester = 1 Credit Four hours of Self-study = 1 Credit

Sl. No.	Course Area	I	II	III	IV
1.	BSC	3	-	-	-
2.	PCC	22	21	18	-
3.	PEC	-	6	6	-
4.	SDC	-	1	-	11
5.	INT	-	-	3	9
	Total	**25**	**28**	**27**	**20**

COMPUTER FUNDAMENTALS AND OPERATING SYSTEM			
Course Code	**23MCA101**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(4:0:0)	SEE Marks	50
Credits	**04**	Exam Hours	03

Course Learning Objectives:
1. To realize the concepts of computer system organization.
2. To get the basic insights of operating systems.
3. To analyze process management in the operating system.
4. To summarize process synchronization techniques.
5. To describe memory management techniques in operating system
6. To implement basic Unix commands and to construct patterns using regular expressions

Module-1	8Hrs

Binary Systems and Combinational Logic Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates, Basic structure of computers, Computer Types, Functional Units, Basic Operational Concepts, Bus structure.

Module-2	8Hrs

Introduction to Operating Systems, Computer System Architecture; Operating System Operations; Operating System Structure: Operating System Services; System Calls; Types of System Calls; System Programs; Virtual Machines; System boot.
Process Management: Process concept, process state, process control block, Process Scheduling

Module-3	8Hrs

Scheduling criteria, Scheduling Algorithms: FCFS, SJFS, Priority scheduling, Round Robin Scheduling, Multi-level queue scheduling, Multilevel feedback queue scheduling,
Process Synchronization: Critical section problem, Synchronization hardware, semaphore, classic problems of synchronization.

Module-4	8Hrs

Deadlocks: System model; Deadlock Characterization, Methods for handling deadlocks; Deadlock Prevention; Deadlock Avoidance; Deadlock Detection and Recovery from deadlock. Memory Management: Memory Management Strategies: Background, Swapping; Contiguous Memory Allocation; Paging; Segmentation; Virtual Memory Management; Demand Paging; Page Replacement; Allocation of Frames; Thrashing

Module-5	8Hrs

Introduction to Unix system, Basic commands: ls, cat, cal, date, calendar, who, echo, tty etc. Unix File System: The Parent-Child Relationship, The HOME Variable: The Home Directory, pwd, cd, mkdir, rmdir, Absolute Pathnames, Relative Pathnames, Basic File Attributes: ls options, File Ownership, File Permissions, chmod, Directory Permissions, Changing the File Ownership More File Attributes: File Systems and Inodes, Hard Links, Symbolic Links.
Pattern matching: the wildcards, escaping and quoting, Filters using regular expression: grep, regular expression, egrep, fgrep, sed instruction

Course Outcomes:	
At the end of the course the student will be able to:	
23MCA101.1	Realize the concepts of computer system organization.
23MCA101.2	Get the basic insights of operating systems.
23MCA101.3	Analyze process management in the operating system.
23MCA101.4	Summarize process synchronization techniques.
23MCA101.5	Describe memory management techniques in operating system
23MCA101.6	Implement basic Unix commands and to construct patterns using regular expressions

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	UNIX Concepts and Applications	Sumitabha Das	Tata McGraw Hill	4th Edition, 2006.
2	Operating system Concepts	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne	Wiley – India	8th Edition, 2017
3.	Digital Logic and Computer Design.	M.Morris Mano,	Pearson education	3rd Edition, 2023
4.	Computer Organization	Carl Hamacher, Zvonko Vranesic Safwat Zaky	Tata McGraw-Hill	5th edition, 2011
Reference Books				
1	UNIX: The Complete Reference	Kenneth Roson et al	Osborne/McGraw Hill	2nd Edition, 2000.
2	Using UNIX	Steve Montsugu	Prentice Hall India	2nd Edition, 1999.
3	UNIX and Shell Programming	M G Venkateshmurthy	Pearson Education Asia	1st Edition, 2005.
4	Operating Systems – A Concept Based Approach	D M Dhamdhere	Tata McGraw – Hill	2nd Edition, 2002

Web links/Video Lectures/MOOCs
1. https://www.coursera.org/learn/os-power-user : Introductions to Operating Systems
2. https://onlinecourses.nptel.ac.in/noc21_cs88/preview : Operating system Fundamentals

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MCA101.1	3							2
24MCA101.2	3	2						
24MCA101.3		3	-	3				2
24MCA101.4		3	2	2			-	
24MCA101.5		2	3		3	3		2
24MCA101.6		**2**	3	2		2		3

1: Low2: Medium 3: High

DATA STRUCTURES WITH ALGORITHMS

Course Code	**23MCA102**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(4:0:0)	SEE Marks	50
Credits	04	Exam Hours	03

Course Learning Objectives:
1. To use the concepts of Stack
2. To use the concepts Queue, Lists, Trees and Hashing
3. To describe concepts and algorithms for searching and sorting.
4. To appraise the efficiency of algorithms in terms of asymptotic notations for the given problem.
5. Apply decrease and conquer and greedy algorithms in problem solving.
6. Build solutions for real world problems using concepts of data structures

Module-1	**10Hrs**

Classification of Data Structures: Primitive and Non- Primitive, Linear and Nonlinear; Data structure Operations, Stack: Definition, Representation, Operations and Applications: Polish and reverse polish expressions, Infix to postfix conversion, evaluation of postfix expression, infix to prefix, postfix to infix conversion.

Module-2	**10Hrs**

Recursion - Factorial, GCD, Fibonacci Sequence, Tower of Hanoi. Queue: Definition, Representation, Queue Variants: Circular Queue, Priority Queue, Double Ended Queue; Applications of Queues. Programming Examples**.**

Module-3	**10Hrs**

Linked List: Limitations of array implementation, Memory Management: Static (Stack) and Dynamic (Heap) Memory Allocation, Memory management functions. Definition, Representation, Types of linked list. Singly Linked List : Operations- Linked list as a data Structure, Inserting and removing nodes from a list, Linked implementations of stacks, Header nodes.

Trees: Binary tree Traversals and related properties.

Module-4	**10Hrs**

Introduction, Fundamentals of the Analysis of Algorithm Efficiency Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Analysis Framework, Asymptotic Notations and Basic efficiency classes, Mathematical analysis of Recursive and Non-recursive algorithms.

Brute Force: Selection Sort and Bubble Sort, Sequential Search.

Module-5	**10Hrs**

Divide-and-Conquer: Mergesort, Quicksort, Binary Search

Decrease-and-Conquer : Insertion Sort, Depth First and Breadth First Search, Topological sorting.

Greedy Technique : Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm

Course Outcomes:	
At the end of the course the student will be able to:	
23MCA102.1	Apply the concepts of Stack and explore its applications
23MCA102.2	Apply the concepts of Queue and Lists
23MCA102.3	Describe concepts and algorithms for searching and sorting.

23MCA102.4	Interpret the efficiency of algorithms in terms of asymptotic notations for the given problem.
23MCA102.5	Apply decrease and conquer and greedy algorithms in problem solving.
23MCA102.6	Build solutions for real world problems using concepts of data structures.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Introduction to the Design and Analysis of Algorithms	Anany Levitin	Pearson Education	3rd Edition, 2023
2	Programming in ANSI C,	Balaguruswamy	McGraw Hill Education	8th Edition, 2022
3	Data Structures Using C and C++	Yedidyah Langsam and Moshe J. Augenstein and Aaron M Tenanbanum,	Pearson Education Asia,	2nd Edition, 2007.
Reference Books				
1	Data Structures	Seymour Lipschutz,	McGraw Hill	Revised 1st Edition, 2016
2	Fundamentals of Data Structures in C	Ellis Horowitz and SartajSahni,	Universities Press,	2nd Edition, 2022

Web links/Video Lectures/MOOCs
1. Introduction to Data Structures: https://nptel.ac.in/courses/106/102/106102064/
2. Data Structures and Algorithms: https://www.coursera.org/specializations/data-structures-algorithms

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Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8
23MCA102.1	3	2						
23MCA102.2	3	2						
23MCA102.3	2	2						
23MCA102.4	2	3						
23MCA102.5	2	2	2					
23MCA102.6			2					2

1: Low 2: Medium 3: High

INTRODUCTION TO WEB TECHNOLOGIES

Course Code	21MCA103	CIE Marks	50
Teaching Hours/Week(L:T:P)	(4:0:0)	SEE Marks	50
Credits	04	Exam Hours	03

Course Learning Objectives:
1. To describe the basics of Web Technologies.
2. To understand the basics of JavaScript.
3. To implement interactive event driven documents using dynamic JavaScript.
4. To demonstrate the applications of Javascript.
5. To apply Database concepts to the Web Page using PHP and MySQL.
6. To apply the Javascript, PHP and MySQL concepts for real world applications.

Module-1	10Hrs

Web Programming Basics
Web browsers, web servers, MIME, URL, HTTP Introduction to HTML tags, Basic syntax and structure, text markups, images, lists, tables and forms. Introduction to HTML5. Difference between HTML and XHTML. Working of World Wide Web: URL, URI, DNS and Web protocols. Introduction to DNS management.

Basics of Cascading Style Sheets
Introduction to CSS, Levels of CSS, Selectors, Font, color and Text Properties, BOX Model, Span and Div tags. Responsive Design, Media Queries and Content Layout.

Module-2	10Hrs

Overview of JavaScript
Data Types Object orientation and JavaScript, general Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts.
The JavaScript Execution Environment
The Document Object Model, Elements Access in JavaScript, Events and Event Handling , Handling Events from Body Elements, Handling Events from Text Box and password Elements, The DOM2 Model, The navigator Object, DomTree Traversal and Modification.

Module-3	10Hrs

Dynamic Documents with JavaScript
Introduction, Positioning Elements, Moving Elements , Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements

Module-4	10Hrs

Advanced Javascript
Prototypes and Inheritance, Classes, Error handling, Promises, async/await, Generators, advanced iteration, Modules, Miscellaneous

Module-5	10Hrs

Introduction to PHP
Essentials of PHP- Installation of Web Server, XAMPP Configurations PHP Forms- GET and POST method. Regular Expressions-Cookies- Sessions- Usage of Include and require statements- File:read and write from the file- PHP Filters-PHP. Introduction to Parsing PHP-Mysql. Introduction to different PHP Frameworks.

Course Outcomes:
At the end of the course the student will be able to:

21MCA103.1	To describe the basics of Web Technologies.
21MCA103.2	To understand the basics of JavaScript.
21MCA103.3	To implement interactive event driven documents using dynamic JavaScript.
21MCA103.4	To demonstrate the applications of Javascript.
21MCA103.5	To apply Database concepts to the Web Page using PHP and MySQL.
21MCA103.6	To apply the Javascript, PHP and MySQL concepts for real world applications.

Sl.No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition And year
Textbooks				
1	Programming the World Wide Web	Robert W.Sebesta	Pearson education	4th Edition, 2012
2.	HTML5 Black Book		Dreamtech	
3	Eloquent JavaScript	Marijn Haverbeke	No Starch Press,US.	3rd Edition 2018
4	The HTML and CSS Workshop	Lewis Coulson	Paperback – Import	2019

	Reference Books			
1.	Web Technologies	Uttam K Roy	Oxford University Press	
2.	Web Programming, building internet applications	Chris Bates	2nd edition Wiley Dreamtech	
3.	Bootstrap: Responsive Web Development	Jake Spurlock	O'Reilly Media	2014

Web links/Video Lectures/MOOCs

Reference Tutorial Link for Module 2, 3 and 4:

https://javascript.info
https://www.youtube.com/watch?v=cM_AeQHzlGg
https://forum.freecodecamp.org/t/askjs-best-books-to-learn-advanced-javascript/563936

1. https://www.coursera.org/projects/dynamic-web-app-php-mysql
2. https://www.coursera.org/specializations/web-applications
3. https://www.coursera.org/specializations/full-stack-react
4. https://www.coursera.org/specializations/full-stack-react

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)												
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13
23MCA103.1	-	-	-	-	-	-	2	-	-	-	-	-	-
23MCA103.2	2	2	-	-	-	-	2	-	-	-	-	-	-
23MCA103.3	2	2	-	-	-	-	-	-	-	3	-	-	-
23MCA103.4	-	-	-	-	-	-	-	-	-	-	2	-	-
23MCA103.5	-	-	-	-	-	-	2	-	-	-	-	-	-
23MCA103.6	-	-	-	-	-	-	2	-	-	2	2	-	-

1: Low 2: Medium 3: High

<div align="center">**DATABASE MANAGEMENT SYSTEMS**</div>

Course Code	**23MCA104**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:
1. To explain basic database concepts, applications, data models, schemas and instances.
2. To demonstrate the use of constraints and relational algebra operations.
3. To implement a database schema for a given problem domain.
4. To describe the basics of SQL and construct queries using SQL.
5. To emphasize the importance of normalization in databases.
6. To distinguish database storage structures and access techniques.

Module-1	**8Hrs**

Characteristics of Database approach, Actors on the Scene, Workers behind the scene, Advantages of using DBMS approach, A Brief History of Database Applications, Data models, schemas and instances, Three-schema architecture and data independence, Database languages and interfaces, the database system environment, Centralized and client-server architectures, Classification of Database Management systems.

Module-2	**8Hrs**

Structure of Relational Databases, Database Schema, Keys, Relational Query Languages, Relational Operations.
Entity-Relationship Model: Conceptual Database using high level conceptual data models for Database Design, A Sample Database Application, Entity types, Entity sets Attributes and Keys Relationship types, Relationship Sets Functional Dependencies, Normal Forms based on Primary.

Module-3	**8Hrs**

SQL data definition and data types, specifying constraints in SQL, basic retrieval queries in SQL, Insert, update and delete statements in SQL, aggregate functions in SQL, group by and having clauses.

Module-4	**8Hrs**

Introduction to triggers in SQL, views in SQL, schema change statements in SQL, stored procedures and functions.

Module-5	**8Hrs**

Introduction to transaction processing, transaction and system concepts, desirable properties of transactions, transaction support in SQL. Concurrency control techniques: two-phase locking techniques, concurrency control based on timestamp ordering, multi version concurrency control techniques, validation concurrency control techniques. Recovery techniques: recovery concepts, recovery in multi database systems, database backup and recovery from catastrophic failures.

Course Outcomes:	
At the end of the course the student will be able to:	
23MCA104.1	Apply the basic concepts of database management in designing the database for the given problem.
23MCA104.2	Design entity-relationship diagrams to the given problem to develop database Application with appropriate fields and validations.
23MCA104.3	Implement a database schema for a given problem domain.

23MCA104.4	Formulate SQL queries in Oracle to the given problem.
23MCA104.5	Apply normalization techniques to improve the database design to the given problem.
23MCA104.6	Distinguish database storage structures and access techniques.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Fundamentals of Database Systems,	Elmasri and Navathe:	Pearson	7th Edition, 2022
2	Database System Concepts,	Silberschatz, Korth and Sudharshan	Tata McGraw Hill	7th Edition 2022
Reference Books				
1	An Introduction to Database Systems,	C.J. Date, A. Kannan, S. Swamynatham:	Pearson education,	8th Edition 2013
2	Database Management Systems,	Majmudar Arun K, Bhattacharyya pritimoy	McGraw-Hill,	1st Edition 2010

Web links/Video Lectures/MOOCs
1. https://coursera.org/learn/database-management : Introduction to database Management System
2. https://onlinecourses.nptel.ac.in/noc22_cs91/preview: Database Management System :By Prof. Partha Pratim Das, Prof. Samiran Chattopadhyay | IIT Kharagpur

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCA104.1	2						1	
23MCA104.2			2					
23MCA104.3	2		1					2
23MCA104.4	2			2			1	
23MCA104.5				2			3	
23MCA104.6							1	2

1: Low 2: Medium 3: High

DISCRETE MATHEMATICS AND STATISTICS						
(Theory)						
Course Code	:	23MCA105		**CIE Marks**	:	50
Credits: L:T:P:S	:	2:2:0:0:0		**SEE Marks**	:	50
Total Hours	:	40		**SEE Duration**	:	3 Hrs

Course Learning Objectives:

1. Use propositional logic in knowledge representation.
2. Apply set theory in computer applications
3. Find relation between different sets
4. Fit a curve for given data points
5. Apply probability distributions in real life problems
6. Identify different graphs and use it to generate prefix codes

Unit – I	**08 Hrs**

Fundamentals of Logic:

Basic Connectives and Truth Tables, Logical Equivalence: The laws of logic, Duality, Logical NAND and NOR , Logical Implications, Rules of inference. Open Statement, Quantifiers

Unit – II	**08 Hrs**

Set Theory and Relations

Sets, Operations on sets , Laws of set theory, inclusion-exclusion principle, Soft Set Theory, Properties of relations, Functions, Composition and Inverse Functions Digraph and Matrix of relation, Equivalence Relations and Partitions.

Unit– III	**08 Hrs**

Statistical methods and Curve Fitting

Correlation, coefficient of correlations, rank correlation lines of regression-principle of least square. Curve Fitting, Principle of least square- to fit a straight line and parabola. Fitting of
$y = ae^{bx}, y = ax^b$

Unit –IV	**08 Hrs**

Random variable and probability distribution

Probability of an event, Conditional probability, Concept of random variable, discrete probability distributions, continuous probability distributions, Mean, variance and Standard deviations of random variables. Binomial and Poisson distribution, normal distribution with mean and varience and problems

Unit – V	**08 Hrs**

Graph Theory

Graphs and sub graphs, Graph Isomorphism, Vertex degree, Euler Graphs, Planar Graphs, Graph Coloring, Trees and Sorting, and Prefix Codes

Course Outcomes:	
At the end of the course the student will be able to:	
23MCA105.1	Apply knowledge of propositional logic in truth verification
23MCA105.2	Demonstrate the application of discrete structures in different fields of computer applications
23MCA105.3	Recognize relations in real life applications
23MCA105.4	Correlate data points and fit curves for different data points
23MCA105.5	Relate discrete and continuous probability distributions in real life problems
23MCA105.6	Find applications of graph theory in real life

Sl. No.	Title of the Book/ Research Papers	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Discrete and Combinatorial Mathematics- An Applied Introduction	Ralph P. Grimaldi and B V Ramana	Pearson Education	5th Edition, 2017
2	Fundamentals of Statistics	S.C. Gupta	Himalaya Publishing	6th Edition 2018
3	Soft Set Theory-Research Paper	P K Maji, R Biswas and A R Roy	Elsvier	2003
Reference Books				
1	Discrete Mathematical Structures with Applications to Computer Science	J.P. Tremblay and R. Manohar	McGraw Hill	Ist Edition, 2017
2	Discrete Mathematics and its Applications	Kenneth H. Rosen	Tata – McGraw Hill	7th Edition, 2017
3	First Look at Graph Theory	John Clark and Darek Allan Holtan	World Scientific Publishers	1st edition 1993

Correlation and Regression -https://www.youtube.com/watch?v=fNLeogEjMmM
Probability Distributions- https://www.youtube.com/watch?v=6x1pL9Yov1k
Mathematical Logic-   https://nptel.ac.in/courses/128106032
Graph theory-https://archive.nptel.ac.in/courses/111/106/111106102/

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCA105.1	**2**	**1**		-	-	-	-	1
23MCA105.2	1111	**1**		-	-	-		**1**
23MCA105.3	**2**	**1**			-	-	-	**1**
23MCA105.4	**2**	**1**	2	-	-	-		111
23MCA105.5	**2**	1		-	-	-		**1**
23MCA105.6	**2**	**1**						**1**

RESEARCH METHODOLOGY AND IPR

Course Code	**23MCA106**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:0:0)	SEE Marks	50
Credits	**02**	Exam Hours	03

Course Learning Objectives:
1. Identify suitable research methods and articulate research steps for any given problem
2. Define the problem statement, perform a literature survey and suggest appropriate solutions
3. Test the problem and perform experimental design with the samplings
4. Schedule data collection from various sources to segregate primary and secondary data
5. Analyze the results obtained and build on the discussions.
6. Apply CopyRight Act/Patent Act/Cyber Law/Trademark concepts and develop conclusions

Module-1	5Hrs

Research Methodology: Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India.

Module-2	5Hrs

Defining the Research Problem: Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration.

Reviewing the literature: Place of the literature review in research, Bringing clarity and focus to your research problem, Improving research methodology, Broadening knowledge base in research area, Enabling contextual findings, How to review the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed.

Module-3	5Hrs

Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs.

Design of Sample Surveys: Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs

Module-4	5Hrs

Data Collection: Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method.

Interpretation and Report Writing: Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout.

Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

Module-5	5Hrs

Intellectual Property Law Basics, Types of Intellectual Property, Agencies Responsible for Intellectual Property Registration, International Organizations, Agencies, and Treaties, The Increasing Importance of Intellectual Property Rights

Course Outcomes:	
At the end of the course the student will be able to:	
23MCA106.1	Identify the suitable research methods and articulate the research steps in a proper sequence for the given problem.
23MCA106.2	Carry out literature surveys, define the problem statement and suggest suitable solutions for the given problem.
23MCA106.3	Analyze the problem and conduct experimental design with the samplings.
23MCA106.4	Perform the data collection from various sources, segregate the primary and secondary data.
23MCA106.5	Analyze the results obtained and build on the discussions.
23MCA106.6	Apply some concepts/sections of CopyRight Act /Patent Act /Cyber Law/ Trademark to the given case and develop – conclusions.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1.	Research Methodology: Methods and Techniques	C.R. Kothari, Gaurav Garg	New Age International	4th Edition, 2022
2.	Research Methodology, a Step-by- Step Guide for Beginners	Ranjit Kumar	SAGE Publications Ltd	4th Edition, 2014
3.	Intellectual Property, The Law of Trademarks, Copyrights, Patents, and Trade Secrets	Deborah E. Bouchoux	Cengage learning	4th Edition, 2018
Reference Books				
1	Research Methods: The Concise Knowledge Base	William Trochim	Atomic Dog Publishing	2nd Edition 2006
2	Intellectual Property Rights	Radhakrishnan R	New Delhi , Excel Books(P) Ltd	2017

Web links/Video Lectures/MOOCs
1. Research Methodology: https://onlinecourses.nptel.ac.in/noc23_ge36/preview
2. Intellectual Property Law Specialization: https://www.coursera.org/specializations/introduction-intellectual-property

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MC106.1		2		2				
24MC106.2		2						
24MC106.3		2						
24MC106.4			2					
24MC106.5								2
24MC106.6							2	

1: Low 2: Medium 3: High

DATA STRUCTURES WITH ALGORITHMS LAB			
Course Code	**23MCL107**	CIE Marks	50
Teaching Hours/Week (L:T:P)	**(1:0:2)**	SEE Marks	50
Credits	**02**	Exam Hours	03

Course Learning Objectives:
1. Familiarize the knowledge of various types of data structures, operations and algorithms.
2. Implement and analyze the performance of Stack and its applications.
3. Implement and analyze Queue, Lists operations.
4. Implement and analyze Trees and graphs.
5. Implement the sorting algorithm.
6. Suggest and apply appropriate data structures for solving computing problems.

1. Write a C program to Implement the following searching techniques a. Linear Search Binary Search

2. Write a C program to implement the following sorting algorithms using user defined functions:
   a. Bubble sort (Ascending order)
   b. Selection sort (Descending order).

3. Write a C Program implement STACK with the following operations
   a. Push an Element on to Stack
   b. Pop an Element from Stack

4. Implement a Program in C for converting an Infix Expression to Postfix Expression.

5. Implement a Program in C for evaluating a Postfix Expression.

6. Write a C Program implement QUEUE with the following operations:
   a. enqueue
   b. dequeue

7. Write a C program to simulate the working of a singly linked list providing the following operations:
   a. Insert at begin
   b. Delete from the end
   c. Delete a given element
   d. Display

8. Obtain the Topological ordering of vertices in a given graph with the help of a C program

9. Check whether a given graph is connected or not using the DFS method using C programming

10. From a given vertex in a weighted connected graph, find shortest paths to other vertices Using Dijkstra's algorithm (C programming)

11. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm (C programming)

12. Implement a merge sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

Course Outcomes:
At the end of the course the student will be able to:

23MCL107.1	Gain the knowledge of various types of data structures, operations and algorithms.
23MCL107.2	Analyze the performance of Stack and its applications.
23MCL107.3	Implement and analyze Queue, Lists operations.
23MCL107.4	Implement decrease and conquer algorithms. (Trees and Graphs)
23MCL107.5	Implement and analyze the sorting algorithms.
23MCL107.6	Design and apply appropriate data structures for solving computing problems.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Introduction to the Design and Analysis of Algorithms	Anany Levitin	Pearson Education,	3rd Edition, 2023
2	Programming in ANSI C,	Balaguruswamy,	McGraw Hill Education	8th Edition, 2022
3	Data Structures Using C and C++	Yedidyah Langsam and Moshe J. Augenstein and Aaron M Tenanbanum,	Pearson Education Asia,	2nd Edition, 2007.
Reference Books				
1	Data Structures	Seymour Lipschutz, Schaum's Outlines	McGraw Hill	Revised 1st Edition, 2015
2	Fundamentals of Data Structures in C	Ellis Horowitz and SartajSahni,	Universities Press,	2nd Edition, 2022

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8
23MCL107.1	3	2						
23MCL107.2	3	2						
23MCL107.3	3	2						
23MCL107.4	2	2						
23MCL107.5	2	2						
23MCL107.6	3	2						2

1: Low 2: Medium 3: High

WEB TECHNOLOGIES LAB WITH MINI PROJECT			
Course Code	21MCL108	CIE Marks	50
Teaching Hours/Week(L:T:P)	(1:0:2)	SEE Marks	50
Credits	02	Exam Hours	03

Course Learning Objectives:
1. Implement XHTML documents using JavaScript and CSS.
2. Demonstrate a web page using HTML5.
3. Use JQuery to develop an interactive web page.
4. Apply database concepts to the interactive Web Page using PHP and MySQL.

Part A
1. Create a Web Page for the admission department of your college using XHTML and HTML5 tags. Design all the necessary input fields to collect the information of the student. Apply different levels of style sheets for the Web Page.

2. Develop and demonstrate, using JavaScript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible. Modify the above document so that when a text is moved from the top stacking position, it returns to its original position rather than to the bottom.

3. Develop and demonstrate using push/pop and shift/unshift operations in jquery

4. Demonstrate applications of recursion in JavaScript.

5. Demonstrate stack applications using JavaScript.

6. Develop multiple webpages with CSS for the student placement application, with a navigation bar in a separate php file and include it in all pages to navigate between them. Keep the navigation icon active based on the page being viewed.

7. Write a PHP program to insert name and age information entered by the user into a table created using MySQL, and to display the current contents of this table.

8. Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table using PHP. Provide buttons to update and delete data for the same.

PART-B

1.	Develop a web application (mini-project) using the languages and concepts learnt in the theory and exercises listed in part A with a good look and feel effects. Database connection needs to be implemented.

Note:
1. A team of two students must develop the mini project. However during the examination, each student must demonstrate the project individually.
2. Each student has to execute one program picked from Part-A during the semester end examination.
3. The team must submit a brief project report (20-25 pages) that must include the following. Introduction b. Requirement Analysis c Software Requirement Specification d. Analysis and Design, e. Implementation, f. Testing.
4. Brief synopsis, not more than two pages to be submitted by the team as per the format given. It was recommended that students do prior art search as part of literature survey before submitting the synopsis for the Mini/Major projects.
5. Rubrics may be used to evaluate the Mini-Project

Note: In CIE and SEE part-A and part-B shall be given weightage of 50% each.

Course Outcomes:
At the end of the course the student will be able to:

21MCL108.1	Apply the concept and usage of web based programming techniques.
21MCL108.2	Develop web pages using XHTML, HTML5, JavaScript and CSS.
21MCL108.3	Apply PHP and MySQL concepts.
21MCL108.4	Use jquery scripts for interactive web pages.
21MCL108.5	Design and implement user interactive dynamic web based applications using PHP and MySQL.
21MCL108.6	Evaluate the given web application and enhance it using the latest web Technologies.

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO 4	PO 5	PO6	PO7	PO8
23MCL108.1	-	-	2	-	-	-	-	-
23MCL108.2	-	-	2	-	-	-	-	-
23MCL108.3	-	-	-	2	-	-	-	-
23MCL108.4	-	-	2-	-	-	-	-	-
23MCL108.5	-	-	-	-	-	-	-	-
23MCL108.6	-	-	3	-	-	-	-	2

1: Low 2: Medium 3: High

DBMS LABORATORY			
Course Code	**23MCL109**	**CIE Marks**	**50**
Teaching Hours/Week (L:T:P)	**(1:0:2)**	**SEE Marks**	**50**
Credits	**02**	**Exam Hours**	**03**

Course Learning Objectives:
1. To familiarize the participant with the nuances of database environments towards an information-oriented data-processing oriented framework
2. To facilitate a good formal foundation on the relational model of data
3. To implement a database schema for a given problem domain
4. To demonstrate SQL and procedural interfaces to SQL comprehensively
5. To introduce systematic database design approaches covering conceptual design, logical design and an overview of physical design
6. To Analyze and select storage and recovery techniques of database system

Instructions for the Exercises:
1. Draw an ER diagram based on a given scenario with various Constraints.
2. Create Relational Database Schema based on the scenario using Mapping Rules.
3. Perform the given queries using any RDBMS Environment.
4. Suitable tuples have to be entered so that queries are executed correctly.
5. The results of the queries may be displayed directly.

1. A Computer Sciences Department frequent fliers have been complaining to Dane County Airport officials about the poor organization at the airport. As a result, the officials have decided that all information related to the airport should be organized using a DBMS, and you've been hired to design the database. Your first task is to organize the information about all the airplanes that are stationed and maintained at the airport. The relevant information is as follows:
Every airplane has a registration number, and each airplane is of a specific model.
The airport accommodates a number of airplane models, and each model is identified by a model number (e.g., DC-10) and has a capacity and a weight.
1) A number of technicians work at the airport. You need to store the name, SSN, address, phone number, and salary of each technician.
2) Each technician is an expert on one or more plane model(s), and his or her expertise may overlap with that of other technicians. This information about technicians must also be recorded.
3) Traffic controllers must have an annual medical examination. For each traffic controller, you must store the date of the most recent exam.
4) All airport employees (including technicians) belong to a union. You must store the union membership number of each employee. You can assume that each employee is uniquely identified by the social security number.
5) The airport has a number of tests that are used periodically to ensure that airplanes are still airworthy. Each test has a Federal Aviation Administration (FAA) test number, a name, and a maximum possible score.
6) The FAA requires the airport to keep track of each time that a given airplane is tested by a given technician using a given test. For each testing event, the information needed is the date, the number of hours the technician spent doing the test, and the score that the airplane received on the test.

Draw an ER diagram for the airport database. Indicate the various attributes of each entity and relationship set. Also specify the key and participation constraints for each relationship set and convert into a table.

2. The following relations keep track of airline flight information:

Flights (flno: integer, from: string, to: string, distance: integer,

departs: time, arrives: time, price: integer)

Aircraft (aid: integer, aname: string, cruisingrange: integer)

Certified (eid: integer, aid: integer)

Employees (eid: integer, ename: string, salary: integer)

Note that the Employees relation describes pilots and other kinds of employees as well;

every pilot is certified for some aircraft, and only pilots are certified to fly. Write each

of the following queries in SQL

1. Find the names of aircraft such that all pilots certified to operate them earn more than 80,000.

2. For each pilot who is certified for more than three aircraft, find the eid and the

maximum cruisingrange of the aircraft that he (or she) is certified for.

3. Find the names of pilots whose salary is less than the price of the cheapest route

from Los Angeles to Honolulu.

4. For all aircraft with cruisingrange over 1,000 miles, find the name of the aircraft

and the average salary of all pilots certified for this aircraft.

5. Find the names of pilots certified for some Boeing aircraft.

3. Write relational algebra queries

STUDENT (Ssn, Name, Subject, DOB)

COURSE (Course_id, Name, Dept)

ENROLL (Ssn, Course_id, Semester, Grade)

Book_issued (Course_id, Semester, ISBN)

TEXT(ISBN, Title, Publisher, Author)

1) Write a query to select all courses available in institute.

2) Find all student details registered for course id 10.

3) Find various book titles and authors for semester higher than 3.

4) Find all students belongs to IT Department (Without Joint)

4. A country wants to conduct an election for the parliament. A country having many constituencies. Each constituency is identified uniquely by Constituency_id, having the Name, belongs to a state,Number_of_voters. A constituency can have many voters. Each voter is uniquely identified by using Voter_id, having the Name, age, address (involves Houseno,city,state,pincode). Each voter belongs to only one constituency. There are many candidates contesting in the election. Each candidate is uniquely identified by using candidate_id, having Name, phone_no, age, state. A candidate belongs to only one party.There Are many parties. Each party is uniquely identified by using Party_id, having Party_Name,Party_symbol. A candidate can contest from many constituencies under the same party. A party can have many candidates contesting from different constituencies.

No constituency having the candidates from the same party. A constituency can have many contesting candidates belonging to different parties. Each voter votes only one candidate of his/her constituency.

Queries:

i. List the details of the candidates who are contesting from more than one \constituency which belong to different states.

ii. Display the state name having the maximum number of constituencies.

iii. Create a stored procedure to insert the tuple into the voter table by checking the voter age. If the voter's age is at least 18 years old, then insert the tuple into the voter else display the "Not an eligible voter msg".

iv. Create a stored procedure to display the number_of_voters in the specified constituency. Where the constituency name is passed as an argument to the stored procedure.

v. Create a TRIGGER to UPDATE the count of " Number_of_voters" of the respective constituency in the "CONSTITUENCY" table , AFTER inserting a tuple into the "VOTERS" table.

5. Design an ER-diagram for the following scenario, Convert the same into a relational model, normalize Relations into a suitable Normal form and then solve the following queries. A country can have many Tourist places . Each Tourist place is identified by using tourist_place_id, having a name, belonging to a state, Number of kilometers away from the 02.03.2021 updated 52/ 104 capital city of that state,history. There are many Tourists visiting tourist places every year. Each tourist is identified uniquely by using Tourist_id, having a Name, age, Country and multiple email ids. A tourist visits many Tourist places, it is also required to record the visted_date in the database. A tourist can visit a Tourist place many times on different dates. A Tourist place can be visited by many tourists either on the same date or at different dates.

Queries:

i. List the state name which has the maximum number of tourist places.

ii. List details of Tourist places where the maximum number of tourists visited.

iii. List the details of tourists visiting all tourist places of the state "KARNATAKA".

iv. Display the details of the tourists who visited at least one tourist place of the state, but visited all state tourist places.

v. Display the details of the tourist place visited by the tourists of all countries.

Part-B

A group of two students has to develop a mini-project where they need to implement SQL queries for inserting, deleting and searching the required record.

Note: In CIE and SEE part-A and part-B shall be given weightage of 50% each.

Course Outcomes:	
At the end of the course the student will be able to:	
23MCL109.1	Design entity-relationship diagrams to solve simple database applications
23MCL109.2	Implement a database schema for a given problem domain.
23MCL109.3	Formulate SQL queries in Oracle
23MCL109.4	Apply normalization techniques to improve the database design
23MCL109.5	Build database for any given problem
23MCL109.6	Analyze and select storage and recovery techniques of database system

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Fundamentals of Database Systems,	Elmasri and Navathe:	Pearson	7th Edition, 2022
2	Database System Concepts,	Silberschatz, Korth and Sudharshan	Tata McGraw Hill	7th Edition 2022
Reference Books				
1	An Introduction to Database Systems,	C.J. Date, A. Kannan, S. Swamynatham:	Pearson education,	8th Edition 2013
2	Database Management Systems,	Majmudar Arun K, Bhattacharyya pritimoy	McGraw-Hill,	1st Edition 2010

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO8
23MCL109.1			2		2			
23MCL109.2			2	1				
23MCL109.3	2				2			
23MCL109.4			2	2				1
23MCL109.5				2	1			
23MCL109.6		2	2					

1: Low 2: Medium 3: High

INDUSTRY ORIENTED TRAINING – I (MATHEMATICAL SKILLS)			
Course Code	**23ITM110**	CIE Marks	100
Teaching Hours/Week (L:T:P:S)	(0:2:0)	SEE Marks	-
Credits	**-**	Exam Hours	2

Course Learning Objectives:
1. To equip the students with basic concepts and tools of Mathematics to solve placement aptitude papers.
2. To enhance the problem solving skills and improve the basic mathematical skills to help students prepare for competitive examinations.

Module-1	4 Hours

Number System: Various types of Numbers; Tests of Divisibility; HCF and LCM; Roots and Squares.
Algebra: Identities; BODMAS Rule; Logarithms; Indices; Number Series; Simple Interest and Compound Interest.

Module-2	4 Hours

Time and Work: Facts and Formulae; Group work; Pipes and Cisterns.
Time and Distance: Basics of Time, Speed and Distance; Average journey speed; Relative Speeds; Boats and Streams.

Module-3	4 Hours

Average, Percentage, Age problems: Average; Concept of percentage, Results on Population and Depreciation; Problems on ages.
Profit and Loss: Profit and Loss formulae; Percentage of profit and loss, Discount.

Module-4	4 Hours

Permutations, Combinations, Probability: Factorial Notation; Permutations; Combinations; Random Experiment; Probability of Occurrence of events.
Ratio, Proportion, Partnership: Ratio; Ratio in terms of Percentage, Proportion, Mean Proportion; Variation; Partnership.

Module-5	4 Hours

Geometry: Pythagoras theorem - Heights and Distances; Area; Volume; Surface Area.
Clock and Calendar: Problems related to clocks; Calendars; odd days; leap year; Day of the week related to Odd days.

Course Outcomes:	
At the end of the course the student will be able to:	
23ITM110.1	Apply the basic concepts of quantitative abilities related to the Number system.
23ITM110.2	Evaluate time related problems by knowing the relationship between time/speed/distance or time/work.

23ITM110.3	Apply the concepts of average, percentage, appreciation and depreciation in real life problems
23ITM110.4	Solve application problems involving permutations and combinations.
23ITM110.5	Apply Ratio and Proportion concepts to solve the partnership problems where people share the ownership.
23ITM110.6	Apply the geometrical concepts in real- world applications.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Quantitative Aptitude for Competitive Examinations	Dr R S Aggarwal	S. Chand & Company LTD	44th Edition, 2018.
2	Quantitative Aptitude for Competitive Examination	R.K Tyagi	MTG Learning Media	First Edition, 2018.

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23ITM110.1	-		-	2	-		1	
23ITM110.2	-	2	-		-			
23ITM110.3	-		-	2	-		1	
23ITM110.4	-	2	-		-			`
23ITM110.5	-		-	2	-		1	
23ITM110.6	-	2	-		-			

1: Low 2: Medium 3: High

FUNDAMENTALS OF PROGRAMMING (BRIDGE COURSE)			
Course Code	**23MCA111**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:2:0)	SEE Marks	-
Credits	0	Exam Hours	-

Course Learning Objectives:
1.   To understand the structure, memory organization, design of the various functional units and components of computers.
2.   To gain the knowledge about the basics of programming structure and module.
3.   To study the concept of decision making statements, loop controlling structures and arrays.
4.   To learn the concept of structure and execute programs on structures.
5.   To gain knowledge about pointers and execute the programs using pointers.
6. To learn the concept of logic gates and its applications in solving some societal/industrial problems

Module-1	**4 Hrs**

Basic Structure of Computer Hardware and Software, Computer Types, Functional Units, Basic Operational Concepts, Bus structure, Software, Performance, Multiprocessing and Multi computers, Machine Instruction: Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Interrupts.

Module-2	**4 Hrs**

C Programming: decision making, control structures and arrays
Decision making with if statement, simple if statement, the if..else statement, nesting of if..else statements, the else..if ladder, the switch statement, the ?: operator, the goto statement, the break statement, programming examples. The while statement, the do...while statement, the for statement, nested loops, jumps in loops, the continue statement, programming examples. one dimensional and two dimensional arrays, declaration and initialization of arrays, reading , writing and manipulation of above types of arrays.

Module-3	**4 Hrs**

 Structures
Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, operations on individual members, array of structures, structures within structures, structures and functions, Unions, size of structures.

Module-4	**4 Hrs**

Pointers
Pointers in C, Declaring and accessing pointers in C, pointers in C++, Pointer as function arguments, Dynamic Allocation Operators new and delete, Initializing Allocated Memory,Allocating Arrays, Allocating Objects. Overloading, overloading operators.

Module-5	4 Hrs

Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r᾽s and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.

Course Outcomes:

At the end of the course the student will be able to:

23MCA111.1	Understand the structure, memory organization, design of the various functional units and components of computers.
23MCA111.2	Understand the basics of programming structure and module
23MCA111.3	Demonstrate the concept of decision making statements, loop controlling structures. Execute simple programs, programs using arrays and structures.
23MCA111.4	Understand the concepts of functions and subroutine, execute the programs.
23MCA111.5	Explain the pointer concepts and execute the programs using pointers.
23MCA111.6	Demonstrate the applications of logic gates in solving some societal/industrial problems.

Sl. No.	Title of the Book	Name of the Author	Name of the Publisher	Edition and Year
Textbooks				
1	Programming in ANSI C	Balaguruswamy	Tata McGraw Hill	6th Edition, 2012
2	Let us C	Yashwant Kanetkar	BPB Publications	18th Edition, 2022
3	Computer Organization	Carl Hamacher, Zvonko Vranesic, Safwat Zaky	Tata McGraw-Hill	5th edition, , 2022
Reference Books				
1	C : The Complete Reference	Herbert Schildt	McGraw Hill Education	4th Edition, 2017
2	Digital Logic and Computer Design	M.Morris Mano	Pearson	2023

Web links/Video Lectures/MOOCs
1.   Introduction: to Programming: https://www.coursera.org/learn/programming-introduction
2.   Computer Organization: https://nptel.ac.in/courses/106103068

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCA111.1	2				2			
23MCA111.2	2	2						
23MCA111.3	2	2						
23MCA111.4	2	2						
23MCA111.5	2	2						
23MCA111.6	2							2

1: Low 2: Medium 3: High

SOFTWARE ENGINEERING & TESTING			
Course Code	**23MCA201**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:
1. To get insight on IEEE/ACM code of software engineering ethics.
2. To describe requirement engineering.
3. To analyze different requirements using UML tools.
4. To discuss UML based object and class concepts.
5. To apply Software Testing concepts.
6. Apply correct process models for software development.

Module-1	8Hrs

Introduction: Professional Software Development Attributes of good software, software engineering diversity, IEEE/ACM code of software engineering ethics, case studies. Software Process and Agile Software Development Software Process models: waterfall, incremental development, reuses oriented, Process activities; coping with change, The Rational Unified Process. Agile Methods, Plan-Driven and Agile Development, Extreme Programming, Agile Project Management.

Module-2	8Hrs

Requirement Engineering: Functional and non-functional requirements, The Software requirements document, Requirements specification, Requirements engineering processes, Requirement elicitation and analysis, Requirement validation, Requirement management.
Project Design and planning: Process planning, Effort estimation, project scheduling and staffing.

Module-3	8Hrs

Object orientation and OO development. OO features, OO themes. Modeling as design Technique: Modeling: The three models. Object and class concepts, Link and associations concepts, Generalization and inheritance, A sample class model. Navigation of class models, Practical tips. Advanced objects and class concepts; Associations ends; N-array association; Aggregation, composition, Abstract class, Multiple inheritance, metadata, reification, constraints, derived data, packages and practical

Module-4	8Hrs

State modeling: Events, States, Transitions and Conditions. State Diagram: State diagram behavior, Practical tips. Advanced State Modeling: Nested state diagram, Nested states, signal generalization, concurrency, A sample state model.
Interaction modeling: Use Case models, Sequence models, Activity models. Use case relationships: Procedural sequence models, special constructs for activity models.

Module-5	8Hrs

Introduction to Testing: The Six Essentials of Software Testing: The Six Essentials of Software Testing; Testing Methods. Verification testing: Basic verification methods, Verifying documents at different phases. Three critical success factors for implementing verification. Validation testing: Validation overview, Validation methods-Black box methods, White box methods. Validation activities: Low level Testing, High level Testing. Software testing tools: Categorizing test tools, tool acquisition. Organizational approaches to testing: Organizing and reorganizing testing, Structural design elements, Approaches to organizing the test function.

Course Outcomes:

At the end of the course the student will be able to:

23MCA201.1	Get insight on IEEE/ACM code of software engineering ethics.
23MCA201.2	Describe requirement engineering.
23MCA201.3	Analyze different requirements using UML tools.
23MCA201.4	Discuss UML based object and class concepts.
23MCA201.5	Apply Software Testing concepts.
23MCA201.6	Apply correct process models for software development.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Software Engineering	Ian Sommerville	Pearson Edition Ltd	9th Edition 2011
2	Software Engineering	PankajJalote	Wiley India Pvt Ltd	2nd Edition 2010
3	Object Oriented Modeling and Design with UML	Michel Blaha, James Rumbaugh	Pearon	2nd Edition 2007
Reference Books				
1	Object oriented software engineering	Stephan R. Schach,	Tata McGraw Hill,2008	2nd Edition 2007
2	Applying UML and Patterns,	Craig Larman,	Pearson Education,	3rd Edition 2005

Remote Laboratory Link

1. http://vlabs.iitkgp.ernet.in/se/

Web links/Video Lectures/MOOCs
   1. https://nptel.ac.in/courses/106/105/106105182/ Software Engineering
   2. https://www.coursera.org/learn/os-power-user : **Software Testing and Automation Specialization**

Course Articulation Matrix

(COs)	Program Outcomes							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCA201.1							2	2
23MCA201.2						2	2	
23MCA201.3				2	2			
23MCA201.4				2	2			
23MCA201.5		2					2	
23MCA201.6					2	2	2	

1: Low 2: Medium 3: High

DATA ANALYTICS USING PYTHON

Course Code	**23MCA202**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(4:0:0)	SEE Marks	50
Credits	**04**	Exam Hours	03

Course Learning Objectives:
1. To apply fundamental Python programming concepts.
2. To implement Python collection objects and functions.
3. To apply object oriented programming concepts in Python.
4. To apply numpy array functions and pandas data structures for data analysis.
5. To implement data loading and wrangling in Python.
6. To implement the data visualization tools matplotlib and seaborn.

Module-1	10Hrs

Python Basic Concepts and Programming: Interpreter – Program Execution – Statements – Expressions – Flow Controls – Functions - Numeric Types – Sequences - Strings, Parts of Python Programming Language, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type( ) Function and Is Operator, Control Flow Statements, The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Module-2	10Hrs

Python Collection Objects, Classes
Strings- Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, Lists-Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods. Sets, Tuples and Dictionaries. Files: reading and writing files. Class Definition – Constructors – Inheritance – Overloading

Module-3	10Hrs

Introduction to Numpy and Pandas
Numpy: Understanding data types in python, basics of Numpy arrays, computation on NumPy arrays: universal function. (refer chapter 2 from python data science handbook)
Pandas: Introducing to pandas data structure, essential functionally, summarizing and computing descriptive statistics, handling missing data.(refer chapter 5 from python for data Analytics)

Module-4	10Hrs

Data Loading and Data Wrangling
Reading and writing data in text format, interacting with databases, combining and merging data sets, reshaping and pivoting, data transformation, string manipulation (refer chapter 6 and 7 from python for data Analytics.

Module-5	10Hrs

Visualization with Matplotlib, and Seaborn
General Matplotlib tips, simple line plots, simple scatter plots, visualizing errors, density and contour plots, histograms, binning and density, customizing plot legends and colorbars, customizing matplotlib, visualization with seaborn.   (refer chapter 4 from python data science handbook)

Course Outcomes:	
At the end of the course the student will be able to:	
23MCA202.1	Apply fundamental Python programming concepts.
23MCA202.2	Implement Python collection objects and functions.
23MCA202.3	Apply object oriented programming concepts in Python.
23MCA202.4	Apply numpy array functions and pandas data structures for data analysis.
23MCA202.5	Implement data loading and wrangling in Python.
23MCA202.6	Implement the data visualization tools matplotlib and seaborn.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Think Python: How to Think Like a Computer Scientist	Allen B. Downey	Shroff/O'Reilly	2nd Edition, Updated for Python 3,2016
2	An Introduction to Python	Guido van Rossum, Fred L. Drake Jr	Network Theory Ltd	Revised Edition for Python 3.2 2011
3	Python Data Science Handbook: Essential tools for working with data	Jake Vander plas	O'Reilly Media, Inc.	1st Edition 2016
4	PYTHON Programming: using problem solving approach	Reema Thareja	Oxford Uni-Press	1st Edition 2018
Reference Books				
1	Programming Python	Mark Lutz	O'Reilly Media	4th Edition 2010
2	Python 3 for Absolute Beginners	Tim Hall and J-P Stacey	Apress	1st Edition 2009
3	Beginning Python: From Novice to Professional	Magnus Lie Hetland	Apress	2nd Edition 2005
4	Beginning Python Visualization Crafting Visual Transformation Scripts	ShaiVaingast,	Apress,	2nd Edition 2014

Web links/Video Lectures/MOOCs
1. **Python for Applied Data Science:** https://www.coursera.org/learn/python-python-for-applied-data science-ai
2. **Python for Data Visualization:** https://www.coursera.org/learn/python-for-data-visualization

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCA202.1	3	2						
23MCA202.2	2	2						
23MCA202.3	2	2						
23MCA202.4	2	2						
23MCA202.5			2					2
23MCA202.6				3				2

1: Low 2: Medium 3: High

ENTERPRISE JAVA			
Course Code	**23MCA203**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(4:0:0)	SEE Marks	50
Credits	04	Exam Hours	04

Course Learning Objectives:

1. To apply the concepts of class and inheritance for a problem and interfaces.

2. To create and analyze the application using of Packages, Exceptions and Multithreading

3. To implement the concepts of Applets, to create GUI applications and networking using Java network classes for distributed applications.

4. Create Database connection for the web applications and discuss the servlets and its life cycle.

5. Describe JSP tags and its usage in web applications.

6. Design enterprise applications using Java Beans concepts for the given problem.

Module-1	**10Hrs**

Introduction to JAVA: Introducing classes: Class fundamentals; Declaring objects; Assigning object reference variables; Introducing methods; Constructors; The this keyword , Method Overloading, Overloading Constructors, Recursion, Understanding Static, Introducing Nested and Inner Classes, varargs: Variable-Length Arguments.

Inheritance: Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Using super to Call Superclass constructors, Using super to Access Superclass Members, Creating a Multilevel Hierarchy, Order of execution of constructors in inheritance, Superclass References and Subclass Objects, Method Overriding, Overridden Methods support polymorphism, Using Abstract Classes, Using final, The Object Class.

Interfaces: Interface Fundamentals, Creating an Interface, Implementing an Interface, Using Interface References, Implementing Multiple Interfaces, Constants in Interfaces, Interfaces can be extended, Nested Interfaces

Module 2	**10Hrs**

Packages: Package Fundamentals, Packages and Member Access, Importing Packages, Static import

Exception Handling: The Exception Hierarchy, Exception Handling Fundamentals, The Consequences of an Uncaught Exception, Exceptions Enable you to handle errors gracefully using Multiple catch clauses, Catching subclass Exceptions, try blocks can be nested, Throwing an Exception, A Closer look at Throwable, using finally, using throws, Java's Built-in Exceptions.

Multithreaded programming: Java Thread model; Main thread; Creating a thread; Creating multiple threads; Using isAlive() and join(); Synchronization; Interthread communication.

Module- 3	**10Hrs**

Applet basics; Applet architecture; Applet skeleton; Simple Applet display methods; Requesting repainting; HTML APPLET tag;

Event Handling: Two event handling mechanisms; Delegation event model; Event classes;Sources of events; EventListener interfaces; Using the Delegation Event Model; Adapter classes; Introducing the AWT: AWT Classes; Window fundamentals; Working with Frame windows; Creating a windowed program; AWT Controls: Labels, Buttons, Choice, List, Checkboxes, CheckboxGroup, TextField, TextArea, Menubars and menus; Understanding layout managers: FlowLayout, BorderLayout, GridLayout;

Networking: Networking basics: Java and the net; InetAddress; TCP/IP client sockets; URL: URLConnection; TCP/IP server sockets; Datagrams.

Module-4	10Hrs

JDBC:JDBC objects: Concept of JDBC; JDBC driver types; JDBC packages; Brief overview of the JDBC process; Database connection; Associating the JDBC/ODBC bridge with the database;Statement objects; ResultSet;

Servlets: Background; Life cycle of a Servlet; Using Tomcat for Servlet development; Simple Servlet; Servlet API; javax.servlet package; Reading Servlet parameter; javax.servlet.http package; Handling HTTP requests and responses; Using Cookies.

Module - 5	10Hrs

Java Server Pages (JSP): Introduction to JSP: Overview of JSP: JSP Technology, Need of JSP, Benefits of JSP, Advantages of JSP, Basic Syntax, Invoking Java code with JSP Scripting Elements, The JSP Page directive, Import Attribute, Session Attribute, is Elignore attribute, Buffer and Auto flush Attribute, Info Attribute, error Page, and is error Page Attributes, is Thread Safe Attribute, extends Attribute, language Attribute, Including Files and Applets in JSP Pages using Java Beans components in JSP documents.

Java Beans:Introduction to Java Beans; Advantages of Java Beans; Bean Developer Kit (BDK); JAR files; Introspection; Developing a simple Bean; Using bound properties; Using BeanInfo Interface; Constrained properties.

Enterprise Java Beans : Enterprise Java Beans; Deployment Descriptors; Session Java Bean; Entity Java Bean; Message-Driven Bean; The JAR File.

Course Outcomes:	
At the end of the course the student will be able to:	
23MCA203.1	Illustrate the concepts of generalization and run time polymorphism applications to develop reusable components and usage of interfaces.
23MCA203.2	Exemplify the usage of Packages, Implement Exceptions, and multithreading in building efficient applications.
23MCA203.3	Implement the concepts of Applets with user friendly interface and networking using Java network classes for distributed applications
23MCA203.4	Build Database connection for the web applications. Apply the concept of Servlet and its life cycle to create web application
23MCA203.5	Apply JSP tags and its services to web application.
23MCA203.6	Develop enterprise applications using Java Beans concepts for the given problem.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Java Fundamentals, A Comprehensive Introduction.	Herbert Schildt, Dale Skrien	Tata Mc Graw Hill	First Edition, 2013.
2	JAVA the Complete Reference	Herbert Schildt	Tata McGraw Hill	2019
3	Java Server Programming Java EE 7 (J2EE 1.7), Black Book	DT EDITORIAL SERVICES	Dreamtech press	2014
4	Servlets and Java server pages.	Marty Hall,Larry Brown Core	Vol 1: Core Technologies. 2nd Edition.	Vol 1: Core Technologies. 2nd Edition.
Reference Books				
1	EJB 3 Developer Guide, A Practical Guide For Developers And Architects to the Enterprise Java Beans	Michel Sikora	PACKT Publishing	Ist Edition, 2008.
2	The Java Complete Reference, Comprehensive coverage of the Java Language	Herbert Schildt	Tata McGraw Hill	8th Edition, 2011
3	Java Programming	Hari Mohan Pandey	Pearson Education	First Edition 2012
4	Java 6 Programming, Black Book	KoGenT	Dreamtech Press	2012.
5	Java 2 Essentials	Cay Horstmann	Wiley	Second Edition,1999

Web links/Video Lectures/MOOCs/papers

1. https://www.udemy.com/course/jsp-servletfree

2.https://www.coursera.org/projects/introduction-to-javaprogramming-java-fundamental-concepts

    3. https://nptel.ac.in/courses/106/105/106105191/

    4. https://www.coursera.org/projects/learn-programming-java

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MCA203.1	3	2						
24MCA203.2	3	2						
24MCA203.3	2	2						
24MCA203.4			2	2				
24MCA203.5	3		2	2				2
24MCA203.6				3				2

1: Low 2: Medium 3: High

MACHINE LEARNING			
Course Code	**23MCA204**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. Develop an appreciation for what is involved in learning models from data.
2. Differentiate supervised and unsupervised learning.
3. Apply neural networks, Bayes classifier and k nearest neighbor, for real world problems.
4. Predict statistical analysis of machine learning techniques.
5. Interpret theory of probability and statistics related to machine learning.
6. Describe a wide variety of learning algorithms.

Module-1	8Hrs

Introduction: Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. Concept Leaming: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.

Module-2	8Hrs

Decision Tree Learning: Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning.

Module-3	8Hrs

Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptrons, Backpropagation algorithm.

Module-4	8Hrs

Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks.

Module-5	8Hrs

Evaluating Hypothesis: Motivation, estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.
Instance Based Learning: Introduction, k-nearest neighbor learning.

Course Outcomes:	
At the end of the course the student will be able to:	
23MCA204.1	Develop an appreciation for what is involved in learning models from data.
23MCA204.2	Differentiate supervised and unsupervised learning.
23MCA204.3	Apply neural networks, Bayes classifier and k nearest neighbor, for real world problems.
23MCA204.4	Predict statistical analysis of machine learning techniques.
23MCA204.5	Interpret theory of probability and statistics related to machine learning.

23MCA204.6	Describe a wide variety of learning algorithms.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Machine Learning	Tom M. Mitchell	McGraw Hill Education	First Edition 2017
Reference Books				
1	The Elements of Statistical Learning	Trevor Hastie, Robert Tibshirani, Jerome Friedman	Springer series in statistics.	2nd Edition 2009
2	Introduction to machine learning	Ethem Alpaydin	PHI Learning Pvt. Ltd.	2nd edition 2015

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCA204.1	2		2					2
23MCA204.2				2				
23MCA204.3		2	3					3
23MCA204.4				2				
23MCA204.5				2				
23MCA204.6					2	2	2	3

1: Low 2: Medium 3: High

CYBER SECURITY			
Course Code	**23MC205A**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Exam Hours	03

Course Learning Objectives:
1. Define the area of cybercrime and forensics.
2. Analyze the working of cyber security principles in designing the system.
3. Analyze the given problem (cybercrime, vulnerability, threat), develop a strategy (physical, logical or administrative controls) to mitigate the problem and articulate consequences on Society and National Economy.
4. Analyze the cybercrimes in mobile and wireless devices
5. Investigate the influence of Block chain technology for the cyber security problem and evaluate its role.
6. Illustrate tools used in cyber forensic

Module-1	8Hrs

Introduction to Cybercrime and Laws
Introduction, Cybercrime: Definition and Origins of the word, Cybercrime and information Security, Cyber criminals, Classifications of Cyber Crimes. How Criminals Plan Them – Introduction, How Criminals Plan the Attacks, Cybercafé and Cybercrimes, Botnets, Attack Vector, Cloud Computing.

Module-2	8Hrs

Tools and Methods used in Cybercrime Introduction, Proxy Server and Anonymizers, Password Cracking, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow.

Module-3	8Hrs

Phishing and Identity Theft Introduction, Phishing – Methods of Phishing, Phishing Techniques, Phishing Toolkits and Spy Phishing. Identity Theft – PII, Types of Identity Theft, Techniques of ID Theft. Digital Forensics Science, Need for Computer Cyber forensics and Digital Evidence, Digital Forensics Life Cycle.

Module-4	8Hrs

Mobile and Wireless Devices - Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

Module-5	8Hrs

Network Defense tools and block chain technology
Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Intrusion Detection System, introduction to block chain technology (definition, tools used for implementation) and its applications.

Course Outcomes:	
At the end of the course the student will be able to:	
23MC205A.1	Comprehend the Cybercrime and its origin
23MC205A.2	Analyze the working of cyber security principles in designing the system.
23MC205A.3	Analyze the given problem (cybercrime, vulnerability, threat), develop a strategy(physical, logical or administrative controls) to mitigate the problem and articulate consequences on Society and National Economy.
23MC205A.4	Analyze the cybercrimes in mobile and wireless devices
23MC205A.5	Investigate the influence of Block chain technology for the cyber security problem and evaluate its role.
23MC205A.6	Comprehend Digital Forensics

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Anti-Hacker Tool Kit (Indian Edition)	Mike Shema	Publication McGraw Hill.	4th Edition, 2014
2	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Nina Godbole and Sunit Belapure,	Wiley	First Edition, 2023
Reference Books				
1	Computer Forensics and Cyber Crime: An Introduction	Marjie T. Britz	Pearson	Third Edition, 2013
2	Introduction to Computer Networks and Cyber Security	Chwan-Hwa (John) Wu,J. David Irwin	CRC Press	First Edition, 2014

3	Guide to Computer Forensics and Investigations -Cengage Learning	Bill Nelson, Amelia Phillips, Christopher Steuart	Course Technology Inc	Fourth Edition, 2014
4	Cybersecurity: Managing Systems, Conducting Testing, and Investigating Intrusions	Thomas J. Mowbray	John Wiley & Sons, Inc	First Edition, 2014
5	Information and Cyber Security	Mr. Santosh BJ, Dr. K.V. S.S.S.S. Sairam, Mr. Shubham Kumar, Mr. Chandu Jagan Sekhar M,	Scientific International Publishing House,	

Web links/Video Lectures/MOOCs
1. https://www.coursera.org/specializations/cyber-security
2. https://www.edx.org/course/introduction-to-cybersecurity
3. Introduction to Information Security I - https://nptel.ac.in/courses/106106129
4. https://www.youtube.com/@VTUeShikshanaProgramme/search?query=cyber%20security
5. Block chain technology - https://www.simplilearn.com/blockchain-certification-training-course

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8
23MC205A.1		2	2					
23MC205A.2		2	2	2				
23MC205A.3		2	2	2				
23MC205A.4		2	2	2			2	
23MC205A.5	2	2	2	2				
23MC205A.6		2	2	2				2

1: Low 2: Medium 3: High

DATA MINING AND BUSINESS INTELLIGENCE			
Course Code	**23MC205B**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:
1.   Differentiate data warehouse, Business Intelligence and OLAP
2.   Demonstrate data pre-processing techniques and application of association rule mining algorithms.
3.   Use various classification algorithms and evaluation of classifiers for the given problem.
4.   Analyze data mining for various business intelligence applications for the given problem.
5.   Interpret classification and regression techniques for the given problem.
6. Evaluate the importance of data quality, data governance, and data security in the context of big data analytics.

Module-1	8Hrs

Overview and concepts Data Warehousing and Business Intelligence: Why reporting and Analyzing data, Raw data to valuable information-Lifecycle of Data - What is Business Intelligence - BI and DW in today's perspective - What is data warehousing - The building Blocks: Defining Features - Data warehouses and data marts - Overview of the components - Metadata in the data warehouse - Need for data warehousing - Basic elements of data warehousing - trends in data warehousing. The Architecture of BI and DW BI and DW architectures and its types - Relation between BI and DW - OLAP (Online analytical processing) definitions - Difference between OLAP and OLTP – Dimension analysis – Cubes, Drill-down and roll-up - slice and dice or rotation – OLAP models - ROLAP versus MOLAP - defining schemas: Stars, snowflakes and fact constellations.

Module-2	8Hrs

Introduction to data mining (DM): Motivation for Data Mining - Data Mining-Definition and Functionalities – Classification of DM Systems - DM task primitives - Integration of a Data Mining system with a Database or a Data Warehouse - Issues in DM – KDD Process Data Pre – processing-Data cleaning: Missing Values, Noisy Data - Data Integration and transformation - Data Reduction: Data cube aggregation,
Dimensionality reduction - Data Compression - Numerosity Reduction - Data Mining Primitives - Languages and System Architectures: Task relevant data - Kind of Knowledge to be mined - Discretization and Concept Hierarchy.

Module-3	8Hrs

Concept Description and Association Rule Mining
Concept description - Data Generalization and summarization-based characterization - Attribute relevance - class comparisons Association Rule Mining: Market basket analysis - basic concepts - Finding frequent item sets: Apriori algorithm -generating rules – Improved Apriori algorithm – Incremental ARM – Associative Classification – Rule Mining.

Module-4	8Hrs

Classification and prediction: Difference between classification and prediction – Issues regarding Classification and prediction: Classification methods: Decision tree, Bayesian Classification, Rule based, CART, Neural Network Prediction methods: Linear and nonlinear regression, Logistic Regression. Introduction of tools such as DB Miner /WEKA/DTREG DM Tools.

Module-5	8Hrs

Data Mining for Business Intelligence Applications: Data mining for business Applications like Balanced Scorecard, Fraud Detection,
Clickstream Mining, Market Segmentation, retail industry, telecommunications industry, banking & finance and CRM etc., Data Analytics Life Cycle: Introduction to Big data Business Analytics - State of the practice in analytics role of data scientists Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables for stakeholders.

Course Outcomes:
At the end of the course the student will be able to:

23MC205B.1	Analyze the concept of data warehouse, Business Intelligence and OLAP
23MC205B.2	Demonstrate data pre-processing techniques and application of association rule mining algorithms
23MC205B.3	Apply various classification algorithms and evaluation of classifiers for the given problem
23MC205B.4	Analyze data mining for various business intelligence applications for the given problem.
23MC205B.5	Apply classification and regression techniques for the given problem.
23MC205B.6	Describe big data business analytics

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Data Mining Concepts and Techniques, Morgan Kaufmann	J. Han, M. Kamber,	Morgan Kaufmann Publishers In	4th Edition, 2022
2	Data mining: Concepts, models, methods and algorithms.	M. Kantardzic	John Wiley & Sons Inc.	3rd Edition, 2019
3	Data Warehousing Fundamentals.	Paulraj Ponnian	John Willey.	2nd Edition, 2012

Reference Books

1	Data Mining: Introductory and Advanced Topics.	M. Dunham	Pearson Education.	1st Edition 2006
2	Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner	G. Shmueli, N.R. Patel, P.C. Bruce	Wiley India	4th Edition, 2023

Web links/Video Lectures/MOOCs

1. Business analytics and data mining Modeling using R - https://nptel.ac.in/courses/110107092
2. Data Mining - https://onlinecourses.nptel.ac.in/noc21_cs06
3. Big data Analytics - https://www.ibm.com/analytics/big-data-analytics
4. Regression and classification - https://www.coursera.org/learn/regression-and-classification
5. Business Intelligence and OLAP - https://www.simplilearn.com/iit-business-analytics-certification-program

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8
24MC205B.1	2	2			2			
24MC205B.2	2		2		2			
24MC205B.3	2	2			2	2		
24MC205B.4	2			2				2
24MC205B.5	2		2					2
24MC205B.6	2	2			2		2	

1: Low 2: Medium 3: High

ENTERPRISE RESOURCE PLANNING			
Course Code	**23MC205C**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. Examine the pros and cons of ERP, data warehousing/mining and OLAP
2. Test the implementation of ERP in the context of business
3. Implement ERP for different manufacturing prospective
4. Explain ERP marketing
5. Examine the design ERP with future e-commerce and internet
6. Examine how to modernize and integrate business processes and systems

Module-1	**8Hrs**

Introduction To ERP Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering, Data Warehousing, Data Mining, On–line Analytical Processing, Supply Chain Management

Module-2	**8Hrs**

ERP Implementation: Implementation of Life Cycle, Implementation Methodology, Hidden Costs, Organizing Implementation, Vendors, Consultants and Users, Contracts, Project Management and Monitoring

Module-3	**8Hrs**

ERP Manufacturing Prospective: MRP - Material Requirement Planning, BOM - Bill Of Material, MRP - Manufacturing Resource Planning, DRP - Distributed Requirement Planning, PDM - Product Data Management.

Module-4	**8Hrs**

ERP Market : ERP Market Place, SAP AG, People Soft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD , System Software Associates.

Module-5	**8Hrs**

ERP–Present And Future : Turbo Charge the ERP System, EIA, ERP and E–Commerce, ERP and Internet, Future Directions in ERP.

Course Outcomes:	
At the end of the course the student will be able to:	
23MC205C.1	Analyze the pros and cons of ERP, Data warehousing/Mining and OLAP for the given problem/application.
23MC205C.2	Analyze the implementation of ERP in the context of business of the different organizations.
23MC205C.3	Analyze and apply ERP for different manufacturing prospective.
23MC205C.4	Explain ERP marketing with the help of a case study
23MC205C.5	Analyze the design ERP with future E-commerce and internet.

23MC205C.6	Describe how to modernize and integrate business processes and systems

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	ERP Demystified	Alexis Leon,	Tata McGraw Hill.	Third Edition, 2014.
2	Concepts in Enterprise Resource Planning	Joseph A. Brady, Ellen F. Monk, Bret J. Wangner	Thomson Learning	4th edition 2012.
Reference Books				
1	Enterprise Resource Planning	Vinod Kumar Garg and N.K Venkata Krishnan	Prentice Hall	2nd Edition 2011.

Web links/Video Lectures/MOOCs
1. Introduction to ERP: https://www.coursera.org/lecture/enterprise-systems/1-1b-introduction-to-enterprise-resource-planning-erp-LneSo
2. Operations Management-ERP: https://freevideolectures.com/course/4539/nptel-operations-management/60

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC205C.1	2	2						
23MC205C.2		2	2	2				
23MC205C.3				2		2		
23MC205C.4		2	2					
23MC205C.5		2	2	3				2
23MC205C.6				2		2		

1: Low 2: Medium 3: High

Parallel Computing			
Course Code	**23MC205D**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. Understand the need of parallel programming.
2. Apply the MPI rules for distributed memory programming.
3. Analyse the thread programming.
4. Develop the shared memory programming with openMP
5. Implement the parallel programs using algorithms
6. Use the parallel program algorithms in real world scenario

Module-1	**8Hrs**

Introduction to Parallel Computing.

Need of Performance, Building Parallel Systems, Why to Write Parallel Programs? How to Write Parallel Programs? Approach : Concurrent, Parallel, Distributed

Parallel Hardware and Parallel Software

Background, Modifications to the von Neumann Model, Parallel Hardware, Parallel Software, Input and Output, Performance, Parallel Program Design and Writing and Running Parallel Programs

Module-2	**8Hrs**

Distributed Memory Programming with MPI:

Getting Started, The Trapezoidal Rule in MPI, Dealing with I/O, Collective Communication, MPI Derived Data types, A Parallel Sorting Algorithm

Module-3	**8Hrs**

Shared Memory Programming with Pthreads:

Processes, Threads and Pthreads, Hello, World program ,Matrix-Vector Multiplication, Critical Sections Busy-Waiting, Mutexes, Producer-Consumer Synchronization and Semaphores, Barriers and Condition Variables, Read-Write Locks, Caches, CacheCoherence, and False Sharing and Thread-Safety

Module-4	**8Hrs**

Shared Memory Programming with OpenMP: Introduction to OpenMP, The Trapezoidal Rulem Scope of Variables, The Reduction Clause, The Parallel For Directive, More About Loops in OpenMP: Sorting, Scheduling Loops, Producers and Consumers, Caches, Cache-Coherence, and False Sharing and Thread-Safety

Module-5	**8Hrs**

6 Parallel Program Development and Parallel Algorithms: Two N-Body Solvers, Tree Search and Case Studies

Course Outcomes:	
At the end of the course the student will be able to:	
23MC205D.1	Understand the need of parallel programming.
23MC205D.2	Apply the MPI rules for distributed memory programming.
23MC205D.3	Analyse the thread programming.
23MC205D.4	Develop the shared memory programming with openMP

23MC205D.5	Implement the parallel programs using algorithms
23MC205D.6	Use the parallel program algorithms in real world scenario

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	An introduction to parallel programming	Peter s. Pacheco	Morgan Kaufmann Publishers	2011 Edition
Reference Books				
1	Using OpenMP: Portable Shared Memory Parallel Programming ,	Gabriele Jost and Ruud van der Pas	The MIT Press	October 12, 2007
2	Using MPI - 2nd Edition: Portable Parallel Programming with the Message Passing Interface	William Gropp and Ewing Lusk	MIT Press	1999, 2nd edition
3	Pthreads Programming: A Posix Standard for Better Multiprocessing	Dick Buttlar, Jacqueline Farrell & Bradford Nichols	Oreilly	1996, I Edition

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC205D.1								
23MC205D.2				1				
23MC205D.3							2	
23MC205D.4							2	
23MC205D.5				1				
23MC205D.6							2	

1: Low 2: Medium 3: High

DevOps			
Course Code	**23MC205E**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

Course Outcome (CO): At the end of this course, the students will be able to:

1. Understand overall structure of Devops with its Lifecycle
2. Understand the different application managed service options in the cloud using LINUX
3. Demonstrate DevOps workflow with GitLab learning Shell Script
4. Discover practical skills of Continuous Integration to improve the speed, stability, Availability and security for software delivery capability
5. Apply practical skills needed for integrating container
6. Demonstrate a DevOps-based tool and explain its functionality, use cases, and how it integrates into the DevOps lifecycle.

Module-1	8Hrs

Introduction to Devops- What Is Devops, History of Devops, Devops, definition, DevOps Main Objectives, DevOps and Software Development, Life Cycle- Waterfall Model and Agile Model, Continuous Integration & Deployment- Jenkins, Containers and Virtual
Development- Docker and Vagrant, Configuration Management Tools-Ansible, Puppet and Chef.

Module-2	8Hrs

Cloud Computing- What is Cloud?, Evolution of Cloud Computing, IAAS (Infrastructure as a Service), SAAS (Software as a Service), PAAS (Platform as a Service), Private, Public and Hybrid Cloud, Public Clouds- Amazon Web Services, Microsoft Azure and Google Cloud Services. LINUX Basic and Admin- Linux OS Introduction, Importance of Linux in DevOps, Linux Basic Command Utilities, Linux Administration and Environment Variables

Module-3	8Hrs

Shell Scripting - Introduction, Variables, Flow Controls, Loops, Functions, Lists, Manipulating Strings, Reading and Writing Files and Positional Parameters. Version Control- Overview of SVN, GIT Features, 3-Tree Architecture, GIT – Clone /Commit / Push, GIT Hub Projects, GIT Hub Management, GIT Rebase & Merge, Reset, Checkout ,GIT Clone, Fetch and Pull.

Module-4	8Hrs

Continuous Integration – Jenkins- Introduction to Jenkins , Continuous Integration with Jenkins , Configure Jenkins, Jenkins Management, Scheduling build Jobs - POLL SCM and Build Periodically ANSIBLE - Introduction to Ansible, Infrastructure Management, SSH Connection in Ansible Master

Module-5	8Hrs

Playbooks- Variables, Conditionals, Loops, Blocks, Handlers and Templates Docker- How to get Docker Image? , What is Docker Image, Working with Docker Containers- What is Container, Docker Engine, Creating Containers, with an Image, Working with Images and Docker Command Line Interphase

Course Outcomes:	
At the end of the course the student will be able to:	
21MC205E.1	Get insight on the overall structure of Devops with its Lifecycle.
23MC205E.2	Describe different application managed service options in the cloud using LINUX.
23MC205E.3	Analyze DevOps workflow with GitLab learning Shell Script.
23MC205E.4	Discuss practical skills of Continuous Integration to improve the speed, stability, Availability and security for software delivery capability.
23MC205E.5	Apply design and planning concepts.
23MC205E.6	Apply correct process models for software development.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Let's Get Started to DevOps-HaryCahyono	Ian Sommerville	Pearson Edition Ltd	9th Edition 2011
2	Practical DevOps – Joakim Verona, PACKT Publisher	PankajJalote	Wiley India Pvt Ltd	2nd Edition 2010
3	DevOps for Developers – Michael Huttermann, APress	Michel Blaha, James Rumbaugh	Pearon	2nd Edition 2007

Web links/Video Lectures/MOOCs
DevOps Beginners to Advanced with Projects - 2023 https://www.udemy.com/course/decodingdevops/ **Introduction to DevOps** https://www.coursera.org/learn/intro-to-devops

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO8
23MC205E.1	3	2			1			
23MC205E.2	2	2			3	1		
23MC205E.3		2	2		2			
23MC205E.4		2	2	2	1			
23MC205E.5	2	2	2		2	1		
23MC205E.6	2	2	3					1

1: Low 2: Medium 3: High

SOFTWARE PROJECT MANAGEMENT			
Course Code	**23MC206A**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:
1. To demonstrate the practices and methods for successful software project management
2. To identify the risk involved in project activities.
3. To acquire the knowledge of planning the project activities and identifying the critical path in the software projects
4. To illustrate the evaluation techniques for estimating cost, benefits, schedule and risk
5. To devise a framework for software project management plan for activities, risk, monitoring and control
6. To design a framework to manage people

Module-1	8Hrs

INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT Introduction, Why is Software Project Management important? What is a Project?, Contract Management, Activities Covered by Software Project Management,   Plans, Methods and Methodologies, Some ways of categorizing software projects, Stakeholders, Setting Objectives, Business Case, Project Success and Failure, What is Management? Management Control, Traditional versus Modern Project Management Practices**.**

Module-2	8Hrs

PROJECT EVALUATION & S/W RISK MANAGEMENT Evaluation of Individual Projects, Cost Benefit Evaluation Techniques, Risk Evaluation, Programme Management, Managing allocation of Resources within Programs, Nature of Risk, Categories of Risk, Software Risk Management Methodologies, Basic constructs to Risk Management, Risk Management Paradigm, Risk Taxonomy, Risk Clinic.

Module-3	8Hrs

ACTIVITY PLANNING Objectives of Activity Planning, When to Plan, Project Schedules, Sequencing and Scheduling Activities, Network Planning Models, Forward Pass – Backward Pass , Identifying critical path, Activity Float, Shortening Project Duration, Activity on Arrow Networks

Module-4	8Hrs

MONITORING AND CONTROL Creating the Framework, Collecting the Data, Review, Project Termination Review, Visualizing Progress, Cost Monitoring, Earned Value Analysis, Prioritizing Monitoring, Getting Project Back To Target, Change Control, Software Configuration Management

Module-5	8Hrs

MANAGING PEOPLE AND WORKING IN TEAMS Introduction, Understanding Behavior, Organizational Behavior: A Background, Selecting the Right Person for the Job, Instruction in the Best Methods, Motivation, The Oldham – Hackman Job Characteristics Model, Stress –Health and Safety Working In Teams, Becoming a Team, Decision Making, Leadership.

Course Outcomes:	
At the end of the course the student will be able to:	
23MC206A.1	Apply the practices and methods for successful software project management

23MC206A.2	Identify the risk involved in project activities
23MC206A.3	Acquire the knowledge of planning the project activities and identifying the critical path in the software projects
23MC206A.4	Illustrate the evaluation techniques for estimating cost, benefits, schedule
23MC206A.5	Devise a framework for software project management plan for activities, risk, monitoring and control
23MC206A.6	Design a framework to manage people

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Software Project Management	Bob Hughes, Mike Cotterell, Rajib Mall,	Tata McGraw Hill	Fifth Edition, 2011.
2	Implementing Enterprise Risk Management	John R.S. Fraser, Betty J	John Wiley & Son, Inc	2015
Reference Books				
1	Project Planning, Scheduling & Control	James P Lewis	McGraw Hill	5th Edition, 2011.
2	Software Project Management in Practice,	Pankaj Jalote	Pearson Education	2016.

Web links/Video Lectures/MOOCs
1. Software Project Management: https://onlinecourses.nptel.ac.in/noc19_cs70/preview
2. Introduction to Software Product Management: https://www.coursera.org/learn/introduction-to-software-product-management

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC206A.1	3			2				2
23MC206A.2		3						2
23MC206A.3		2				2		2
23MC206A.4		2				2		
23MC206A.5		2	2					2
23MC206A.6						2	2	2

1: Low 2: Medium 3: High

ARTIFICIAL INTELLIGENCE			
Course Code	**23MC206B**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. Recognize problems that are amenable to solution by AI methods.
2. Identify appropriate AI methods to solve a given problem.
3. Implement a given problem in the language/framework of different AI methods.
4. Solve basic AI algorithms.
5. Design and carry out an empirical evaluation of different algorithms on a

Problem formalization, and state the conclusions that the evaluation supports.

6. Demonstrate the current scope, limitations, and societal implications.

Module-1	8Hrs

INTRODUCTION TO Al AND PRODUCTION SYSTEMS

Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized productions system- Problem solving methods – Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breadth first, Constraints satisfaction – Related algorithms, Measure of performance and analysis of search algorithms.

Module-2	8Hrs

REPRESENTATION OF KNOWLEDGE

Game playing – Knowledge representation, Knowledge representation using Predicatelogic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.

Module-3	8Hrs

KNOWLEDGE INFERENCE

Knowledge representation -Production based system, Frame based system. Inference –Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning –Certainty factors, Bayesian Theory-Bayesian Network- Dempster – Shafer theory.

Module-4	8Hrs

PLANNING AND MACHINE LEARNING

Basic plan generation systems – Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.

Module-5	8Hrs

EXPERT SYSTEMS

Expert systems – Architecture of expert systems, Roles of expert systems – Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems – MYCIN, DART, XOON, Expert systems shells.

Course Outcomes:	
At the end of the course the student will be able to:	
23MC206B.1	Identify problems that are amenable to solution by AI methods.
23MC206B.2	Identify appropriate AI methods to solve a given problem.
23MC206B.3	Formalize a given problem in the language/framework of different AI methods.

23MC206B.4	Implement basic AI algorithms.
23MC206B.5	Design and carry out an empirical evaluation of different algorithms on Problem formalization, and state the conclusions that the evaluation supports.
23MC206B.6	Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Artificial Intelligence (SIE)	Kevin Night and Elaine Rich, Nair B.,	McGraw Hill	Third Edition, 2010
2	Introduction to AI and ES	Dan W. Patterson	Pearson Education	First Edition, 2007
Reference Books				
1	Introduction to Expert Systems	Peter Jackson	Pearson Education.	3rd Edition, 2007
2	AI – A Modern Approach	Stuart Russel and Peter Norvig	Pearson Education	2nd Edition, 2007.
3	Artificial Intelligence	Deepak Khemani	Tata McGraw Hill Education	Sixth reprint 2018 edition

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC206B.1		3	2					
23MC206B.2		2	3					
23MC206B.3		2		2				
23MC206B.4			2	2				
23MC206B.5				2				
23MC206B.6				2			2	2

1: Low 2: Medium 3: High

PRINCIPLES OF USER INTERFACE DESIGN			
Course Code	**23MC206C**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. Demonstrate the knowledge of theories and guidelines of designing the user interfaces
2. Familiarize the need of interactive design principles and their patterns
3. Explore the various interaction styles of user interfaces
4. Analyse the user interfaces from both communication perspective and historical perspective
5. Demonstrate the user documentation
6. Use advanced tools and analyse the UI/UX

Module-1	8Hrs

Introduction

Usability of Interactive Systems: Introduction, Usability Goals and Measures, Usability Motivation, Universal Usability, Goals for our profession. Guideline, principles, and theories: Introduction, Guidelines, principles, Theories.

Module-2	8Hrs

Development Process, Evaluating interface

Managing Design Processes: Introduction, Organizational Design to support Usability, The Four Pillars of Design, Development methodologies: Ethnographic Observation, Participatory Design, Scenario Development, Social Impact statement for Early Design Review, Legal Issues. Evaluating Interface Design: Introduction, Expert Reviews, Usability Testing and Laboratories, Survey Instruments, Acceptance tests, Evaluation during Active Use, Controlled Psychologically Oriented Experiments.

Module-3	8Hrs

Interaction Styles

Direct Manipulation and Virtual Environments: Introduction, Examples of Direct Manipulation, Discussion of direct manipulation, 3D Interfaces, Tele-operation, Virtual and Augmented Reality Menu Selection, Form Filling and Dialog Boxes: Introduction, Task-Related Menu Organization, Single Menus, Combination of Multiple Menus, Content Organization, Fast Movement Through Menus, Data Entry with Menus, Form Filling, Dialog Boxes and Alternatives, Audio Menus and Menus for Small Displays.

Module-4	8Hrs

Command and Natural Languages, Design Issues

Introduction, Command-organization functionality strategies and structure, Naming and Abbreviations, Natural Language in computing. Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech, and Auditory interfaces, Displays-Small and Large. Quality of Service: Introduction, Models of Response-Time Impacts, Expectations and Attitudes, User Productivity, Variability in Response time, Frustrating Experiences.

Module-5	8Hrs

User Documentation and Online Help, Information Search and Visualization

User Documentation and Online Help: Introduction, online versus paper documentation, reading from paper versus Displays, Shaping the content of the Manuals, Accessing the Documentation, Online Tutorials and animated demonstrations, Online Communities for User Assistance, The Development Process.

Information Search and Visualization: Introduction, Search in Textual Documents and Database Querying, Multimedia document searches, advanced filtering and Search Interfaces, Information Visualization: Introduction, Data type by task taxonomy, Challenges for information visualization

Course Outcomes: At the end of the course the student will be able to:	
23MC206C.1	Demonstrate the knowledge of theories and guidelines of designing the user interfaces
23MC206C.2	Write the need of interactive design principles and their patterns
23MC206C.3	Explore the various interaction styles of user interfaces
23MC206C.4	Analyse the user interfaces from both communication perspective and historical perspective
23MC206C.5	Demonstrate the user documentation
23MC206C.6	Use advanced tools and analyse the UI/UX

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Designing the User Interface	Ben Shneiderman, Plaisant, Cohen, Jacobs	Pearson Education	5th Edition 2014
Reference Books				
1	Human- Computer Interaction	Alan Dix, Janet Finalay, Gregory D Abiwdm Russel Bealel	Pearson Education	III Edition 2008

Study Links:

The Introduction to UX/UI Design course offered by Coursera: https://quiztudy.com/coursera-meta/weekly-breakdown-meta-front-end-developer/introduction-to-ux-ui-design-week-1/

Architecture - NOC: User Interface Design offered by NPTEL:
https://archive.nptel.ac.in/courses/124/107/124107008/

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
23MC206C01	2		2					
23MC206C02			2					
23MC206C03					2			
23MC206C04					2			
23MC206C05		2						
23MC206C06				2				

1: Low   2: Medium   3: High

DISTRIBUTED OPERATING SYSTEMS			
Course Code	**23MC206D**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:
1. Discuss design issues and different message passing techniques in DOS, distributed systems
2. Describe RPC implementation and its performance in DOS.
3. Sketch the major security issues associated with distributed systems and evaluate techniques available for increasing system security
4. Distinguish the concepts of distributed shared memory and resource management for the given problem/ case study.
5. Organize distributed file systems and evaluate the performance in terms of fault tolerance, file replication as major factors
6. Use the modified algorithms from existing algorithms to improve the performance of DOS.

Module-1	8Hrs

Fundamentals of Distributed Computing Systems. Evolution of Distributed Computing System; Distributed Computing System Models; What is Distributed Operating System? Issues in Designing a Distributed Operating System; Introduction to Distributed Computing Environment (DCE).Message Passing: Introduction, Desirable features of a Good Message Passing System, Issues in PC by Message Passing, Synchronization, Buffering, Multi-datagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication, Case Study: 4.3 BSD UNIX IPC Mechanism.

Module-2	8Hrs

Remote Procedure Calls: Introduction, The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC, Optimization for Better Performance, Case Studies: Sun RPC.

Module-3	8Hrs

Distributed Shared Memory: Introduction, General Architecture of DSM systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing, Other approaches to DSM, Heterogeneous DSM, Advantages of DSM. Synchronization: Introduction, Clock Synchronization, Event Ordering, Mutual Exclusion, Dead-Lock, Election Algorithms

Module-4	8Hrs

Resource Management: Introduction, Desirable Features of a Good Global Scheduling algorithm, Task Assignment Approach, Load – Balancing Approach, Load – Sharing
Approach Process Management: Introduction, Process Migration, Threads.

Module-5	8Hrs
Distributed File Systems: Introduction, Desirable Features of a Good Distributed File System, File models, File–Accessing Models, File – Sharing Semantics, File – Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions and Design Principles.	

Course Outcomes:
At the end of the course the student will be able to:

23MC206D.1	Analyze design issues and different message passing techniques in DOS, distributed systems.
23MC206D.2	Analyze RPC implementation and its performance in DOS
23MC206D.3	Analyze the major security issues associated with distributed systems and evaluate techniques available for increasing system security
23MC206D.4	Apply the concepts of distributed shared memory and resource management for the given problem/ case study.
23MC206D.5	Analyze distributed file systems and evaluate the performance in terms of fault tolerance, file replication as major factors
23MC206D.6	Apply modification to the existing algorithms to improve the performance of DOS.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Distributed Operating Systems: Concepts and Design	Pradeep. K. Sinha:	PHI	2012
Reference Books				
1	Distributed Operating Systems,	Andrew S.Tanenbaum:	Pearson Education	First Edition, 2002
2	Distributed Computing: Principles, Algorithms and Systems	Ajay D. Kshemkalyani and MukeshSinghal	Cambridge University Press,	Reissue Edition, 2011

| 3 | Distributed Computing | Sunita Mahajan, Seema Shan | Oxford University | 2015 |

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC206D.1	2	3	2		2			
23MC206D.2		3	2				2	
23MC206D.3	2	3	2					2
23MC206D.4		3	2	2				2
23MC206D.5		3	2		2			
23MC206D.6	2	3	3	3				2

NATURAL LANGUAGE PROCESSING			
Course Code	**23MC206E**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:
1. Discuss the current and likely future performance of several NLP applications.
2. Describe briefly a fundamental technique for processing language for several subtasks, such as morphological processing, parsing, summarization etc.
3. Describe how these techniques draw on and relate to other areas of computer science
4. Use parsing technique to the given problem and verify the output and give valid Conclusions.

Module-1	8Hrs

Introduction, Morphology: Knowledge in Speech & Language Processing, Ambiguity, Models & Algorithms, Language, Thought & Understanding, Some Brief History, The State of the Art & Near-Term Future, Summary Morphology and Finite State Transducers: Survey of English Morphology, Finite state Morphological Parsing, Lexicon-Free FST: The Porter Stemmer, Human Morphological Parsing, Summary, Combining FST Lexicon and Rules.

Module-2	8Hrs

N-Grams: Counting Words in Corpora, Simple N-Grams, Smoothing, Back off, Deleted Interpolation, N-Grams for Spelling and Pronunciation, Entropy, Summary. Word Classes and Part-of- Speech Tagging: English Word Classes, Tag sets for English, Part-of-Speech Tagging.

Module-3	8Hrs

Context-Free Grammars and Predicate Calculus for English: Constituency, Context-Free Rules and Trees, Sentence Level Constructions, Coordination, Agreement, The Verb Phrase Sub Categorization, Auxiliaries, Spoken Language Syntax, Grammar Equivalence and Normal Form, Finite –State and Context- Free Grammars, Grammars and Human Processing, The Early Algorithm, Finite-State Parsing Method, Summary Representing Meaning:

Module-4	8Hrs

Semantic Analysis: Syntax-Driven Semantic Analysis, Attachments for a Fragment of English, Integrating Semantic Analysis into the Early Parser, Idioms and Compositionality, Robust Semantic Analysis, Summary. Lexical Semantics: Relations Among Lexemes and Their Senses, Word Net: A Database of Lexical Relations, The Internal Structure of Words, Creativity and the Lexicon, Summary Word Sense Disambiguation and Information

Module-5	8Hrs

Retrieval: Selection Restriction Based Disambiguation, Robust Word Sense Disambiguation, Information Retrieval, Other Retrieval Tasks, and Summary. Case Study of Simple Text Recognition or Content Based Text Extraction System. Evolving Explanatory Novel Patterns for Semantically-Based Text Mining: Related Work, A Semantically Guided Model for Effective Text Mining.

Course Outcomes:

At the end of the course the student will be able to:

23MC206E.1	Describe the fundamental concepts and techniques of natural language processing.
23MC206E.2	Apply parsing technique to the given problem and verify the output and give valid conclusions
23MC206E.3	Illustrate the approaches to syntax and semantics in NLP.
23MC206E.4	Formulate solutions for a range of natural language components using existing algorithms, techniques and frameworks, including part-of-speech tagging, language modeling, parsing and semantic role labeling.
23MC206E.5	Evaluate NLP solutions of the given problem and arrive at valid conclusions.
23MC206E.6	Illustrate information retrieval techniques.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition	Daniel Jurafsky and James H Martin	Prentice Hall	2nd Edition, 2009.
Reference Books				
1	Foundations of Statistical Natural language Processing	Christopher D.Manning and Hinrich Schutze	MIT Press,	Second Edition 1999.

2	Natural Language Processing and Information Retrieval	Tanveer Siddiqui, U.S. Tiwary	Oxford University Press, 2008.	2008
3	Natural Language Processing and Text Mining	Anne Kao and Stephen R. Poteet (Eds)	Springer Verlag London Limited	2007

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC206E.1	2							
23MC206E.2	3	3						
23MC206E.3	3	2						
23MC206E.4				3				
23MC206E.5	2			3				2
23MC206E.6	3							2

1: Low 2: Medium 3: High

DATA ANALYTICS LAB WITH MINI PROJECT			
Course Code	**23MCL207**	**CIE Marks**	**50**
Teaching Hours/Week (L:T:P)	**(1:0:2)**	**SEE Marks**	**50**
Credits	**02**	**Exam Hours**	**03**

Course Learning Objectives:

1: Apply control structures to the given problems and write Python programs for search/sort on a given data set

2: Implement object oriented principles in Python

3: Demonstrate data visualization using matplotlib and seaborn for a given problem

4: Demonstrate regression model for a given problem

5: Demonstrate Time series analysis with Pandas

6: Develop a project by applying the data analytics concepts

PART- A

1.   Write a Python program to perform linear search

2.   Write a Python program to insert an element into a sorted list

3.   Write a python program using object oriented programming to demonstrate encapsulation, overloading and inheritance

4.   Implement a python program to demonstrate 1) Importing Datasets 2) Cleaning the Data 3) Data frame manipulation using Pandas

5.   Implement a python program to demonstrate the following using numpy

   a) Array manipulation, Searching, Sorting and splitting.

   b) broadcasting and Plotting numpy arrays

6.   Implement a python program to demonstrate Data visualization with various types of Graphs using numpy

7.   Write a Python program that creates a mXn integer array and Prints its attributes.

8.   Write a Python program to demonstrate the generation of linear regression models.

9.   Write a Python program to demonstrate the generation of logistic regression models using Python.

10. Write a Python program to demonstrate Time series analysis with Pandas.

11. Write a Python program to demonstrate Data Visualization using Seaborn.

Part- B

● Students shall carry out a mini project using Python to demonstrate data analysis.
● A team of two students must develop the mini project and during the examination each student must demonstrate the project individually
● The team must submit a brief report (20-25 pages) as per the format given.
● Rubrics may be used to evaluate the mini project
  ● Each student has to execute one program from Part A during the Semester End Examination. Part A and Part B shall be given 50% weightage each.

Course Outcomes:
At the end of the course the student will be able to:

23MCL207.1	Implement python programming concepts.
23MCL207.2	Make use of numpy and pandas libraries for data handling
23MCL207.3	Demonstrate regression model for a given problem
23MCL207.4	Demonstrate Time series analysis with Pandas
23MCL207.5	Demonstrate data visualization using matplotlib and seaborn libraries
23MCL207.6	Develop critical-thinking, problem-solving and decision making skills by designing projects.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Think Python: How to Think Like a Computer Scientist	Allen B. Downey	Shroff/O'Reilly Publishers	2nd Edition, Updated for Python 3,2016
2	An Introduction to Python	Guido van Rossum and Fred L. Drake Jr	Shroff Publishers and Distributors	2011
3	Python Data Science Handbook: Essential tools for working with data	Jake Vander plas	O'Reilly Media, Inc	1st Edition 2016

Reference Books				
1	Programming Python	Mark Lutz	O'Reilly	4th Edition 2010
2	Python 3 for Absolute Beginners	Tim Hall and J-P Stacey	Apress	1st Edition 2009
3	Beginning Python: From Novice to Professional	Magnus Lie Hetland	Apress	2nd Edition 2005
4	Beginning Python Visualization Crafting Visual Transformation Scripts	Shai Vaingast,	Apress	2nd Edition 2014

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCL207.1	3	2						
23MCL207.2	2	2						
23MCL207.3	2			2				
23MCL207.4		2		3				
23MCL207.5			2	2				
23MCL207.6			2	3				

1: Low 2: Medium 3: High

ENTERPRISE JAVA LAB			
Course Code	**23MCL208**	CIE Marks	50
Teaching Hours/Week (L:T:P)	**(1:0:2)**	SEE Marks	50
Credits	**02**	Exam Hours	03

Course Learning Objectives:

1. Implement the fundamental concept of java programming by writing executable programs.
2. Solve the object oriented principles with the help of java programs.
3. Construct reusable and efficient applications using inheritance and multi-threading concepts of java and design user friendly interfaces.
4. Use servlets and JSP tags and its services to develop a web application
5. Demonstrate the Database connections for the web applications.
6. Design enterprise applications using different Java Beans concepts for the given problem.

1. Write a JAVA program to demonstrate Constructor Overloading and Method Overloading.

2. Write a JAVA program to implement Inner class and demonstrate its Access protection.

3. i) Write a JAVA program to demonstrate Inheritance.

   ii) Simple Program on Java for the implementation of Multiple inheritance using interfaces to calculate the area of a rectangle and triangle.

4. Write a JAVA program which has:

   a. A Class called Account that creates an account with Rs. 500 minimum balance, a deposit() method to deposit amount, a withdraw() method to withdraw amount and also throws Less Balance Exception if an account holder tries to withdraw money which makes the balance become less than Rs. 500.

   b. A Class called Less_ Balance_ Exception which returns the statement that says withdrawal amount (Rs.) is not valid.

   c. A Class which creates 2 accounts, both account deposit money and one account tries to withdraw more money which generates a Less Balance Exception and takes appropriate action for the same.

5. Write a JAVA program using Synchronized Threads, which demonstrates the Producer Consumer concept.

6. Complete the following:

   a. Create a package named shape.

   b. Create some classes in the package representing some common shapes like Square, Triangle, and Circle.

   c. Import and compile these classes in other programs.

7. Write a JAVA Servlet Program to implement a dynamic HTML using Servlet (user name and Password should be accepted using HTML and displayed using a Servlet).

8. Write a JAVA Servlet Program to implement and demonstrate GET and POST methods (Using HTTP Servlet Class).

9. Write a JAVA Servlet Program using cookies to remember user preferences. Write a JSP Program to get student information through an HTML and create a JAVA Bean class, populate Bean, and display the same information through another JSP.

10. Write a JSP program to implement all the attributes of the page directive tag.

11. Write a JAVA Program to insert data into Student DATABASE and retrieve info based on particular queries (For example update, delete, search, etc…)

12. An EJB application that demonstrates Session Bean (with appropriate business logic).

13. An EJB application that demonstrates MDB (with appropriate business logic)

Course Outcomes:

At the end of the course the student will be able to:

23MCL208.1	Illustrate the object oriented principles with the help of java programs.
23MCL208.2	Implement user defined exceptions.
23MCL208.3	Develop reusable and efficient applications using inheritance and multi- threading concepts of java as well as design user friendly interfaces

23MCL208.4	Apply the concept of Servlet and its life cycle to create web application and also demonstrate the JSP tags and its services to web application.
23MCL208.5	Build Database connection for the web applications.
23MCL208.6	Develop application programs using Java beans concept.

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MCL209.1	3	2						
24MCL209.2	3	2						
24MCL209.3	2	2						
24MCL209.4		3		3				
24MCL209.5	3		2	2				2
24MCL209.6				3				2

1: Low 2: Medium 3: High

Mobile Applications Laboratory			
Course Code	**23MCL209**	CIE Marks	50
Teaching Hours/Week (L:T:P)	**(1:0:2)**	SEE Marks	50
Credits	**02**	Exam Hours	03

Course Learning Objectives:
1. Create a project and develop a mobile application in Android studio using XML and Java programming language.
2. Test and Debug a mobile application for a reliable output
3. Develop a project and emphasize its applications and uses to the real world.

1. Simple Program to display Hello World on App Screen and Looking into the res folder, Manifest.xml file, values folder and activity_main.xml file

2. Mobile Application to develop a simple Calculator, Application to generate a random color on each button click, Application to change background color using radio buttons

3   3 3. Develop a mobile application to display user profiles with 3 UI activities using intents.

4. Implement option menu and context menu to perform mathematical operations, Application to dynamically and statically add items to a list.

5. Mobile Application to demonstrate the activity life cycle by logging the activities in the LogCat, Application to demonstrate interaction between activities

6. Implement an AsyncTask to count from 1 to 100 in background and display the progress using progress bar, Implement the same using threads.

7. Implement a service to play music in background. Demonstrate sending of SMS, Call, Email using Intent class. Demonstrate usage of Browser and Maps using Intent class.

8. Implement broadcast receiver to read the battery percentage from cellphone and change background color based on level, Application to send SMS using SMS Manager, Application to read phone call state using Telephony APIs

9   9. Application to insert data entered by user into database and display the values in database (using SQLiteDatabase and DBHelper).

10. Implement an application to store and retrieve data by using Shared Preference.

11. Mobile Application to implement Android Graphics with different objects, Application to implement Android Animations – Fade, Rotate, zoom, blink

12. Mobile Application to capture image using Camera and set the image as background, Mobile Application to capture video and illustrate playback

13. Mobile Application to use Accelerometer and display coordinates, Application to use gyroscope and change Background color using sensor values.

PART-B

Develop an application (mini-project) using the latest languages and concepts in mobile applications learnt through MOOC courses

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Professional Mobile Application Development	Jeff McWherter and Scott Gowell	John Wiley & Sons, Inc.	First Edition, 2013
2	Beginning Android™ 4 Application Development	Wei-Meng Lee	Jhon Wiley & Sons Inc Inc.	First Edition, 2012
Reference Books				
1	Professional Android 4 Application Development	Meier Reto	Willey India	First Edition 2014

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
23MCL209.1					3			
23MCL209.2	3		1					
23MCL209.3		3		2				
23MCL209.4							3	
23MCL209.5								
23MCL209.6					3			

1: Low 2: Medium 3: High

RESEARCH / TECHNICAL SEMINAR				
Course Code	**23MCS210**	CIE Marks	100	
Teaching Hours/Week (L:T:P)	(0:0:0)	SEE Marks	-	
Credits	**01**	Exam Hours	02	

Course Learning Objectives:

    1. To acquire knowledge on advanced technologies

2. To read and understand technical papers

3. To improve effective oral communication

4. Compare the current Technology trends

5. To enhance innovative approaches

6. To improve research aspects

The CIE marks awarded for Research/Technical Seminar shall be based on the evaluation of Seminar Report, Presentation skills and performance in Question and Answer session in the ratio 50:25:25. Seminar presentation and report have to be evaluated using rubrics.

Course Outcomes:

At the end of the course the student will be able to:

23MCS210.1	Analyze relevant topic in computing sciences and make valid conclusions on industry/society/environment using fundamental/ research based knowledge.
23MCS210.2	Demonstrate the basic concepts and ideas presented in technical papers
23MCS210.3	Demonstrate self-learning by making effective presentation and report writing.
23MCS210.4	Differentiate technology trends in the selected area.
23MCS210.5	Apply innovative approaches in articulation of presentation or technical / research document
23MCS210.6	Develop a technical or research article

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCS210.1	-	2	-	-	-	-	-	-
23MCS210.2	-	2	-	-	-	-	-	-
23MCS210.3	-	-	-	-	-	-	2	-
23MCS210.4	-	2	-	-	-	-	-	-
23MCS210.5	-	-	-	-	-	-	-	-
23MCS210.6	-	-	-	-	-	-	-	-

1: Low 2: Medium 3: High

INDUSTRY ORIENTED TRAINING-II				
(Problem Solving Skills)				
Course Code	**23ITP211**	CIE Marks	100	
Teaching Hours/Week (L:T:P)	(0:2:0)	SEE Marks	-	
Credits	**-**	Exam Hours	2	

Course Learning Objectives:
1. Develop thinking capacity in solving simple problems.
2. Learn the fundamentals of skill development.
3. Articulate the nuances of effective communication
4. Perform a SWOT analysis to estimate the personality traits.
5. Learn to be a part of the team and become effective team players.
6. Discuss the importance of developing problem-solving skills.

Module-1	4 Hours

How to pick up Skills faster? Knowledge v/s Skill, Skill introspection, Skill acquisition, Engineering Graduate v/s Engineer
Building Interpersonal & Intrapersonal Skills: Peer communication, Social interactions, Bonding Emotional Management, Moral, social & personal responsibilities.

Module-2	4 Hours

Professional Etiquettes: Workplace etiquette, Dining etiquettes, Telephone etiquettes, E-mail etiquettes.
Change Management: Tolerance of change and uncertainty, Joining the bandwagon, Adapting change for growth-overcoming inhibition, Adapt to changes**.**

Module-3	4 Hours

Self-Awareness & Goal Setting: Identifying your Unique Selling proposition, SWOT, Nurture strengths, Fixing weaknesses, Overcoming complacency, Building confidence, Ambition/SMART Goals, Managing Failures.
Leadership & Motivation: Types of leadership styles, Case studies, Motivation, Qualities of a leader.

Module-4	4 Hours

Team Building: Difference between team and group, Qualities of an effective team player, Stages of team building, Problem-solving among team members, Building winning teams.

Module-5	4 Hours

Problem Solving: Styles of problem solvers, Effective problem solving, Case studies, Individual/teams.
Creative Thinking: Examples of creative thinking,   Tools of creativity, Creative/critical thinking.

| Course Outcomes: |
| At the end of the course the student will be able to: |

23ITP211.1	Apply rational thinking abilities in solving real life problems.
23ITP211.2	Identify the science behind picking up any skill quickly.
23ITP211.3	Develop the required skills to effectively interact with people and to articulate the ideas.
23ITP211.4	Discover one's strengths and weaknesses, and apply them effectively for career growth.
23ITP211.5	Recognize the dynamics of a team and achieve synergy.
23ITP211.6	Articulate leadership and problem-solving skills.

Textbooks:

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher
1	Think Smarter: Critical Thinking to Improve Problem-Solving and Decision-Making Skills	Michael Kallet	Wiley
2	The Road Less Traveled	M Scott Peck	Simon & Schuster
3	The Five Dysfunctions of a Team	Patrick Lencioni	Jossey-Bass

Reference Books:

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher
1	Stop Guessing: The 9 Behaviors of Great Problem Solvers	Nat Greene	Berrett-Koehler
2	The 7 Habits of Highly Effective People	Stephen R Covey	Free Press
3	Problem Solving 101: A Simple Book for Smart People	Ken Watanabe	Penguin Group

Weblinks/Video Lectures/MOOCs

1. https://www.youtube.com/watch?v=A9Q20hZ5ZX4
2. https://www.youtube.com/watch?v=L4N1q4RNi9I
3. https://www.coursera.org/search?query=problem%20solving%20and%20critical%20thinking
4. https://www.coursera.org/learn/visionary-leadership-meaning-maker
5. https://www.coursera.org/learn/interpersonal-communication

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23ITP211.1		3				2		
23ITP211.2		2				2		
23ITP211.3						2		
23ITP211.4								1
23ITP211.5						2		1
23ITP211.6						2		1

1: Low 2: Medium 3: High

ADVANCES IN WEB TECHNOLOGIES			
Course Code	**23MCA301**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(4:0:0)	SEE Marks	50
Credits	**04**	Exam Hours	03

Course Learning Objectives:

1. Implement Tailwind CSS and Bootstrap in web Pages.
2. Design Web Pages using React basics.
3. Design programs using Advanced React
4. Understand the basics of Node.js
5. Apply content management tools to develop web application

Module-1 Tailwind CSS and Bootstrap	**10Hrs**

What is Tailwind CSS? advantages of tailwind CSS, getting started with tailwind, colors, element sizing, flexbox and grid, padding and margins, styling text, typography, borders and shadows. Introduction to Bootstrap, Grid System, Bootstrap components- Buttons, Modals, Alerts, Cards, Forms. Comparison of tailwind CSS and bootstrap. Introduction to twitter bootstrap.

Module-2 React Basics	**10Hrs**

The Overview of React and Javascript fundamentals. React installation and setup. Hello World: Hello React World, React.createElement(), JSX, Setup Babel. The Life of a Component: A Custom Function Component, A Custom Class Component,Properties, State, A textarea Component, Make It Stateful.

Module-3 Advanced React and Introduction to Material UI	**10Hrs**

The Life of a Component: A Note on DOM Events, Props Versus State, Props in Initial State, Accessing the Component from the Outside, Lifecycle Methods, Lifecycle Example: Log It All, Lifecycle Example: Using a Child Component. JSX: A Couple Tools, Whitespace in JSX, Comments in JSX, HTML Entities, Spread Attributes, Returning Multiple Nodes in JSX. Introduction to Material UI, material UI Components- Buttons, icons, Text Fields, Grid, Box, Containers. Understanding Material UI's Grid System.

Module-4 Introduction to Node.js	**10Hrs**

Welcome to Node.js: Built on JavaScript, Asynchronous and evented, DIRTy applications, DIRTyby default. Working with npm (Node Package Manager). Introduction to Express.js: Creating an HTTP Server, Creating routes. Fetching Data: Fetch API: Introduction to Fetch, Making GET and POST requests using fetch. Handling responses and errors.

Module-5 Search Engine and Web Content Management System	**10Hrs**

Search Engine: Working of Search Engine, Keywords and Metadata sculpting, Basics of Search Engine development and optimization; Web Content Management System: Differences between content, content management, and a content management system. Types of Content Management Systems: WordPress, Drupal, Joomla.

	Course Outcomes: At the end of the course the student will be able to:
23MCA301.1	Develop and maintain clean, efficient, and scalable CSS codebases using Tailwind CSS and Bootstrap.
23MCA301.2	Design pages using react.
23MCA301.3	Apply the concepts of React to create Components and design applications using the Lifecycle method.
23MCA301.4	Build applications using Node.js.
23MCA301.5	Develop Strategies to improve website visibility, content management, optimize web pages for search rankings and familiarize themselves with key features of CMS.
23MCA301.6	Develop Strategies to improve website visibility, content management, optimize web pages for search rankings and familiarize themselves with key features of CMS.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	React: Up & Running: Building Web Applications	Stoyan Stefanov	O'Reilly Media, Inc.	2nd Edition 2021
2	Node.js in Action	Mike Cantelon, Marc Harter, T.J. Holowaychuk, and Nathan Rajlich	Manning Publications	1st Edition 2014
3	React Material-UI Cookbook	Adam Boduch	Pack Publis hing	2019
4	The Art of SEO: Mastering Search Engine Optimization	Eric Enge, Jessie Stricchiola, and Stephan Spencer	Shroff/O' Reilly	4th edition 2015
5	Web Content Management	Deane Barker	O'Reilly Media, Inc, USA;	1st edition 2016
6	Tailwind CSS:craft beautiful flexible and	Ivaylo Gerchev	SitePoint	2022

	responsive designs.			
Reference Books			
1	The Road to Learn React	Robin Wieruch	-	2017
2	Beginning Node.js, Express & MongoDB Development	Greg Lim	Greg Lim	2020
3	Drupal 8 Development Cookbook	Matt Butcher and others	Packt	2017
4	Modern CSS with Tailwind: flexible styling without the fuss	Noel Rappin	programmatic bookshelf	2021

Web Links:
https://tailwindcss.com/
https://ui.shadcn.com/
https://www.youtube.com/watch?v=v0_AT8zaLo8
https://www.youtube.com/watch?v=lCxcTsOHrjo&t=1874s
https://mui.com/material-ui/

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCA301.1			2	2	2			
23MCA301.2		1		2	2			
23MCA301.3			2	2	2			
23MCA301.4					1			
23MCA301.5					1			
23MCA301.6		2		1				

PROGRAMMING USING C#.NET

Course Code	**23MCA302**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(4:0:0)	SEE Marks	50
Credits	**04**	Exam Hours	03

Course Learning Objectives:

1: To Analyze C# and client-server concepts using .Net FrameWork Components.
2: To implement object oriented concepts using C#.NET
3. To design user interface for web applications using WinForms
4: To apply delegates, event and exception handling to incorporate with WinForm, and ADO.NET.
5: To analyze the use of .Net Components depending on the problem statement.
6: To demonstrate a web application using ASP.NET with Database connectivity and AJAX concepts.

Module-1	**10 Hrs**

Getting started with .NET Framework 4.0 and C#, Understanding Previous Technologies, Benefits of .NET Framework, Architecture of .NET Framework 4.0,.NET Execution Engine, Components of .NET Framework 4.0.
Introducing C# Creating a Simple C# Console Application, Identifiers and Keywords. System Data Types, Variables and Constants: Value Types, Reference Types, Understanding Type Conversions, Boxing and UnBoxing. Variables and constants. Namespaces, The System namespace, .NET Array Types. Object Oriented Programming: Classes and Objects: Creating a Class, Creating an Object, Using this Keyword.

Module-2	**10 Hrs**

Object Oriented Programming: Creating an Array of Objects, Using the Nested Classes, Defining Partial Classes and Method, Returning a Value from a Method and Describing Access Modifiers. Static Classes and Static Members, Properties: Read-only Property, Static Property, Indexers, Structs: Syntax of a struct and Access Modifiers for structs, System. Object Class Encapsulation: Encapsulation using accessors and mutators, Encapsulation using Properties. Inheritance: Inheritance and Constructors, Sealed Classes and Sealed Methods, Extension methods. Polymorphism: Compile time Polymorphism/ Overloading, Runtime Polymorphism/ Overriding. Abstraction: Abstract classes, Abstract methods. Interfaces: Syntax of Interfaces, Implementation of Interfaces and Inheritance.

Module-3	**10 Hrs**

Delegates, Events, Exception Handling and ADO.NET Delegates: Creating and using Delegates, Multicasting with Delegates. Events: Event Sources, Event Handlers, Events and Delegates, Multiple Event Handlers. Exception Handling: The try/catch/throw/finally statement, Custom Exception. System.Exception, Handling Multiple Exception. Data Access with ADO.NET :Understanding ADO.NET: Describing the Architecture of ADO.NET, ADO.NET,ADO.NET Entity Framework. Creating Connection Strings: Syntax for Connection Strings. Creating a Connection to a Database: SQL Server Database, OLEDB Database, ODBC Data Source. Creating a Command Object. Working with DataAdapters: Creating DataSet from

DataAdapter.	

Module-4	**10 Hrs**

Graphical User Interface with Windows Forms and WPF Windows Forms : Introduction, Windows Forms, Event Handling: A Simple Event- Driven GUI, Control Properties and Layout, Labels, TextBoxes and Buttons, GroupBoxes and Panels, CheckBoxes and RadioButtons, ToolTips, Mouse-Event Handling, Keyboard-Event Handling. Menus, Month Calendar Control, LinkLabel Control, ListBox Control, ComboBox Control, TreeView Control, ListView Control, TabControl and Multiple Document Interface (MDI) Windows. WPF: New WPF Controls, WPF Architecture: Presentation Framework, Presentation Core, WindowsBase, MIL or Milcore, Working with WPF Windows.

Module-5	**10 Hrs**

Web App Development and Data Access using ADO.NET: Introduction, Web Basics, Multitier Application Architecture, Your First Web Application: Understanding Master pages, Standard Web Controls: Designing a Form, Validation Controls, Grid View Control, DropDownList, Session Tracking, ASP.NET AJAX : Exploring AJAX,Need for AJAX, AJAX and other Technologies, AJAX Server Controls, Script Manager control, Update Panel, Update Progress Control, Creating Simple Application using AJAX Server Controls.

Course Outcomes: At the end of the course the student will be able to:	
23MCA302.1	Analyze C# and client-server concepts using .Net FrameWork Components.
23MCA302.2	Implement object oriented concepts using C#.NET
23MCA302.3	Design user interfaces for web applications using WinForms
23MCA302.4	Apply delegates, event and exception handling to incorporate with WinForm, and ADO.NET.
23MCA302.5	Analyze the use of .Net Components depending on the problem statement.
23MCA302.6	Demonstrate a web application using ASP.NET with Database connectivity and AJAX concepts.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				

1	.NET 4.0 Programming (6-in-1), Black Book,. (Chapters: 1,10,11,12,13,14 and 19).	Kogent Learning Solutions Inc.	Dream Tech Press	2nd edition, Updated for Python 3,2016
2	C# 2010 for Programmers, (Chapters: 14,15,19 and 27.3)	Paul Deitel and Harvey Deitel	Pearson Education.	4th Edition, 2010
Reference Books				
1	Pro C# 5.0 and the .NET 4.5 Framework,	Andrew Trolsen	Apress	6th Edition, 2012
2	C# 4.0 Unleashed,	Bart De Smet	Pearson Education-SAMS Series.	2011
3	Complete Reference C# 4.0	Herbert Schildt	Tata McGraw Hill	2010

Web links/Video Lectures/MOOCs

- https://www.udemy.com/course/learn-c-sharp-programming-in-ten-easy-steps/
- https://www.youtube.com/watch?v=aoFDyt8oG0k

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCA302.1	2	2						
23MCA302.2	2	2						
23MCA302.3	2	2		3				
23MCA302.4	2	2		3				
23MCA302.5		2						2
23MCA302.6		2		2				2

1: Low 2: Medium 3: High

COMPUTER NETWORKS

Course Code	**23MCA303**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	(4:0:0)	SEE Marks	50
Credits	**04**	Exam Hours	03

Course Learning Objectives:
1: To provide an introduction to the OSI and TCP/IP layers.
2 : To gain an understanding of the roles of data link control protocols.
3 : To develop the ability to explain the network layers working principles.
4 : To provide a comprehensive introduction to analyze the transport layer functionalities.
5. To familiarize various network security and applications.
6. To Analyze the basic error detection techniques and reliable transmission.

Module-1	**8Hrs**

Applications, Requirements, Network Architecture, Implementing Network Software, Performance.

Module-2	**8Hrs**

Perspectives on Connecting, Encoding (NRZ, NRZI, Manchester, 4B/5B), Framing, Error Detection, Reliable Transmission, Ethernet and Multiple Access Networks (802.3), Wireless(802.11/Wi-Fi, Bluetooth(802.15.1), cellphone technologies.

Module-3	**8Hrs**

Internetworking and Advanced Internetworking Switching and Bridging, Basic Internetworking (IP), Routing, The Global Internet, Routing among Mobile Devices.

Module-4	**8Hrs**

End-to-End Protocols and Congestion Control Simple Demultiplexer (UDP), Reliable Byte Stream (TCP), Queuing Disciplines, TCP Congestion Control, Congestion-Avoidance Mechanisms.

Module-5	**8Hrs**

Network Security and Applications
Cryptographic Building Blocks, Key Pre-distribution, Firewalls, Traditional Applications, Infrastructure Services.

Course Outcomes:

At the end of the course the student will be able to:

23MCA303.1	Apply the basic concepts of networking and to analyze different parameters such as bandwidth, delay, throughput of the networks for the given problem.
23MCA303.2	Apply different techniques to ensure the reliable and secured communication in wired and wireless communication
23MCA303.3	Analyze the networking concepts of TCP/IP for wired and wireless components
23MCA303.4	Identify the issues of Transport layer to analyze the congestion control mechanism
23MCA303.5	Design network topology with different protocols and analyze the performance
23MCA303.6	Analyze the basic error detection techniques and reliable transmission.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Computer Networks A Systems Approach (1, 2 ,3.1,3.2,3.3, 3.4,4.1, 5.1,5.2,6.2,6.36.4, 8.1,8.2,8.5, 9.1,9.3)	Larry L Peterson and Bruce S Davie	Morgan Kaufmann Publishers	5th Edition, 2012.
Reference Books				
1	Computer Networking – A Top-Down Approach Featuring the Internet	James F. Kurose, Keith W. Ross	Pearson Education	Fifth Edition, 2009.
2	Computer and Communication Networks	Nader. F. Mir	Pearson Prentice Hall Publishers	Second Edition, 2010.
3	Computer Networks: An Open Source Approach	Ying-Dar Lin, Ren-Hung Hwang, Fred Baker	McGraw Hill Publisher	2012.
4	Data Communication and Networking	Behrouz A. Forouzan	Tata McGraw – Hill	Fourth Edition, 2011.

Web links/Video Lectures/MOOCs/papers

1. https://www.coursera.org/learn/computer-networking
2. https://www.coursera.org/specializations/computer communications

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO 1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO 8
23MCA303.1	2				2			
23MCA303.2		2					2	
23MCA303.3			2			2		
23MCA303.4		2			2			
23MCA303.5	2				2			
23MCA303.6		2					2	

1: Low   2: Medium 3: High

BLOCKCHAIN TECHNOLOGY

Course Code	**23MC304A**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:
1. To demonstrate the basics of Blockchain concepts using modern tools/technologies.
2. To analyze the role of blockchain applications in different domains including cybersecurity.
3. To evaluate the usage of Blockchain implementation/features for the given problem.
4. To exemplify the usage of bitcoins and its impact on the economy.
5. To analyze the application of specific block chain architecture for a given problem
6. To demonstrate the working principles of bitcoin

Module-1	8Hrs

Introduction to Blockchain, How Blockchain works, Blockchain vsBitcoin, Practical applications, public and private key basics, pros and cons of Blockchain, Myths about Bitcoin

Module-2	8Hrs

Blockchain :Architecture , versions ,variants , use cases, Life use cases of blockchain, Blockchain shared Database, Introduction to crypto currencies, Types, Applications.

Module-3	8Hrs

Concept of Double Spending, Hashing, Mining, Proof of work. Introduction to Merkel tree, Privacy , payment verification , Resolving Conflicts , Creation of Blocks

Module-4	8Hrs

Introduction to Bitcoin, key concepts of Bitcoin, Merits and De Merits Fork and Segwits, Sending and Receiving bitcoins, choosing bitcoin wallet, Converting Bitcoins to Fiat Currency.

Module-5	8Hrs

Introduction to Ethereum, Advantages and Disadvantages, Ethereumvs Bitcoin, Introduction to Smart contracts, usage, application, working principle, Law and Regulations. Case Study

Course Outcomes:
At the end of the course the student will be able to:

23MC304A.1	Demonstrate the basics of Block chain concepts using modern tools/technologies.

23MC304A.2	Analyze the role of block chain applications in different domains including cyber security.
23MC304A.3	Evaluate the usage of Block chain implementation/features for the given problem
23MC304A.4	Demonstrate the usage of bitcoins and its impact on the economy.
23MC304A.5	Analyze the application of specific block chain architecture for a given problem
23MC304A.6	Demonstrate the working principles of bitcoin

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions.	Arshdeep Bikramaditya Signal, Gautam Dhameja (PriyansuSekharPanda.,	APress	1st Edition 2018
2	Blockchain Applications: A Hands-On Approach	Bahga, Vijay Madisetti	Published By Arshadeep Bahga & Vijay Madisetti	1st Edition 2017
3	Blockchain	Melanie Swan,	OReilly	1st edition, 2015
Reference Books				
1	Bitcoin and Cryptocurrency Technologies	Aravind Narayan. Joseph Bonneau, princton	O'Reilly	4th edition, 2010
2	Bitcoin and Blockchain Basics: A non-technical introduction for beginners	Arthu.T Brooks.	Arthu.T Brooks	1st edition 2019

Web links/Video Lectures/MOOCs
1. https://www.coursera.org/specializations/blockchain
2. https://www.coursera.org/specializations/uci-blockchain

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC304A.1	2			2				
23MC304A.2		2					2	
23MC304A.3		2	2	2				
23MC304A.4		2						2
23MC304A.5	2	2						
23MC304A.6							2	2

1: Low 2: Medium 3: High

CLOUD COMPUTING			
Course Code	**23MC304B**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:
1. Understand the Fundamentals of Cloud Computing
2. Analyze Cloud Computing Architectures
3. Apply Virtualization Techniques
4. Explore Advanced Topics in Cloud Computing
5. Utilize Cloud Tools and Applications
6. Critical Evaluation of Cloud Computing Technologies and Their Applications

Module-1	8Hrs

Introduction to Cloud Computing: Eras of computing, Virtualization, Web 2.0, Service oriented computing vs Utility oriented computing, The vision of Cloud Computing, Parallel Vs Distributed computing, Technologies for distributed computing.

Module-2	8Hrs

Cloud computing architecture : Cloud reference model: Architecture, IaaS, PaaS, SaaS, Types of Clouds: Public, Private, Hybrid and Community clouds, Economics of the cloud, Open challenges.

Module-3	8Hrs

Virtualization: Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples:Xen: Para virtualization, VmWare: Full virtualization.

Module-4	8Hrs

Advanced Topics in Cloud Computing: Market-oriented cloud computing definition, Energy efficiency in clouds, Energy-efficient and green cloud computing architecture, Energy-aware dynamic resource allocation, InterClouds and integrated allocation of resources.

Module-5	8Hrs

Cloud Tools and Applications: Aneka PaaS; Open stack: Introduction to open stack; Components of open stack; Amazon web services; Google AppEngine; Microsoft Azure; Scientific applications: Healthcare; Biology; Geo-Science, Business and Consumer applications:

ARM & ERP; Productivity; Social networking.

Course Outcomes:
At the end of the course the student will be able to:

23MC304B.1	Demonstrate the Fundamentals of Cloud Computing
23MC304B.2	Analyze Cloud Computing Architectures
23MC304B.3	Apply Virtualization Techniques
23MC304B.4	Discover Advanced Topics in Cloud Computing
23MC304B.5	Use Cloud Tools in designing applications
23MC304B.6	Invent of Cloud Computing Technologies and Their Applications

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Mastering Cloud Computing	Rjkumar Buyya, Christian Vecchiola, and Thamarai Selci,	Tata McGraw Hill, New Delhi, India	Illustrated edition 2013.
Reference Books				
1	Cloud Computing for Dummies	Judith Hurwitz, R.Bloor, M. Kanfman, F.Halper	Wiley India Edition	2nd Edition 2020
2	Cloud Computing: A Practical Approach	Vette, Toby J. Vette, Robert Elsenpeter	Tata McGraw Hill	Ist Edition 2010

Course Links:
1. https://www.edx.org/learn/cloud-computing 2.https://www.ibm.com/training/cloud/home

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC304B.1	2	2						
23MC304B.2	2	2			1			
23MC304B.3		2	2		2			
23MC304B.4				2	2	2		
23MC304B.5			2		2			
23MC304B.6		2	2	2				

1: Low 2: Medium 3: High

DIGITAL MARKETING			
Course Code	**23MC304C**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. To interpret key concepts related to e-marketing for any given case.
2. To identify the importance of conversion and working with digital relationship marketing.
3. To demonstrate the use of electronic media for designing marketing activities.
4. To examine the role of the search engine in improving digital marketing.
5. To execute social media marketing for a given scenario.
6. To test technical solutions to overcome social media threats.

Module-1	8Hrs

Introduction to Digital Marketing Evolution of Digital Marketing from traditional to modern era, Role of Internet; Current trends, Info-graphics, implications for business & society; Emergence of digital marketing as a tool; Drivers of the new marketing environment; Digital marketing strategy; P.O.E.M. framework, Digital landscape, Digital marketing plan, Digital marketing models.

Module-2	8Hrs

Internet Marketing and Digital Marketing Mix – Internet Marketing, opportunities and challenges; Digital marketing framework; Digital Marketing mix, Impact of digital channels on IMC; Search Engine Advertising: - 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 marketing.

Module-3	8Hrs

Social Media Marketing – Role of Influencer Marketing, Tools & Plan– Introduction to social media platforms, penetration & characteristics; Building a successful social media marketing strategy, Facebook Marketing: - Business through Facebook Marketing, Creating Advertising Campaigns, Adverts, Facebook Marketing Tools, Linkedin Marketing: - Introduction and Importance of Linkedin Marketing, Framing Linkedin Strategy, Lead Generation through Linkedin, Content Strategy, Analytics and Targeting Twitter(officially rebranded to X) Marketing: - Introduction to Twitter(officially rebranded to X) Marketing, how twitter Marketing is different than other forms of digital marketing, framing content strategy, Twitter(officially rebranded to X) Advertising Campaigns Instagram and Snapchat: - Digital Marketing Strategies through Instagram and Snapchat, Mobile Marketing: - Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics Introduction to social media metrics.

Module-4	8Hrs

Introduction to SEO, SEM, Web Analytics, Mobile Marketing, Trends in Digital Advertising - Introduction and need for SEO, How to use internet & search engines; Search engine and its working pattern, On-page and off-page optimization, SEO Tactics - Introduction to SEM Web Analytics: - Google Analytics & Google Ads; data collection for web analytics, multi-channel attribution, Universal analytics, Tracking code Trends in digital advertising.

Module-5	8Hrs

Social Media Channels:- Introduction, Key terms and concepts, Traditional media vs Social media. Social media channels:- Social networking. Content creation, Bookmarking & aggregating and Location & social media. Tracking social media campaigns. Social media marketing:- Rules of engagement. Advantages and challenges. Social Media Strategy:- Introduction, Key terms and concepts. Using social media to solve business challenges. Step-by-step guide to creating a social media strategy. Documents and processes. Dealing with opportunities and threats. Step-by-step guide for recovering from an online brand attack. Social media risks and challenges.

Course Outcomes:
At the end of the course the student will be able to:

23MC304C.1	Demonstrate the key concepts related to e-marketing for the given case.
23MC304C.2	Analyze the importance of conversion and working with digital relationship marketing.
23MC304C.3	Demonstrate the use of different electronic media for designing marketing activities.
23MC304C.4	Analyze the role of search engine in improving digital marketing.
23MC304C.5	Analyze the role of social media marketing for the given problem.
23MC304C.6	Analyze technical solutions to overcome social media threats.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Digital Marketing	Seema Gupta	Mc-Graw Hill	1st Edition – 2017
Reference Books				
1	The Art of Digital Marketing	Ian Dodson	Wiley Latest Edition	2nd edition, Updated for

				Python 3,2016
2	Fundamentals of Digital Marketing	Puneet Singh Bhatia	Pearson	23st Edition – 2017
3	Digital Social Media Marketing	Prof. Nitin C. Kamat, Mr.Chinmay	Himalaya Publishing House Pvt. Ltd.	1st Edition 2017

Web links/Video Lectures/MOOCs
1. https://www.digitalmarketer.com/digital-marketing/assets/pdf/ultimate-guide-to-digital-marketing.pdf
2. https://mailchimp.com/marketing-glossary/digital-marketing/

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC304C.1	1				2			
23MC304C.2	2			1				
23MC304C.3			2		2			
23MC304C.4				2	2			
23MC304C.5			2		2			
23MC304C.6				3	2			

1: Low 2: Medium 3: High

INTRODUCTION TO DRONE TECHNOLOGIES

Course Code	**23MC304D**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:
1. To discuss the basic principles of software testing.
2. To recognize the perceptions on testing with related examples.
3. To interpret the various types of testing.
4. To analyze the difference between functional testing and structural testing.
5. To analyze the performance of fault based testing.
6. To evaluate different testing tools.

Module-1	8Hrs

Overview of Drone Technologies
Introduction to Drones-Definition and classification, Historical development. Components of Drones-Frame and body, Propulsion systems, Flight controllers, Sensors and cameras, Communication systems/protocols Regulations and Ethics-Overview of drone regulations, Responsible drone usage, Privacy concerns and ethical considerations Applications of Drones-Agriculture, Surveying and mapping, Search and rescue, Filmmaking and photography, Environmental monitoring

Module-2	8Hrs

Drone Flight Principles
Aerodynamics of Drones-Lift, thrust, drag, and weight, Basic principles of flight, Flight Modes-Manual mode, GPS-assisted mode, Autonomous flight. Pre-flight Checks and Safety Procedures-Importance of pre-flight checks, Emergency procedures, Safety guidelines Flight Training-Basic flight controls, Take off and landing procedures, Troubleshooting common issues.

Module-3	8Hrs

Drone Navigation and Control
GPS Technology-Role of GPS in drone navigation, Waypoints and geofencing Remote Sensing and Image Processing-Types of sensors used in drones, Image processing techniques Autonomous Navigation-Introduction to autonomous flight, Programming flight paths Regulatory Compliance/Standards-Understanding airspace regulations, Registration and licensing requirements

Module-4	8Hrs

Drone Maintenance and Repairs
Routine Maintenance-Battery care and maintenance, Propeller inspection and replacement Troubleshooting and Diagnostics-Identifying common issues, Using diagnostic tools Firmware Updates-Importance of firmware and updates, Update procedures for various components Repair Techniques-Basic repairs for common issues, Knowing when to seek professional help.

Module-5	**8Hrs**

Advanced Applications and Future Trends
Advanced Drone Technologies-Beyond visual line of sight (BVLOS) operations, Swarm technology Emerging Trends-Artificial Intelligence in drones, Integration with other technologies (5G, IoT) Industry-specific Applications-Case studies in various industries, Future job opportunities in drone technology IoT Sensors for Drone Navigation-Overview of IoT sensors for navigation and data collection, Integration of GPS, accelerometers, and other sensors IoT Data Analysis for Flight Optimization-Utilizing IoT-generated data for optimizing drone flights, Exercises on data analysis tools.
Mini Project

Course Outcomes:	
At the end of the course the student will be able to:	
23MC304D.1	Discuss the basic principles of software testing with related examples.
23MC304D.2	Recognize the perceptions on testing
23MC304D.3	Interpret the various types of testing.
23MC304D.4	Analyze the difference between functional testing and structural testing.
23MC304D.5	Analyze the performance of fault based testing.
23MC304D.6	Evaluate different testing tools.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	"Drone University"	John M. Glover	Drone University	2nd Edition 2014
2	Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs	John Baichtal	Que Publishers	2nd Edition 2015
3	Drones For Dummies	Mark LaFay	For Dummies	1st Edition, 2015

Web links/Video Lectures/MOOCs

1. https://www.udemy.com/course/certified-tester-foundation-level-
2. https://onlinecourses.nptel.ac.in/noc19_cs71/preview
3. https://www.coursera.org/courses?query=software%20testing

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC304D.1	2							
23MC304D.2		2						
23MC304D.3		2						
23MC304D.4				1				
23MC304D.5		2						
23MC304D.6					2			

1: Low 2: Medium 3: High

NOSQL			
Course Code	**23MC304E**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:
1. To demonstrate the basic concepts of unstructured data.
2. To contrast and Manage the Data using CRUD operations.
3. To analyze the NoSQL data architecture patterns
4. To develop the applications using NoSQL
5. To realize the concept of Map Reduce and its applicability in the real world application development.
6. To examine the framework of NOSQL

Module-1	8Hrs

Introduction to NoSQL, Definition of NoSQL, History of NoSQL and Different types of NoSQL . Exploring NoSQL: CRUD operations with Mongo DB, Querying, Modifying and Managing. Interfacing and Interacting with NoSQL.

Module-2	8Hrs

NoSQL Basics: NoSQL Storage Architecture: Distributed storage systems, Storage engines ,Consistency models, Scalability features and storage optimization techniques.
Exploring Mongo DB Java/Ruby/Python,
Data Storage in NoSQL: NoSQL Data Stores, Indexing and ordering datasets (MongoDB/CouchDB/Cassandra)

Module-3	8Hrs

Advanced NoSQL, NoSQL in Cloud, Parallel Processing with Map Reduce, Big Data with Hive

Module-4	8Hrs

Working with NoSQL, Surveying Database Internals, Migrating from RDBMS to NoSQL, Web Frameworks and NoSQL, using MySQL as a NoSQL.

Module-5	8Hrs

Developing Web Application with NOSQL and NOSQL Administration Php and MongoDB, Python and MongoDB, Creating Blog Application with PHP.

Course Outcomes:

At the end of the course the student will be able to:	
23MC304E.1	Demonstrate the concepts of unstructured data.
23MC304E.2	Analyze and manage Data using CRUD operations
23MC304E.3	Describe the NoSQL data architecture patterns
23MC304E.4	Develop the applications using NoSQL
23MC304E.5	Realize the concept of Map Reduce and its applicability in the real world application development
23MC304E.6	Analyze the framework of NOSQL

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Professional NOSQL	Shashank Tiwari	John Wiley & Sons, Inc.	1st Edition 2011
2	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence‖.	Pramod J. Sadalage, Martin Fowler	Addison-Wesley.	1st Edition 2012
Reference Books				
1	The Definitive Guide to Mongo DB, The NOSQL Database for cloud and Desktop Computing	EelcoPlugge, Peter Membreyand Tim Hawkins	APress	1st Edition 2010

Web links/Video Lectures/MOOCs

1. https://www.guru99.com/nosql-tutorial.html
2. https://www.javatpoint.com/nosql-databases
3. https://www.geeksforgeeks.org/introduction-to-nosql/

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC304E.1				2				
23MC304E.2	2			2				
23MC304E.3				2				
23MC304E.4			2	2				2
23MC304E.5				2				2
23MC304E.6		2	2					

1: Low 2: Medium 3: High

DEEP LEARNING			
Course Code	**23MC305A**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:
1. To discuss the basics of deep learning for a given context.
2. To introduce neural network concepts
3. To implement various deep learning models for the given problem
4. To organize high dimensional data using reduction techniques for the given problem
5. To analyze optimization and generalization techniques of deep learning for the given problem.
6. To appraise the given deep learning application and enhance by applying latest techniques for libraries and packages

Module-1	**8Hrs**

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

Module-2	**8Hrs**

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

Module-3	**8Hrs**

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

Module-4	**8Hrs**

OPTIMIZATION AND GENERALIZATION Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience.

Module-5	**8Hrs**

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

Course Outcomes:
At the end of the course the student will be able to:

23MC305A.1	Demonstrate the basics of deep learning for a given context.
23MC305A.2	Demonstrate neural network concepts
23MC305A.3	Implement various deep learning models for the given problem
23MC305A.4	Formulate high dimensional data using reduction techniques for the given problem
23MC305A.5	Analyze optimization and generalization techniques of deep learning for the given problem.
23MC305A.6	Evaluate the given deep learning application and enhance it by applying the latest techniques.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Advanced Data Analysis from an Elementary Point of View	CosmaRohilla Shalizi	Cambridge University Press	2015
Reference Books				
1	Deep Learning: Methods and Applications	Deng & Yu	Now Publishers	2013.
2	Deep Learning	Ian Goodfellow,Yoshua Bengio, Aaron Courville	MIT Press,	2016.
3	Neural Networks and Deep Learning	Michael Nielsen	Determination Press.	2015.

Web links/Video Lectures/MOOCs

1. https://www.coursera.org/learn/introduction-to-deep-learning-boulder
2. https://www.simplilearn.com/tutorials/deep-learning-tutorial/what-is-deep-learning
3. https://www.youtube.com/watch?v=VyWAvY2CF9c

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC305A.1	3							2
23MC305A.2	3			2				
23MC305A.3			2	2				
23MC305A.4	2	2						2
23MC305A.5		2		2				2
23MC305A.6								

1: Low 2: Medium 3: High

BIG DATA ANALYTICS			
Course Code	**23MC305B**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

    1. To gain knowledge on the basic principles of Big Data and Analytics.

    2. To demonstrate various technologies for handling large volumes of data.

    3. To describe Hadoop ecosystem.

    4. To illustrate the architecture of HDFS and explain the functioning of HDFS clusters.

    5. To analyze the usage of Map-Reduce techniques for solving big data problems.

    6. To analyze and visualize various datasets.

Module-1	**8Hrs**

Big Data and Analytics

Example Applications, Basic Nomenclature, Analysis Process Model, Analytical Model Requirements , Types of Data Sources, Sampling, Types of Data Elements, Data Exploration, Exploratory Statistical Analysis, Missing Values, Outlier Detection and Treatment, Standardizing Data Labels, Categorization

Module-2	**8Hrs**

Big Data Technology

Hadoop's Parallel World, Data discovery, Open source technology for Big Data Analytics, Cloud and Big Data, Predictive Analytics, Mobile Business Intelligence and Big Data, Crowd Sourcing Analytics, Inter- and Trans-Firewall Analytics.

Module-3	**8Hrs**

Meet Hadoop

Data, Data Storage and Analysis, Comparison with Other Systems, RDBMS, Grid Computing, Volunteer Computing, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem Hadoop Releases Response.

Module-4	**8Hrs**

The Hadoop Distributed File system

The Design of HDFS, HDFS Concepts, Blocks, Namenodes and Datanodes, HDFS Federation, HDFS High-Availability, The Command-Line Interface, Basic Filesystem Operations, HadoopFilesystems Interfaces, The Java Interface, Reading Data from a Hadoop URL, Reading Data Using the FileSystem API, Writing Data, Directories, Querying the Filesystem, Deleting Data, Data Flow Anatomy of a File Read, Anatomy of a File Write, Coherency Model, Parallel Copying with distcp Keeping an HDFS Cluster Balanced, Hadoop Archives.

Module-5	8Hrs

A Weather Dataset ,Data Format, Analysing the Data with Unix Tools, Analyzing the Data with Hadoop, Map and Reduce, Java MapReduce, Scaling Out, Data Flow, Combiner functions, Running a Distributed Map Reduce Job, Hadoop Streaming, Hadoop Pipes, Compiling and Running, Developing a Map Reduce Application, The Configuration API, Combining Resources, Variable Expansion, The Map Reduce Web UI

Course Outcomes:

At the end of the course the student will be able to:

23MC305B.1	Explain the basic principles of Big Data and Analytics.
23MC305B.2	Describe various technologies for handling large volumes of data.
23MC305B.3	Describe Hadoop ecosystem.
23MC305B.4	Illustrate the architecture of HDFS and explain functioning of HDFS clusters.
23MC305B.5	Analyze the usage of Map-Reduce techniques for solving big data problems.
23MC305B.6	Analyze and visualize various datasets

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Analytics in a Big Data World: The Essential Guide to Data Science and its Applications"	Bart Baesens	Wiley	2nd edition, Updated for Python 3,2016
2	Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's	Michael Minelli, Michehe Chambers	Wiley CIO Series	1st Edition, 2013
3	Hadoop: The Definitive Guide	Tom White	O'reilly	3rd Edition, 2012.
Reference Books				
1	Professional Hadoop Solutions	Boris Lublinsky, Kevin T.	Wrox A Wiley Brand	2nd edition 2015

		Smith, Alexey Yakubovich,		
2	Understanding Big data	Chris Eaton, Dirk deroos et al.	McGraw Hill,	Ist edition 2012
3	Big Data Analytics with R and Haoop	Vignesh Prajapati	PACKT Publishing	Ist edition, 2013
4	Oracle Big Data Handbook	Tom Plunkett, Brian Macdonald.	Oracle Press	Ist edition, 2013

Web links/Video Lectures/MOOCs

1. https://youtu.be/bY6ZzQmtOzk
2. https://www.coursera.org/learn/foundations-big-data-analysis-sql
3. https://www.coursera.org/specializations/introduction-data-science

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC305B.1	2	2						
23MC305B.2	2			2				2
23MC305B.3	2							2
23MC305B.4	2							2
23MC305B.5	2	2						
23MC305B.6	2	2		2				

1: Low 2: Medium 3: High

INTERNET OF THINGS			
Course Code	**23MC305C**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1: To realize the fundamentals of internet of things
2. To analyze the IoT architecture and design along with functional/compute stack and data management.
3: To apply IOT architecture for a given problem
4: To analyze the application protocol, transport layer methods for the given business case.
5: To analyze the application of data analytics for IOT for a given business case
6: To analyze the architecture and develop programming using modern tools for the given use case

Module-1	**8Hrs**

What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack

Module-2	**8Hrs**

Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

Module-3	**8Hrs**

IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

Module-4	**8Hrs**

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment 10.

Module-5	**8Hrs**

IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming.   IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.

Course Outcomes:
At the end of the course the student will be able to:

23MC305C.1	Realize the fundamentals of internet of things
23MC305C.2	Analyze the IoT architecture and design along with functional/compute stack and data management.
23MC305C.3	Apply IOT architecture for a given problem
23MC305C.4	Analyze the application protocol, transport layer methods for the given business case.
23MC305C.5	Analyze the application of data analytics for IOT for a given business case.
23MC305C.6	Analyze the architecture and develop programming using modern tools for the given use case

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry	Pearson Education (Cisco Press Indian Reprint)	1st Edition. 2017
2	Internet of Things	Srinivasa K G	CENGAGE Learning India	1st Edition 2018
Reference Books				
1	Internet of Things (A Hands-on-Approach)	Vijay Madisetti and ArshdeepBahga,	Orient Blackswan Private Limited	1st Edition, 2015

| 2 | Internet of Things: Architecture and Design Principles | Raj Kamal | Tata McGraw Hill | 1st Edition, 2017 |

Web links/Video Lectures/MOOCs/papers
1. https://www.coursera.org/specializations/iot
2. https://www.coursera.org/specializations/uiuc-iot

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
23MC305C.1	2	2	1					
23MC305C.2	2	2		2				
23MC305C.3	-	2	2		2			
23MC305C.4	-	2		2	2			
23MC305C.5	-		2	2	3			
23MC305C.6	2		2		2			

1: Low   2: Medium 3: High

CRYPTOGRAPHY AND NETWORK SECURITY			
Course Code	**23MC305D**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:
 1. Implement encryption techniques for the given problem and analyze the results
 2. Design the cipher technique and analyze the functioning of cipher for any given problem
 3.Execute the public and private key-based cryptography algorithms and investigate the results of the algorithm based on the output
 4. Construct the cryptographic algorithms using programming languages for any given problem
 5. Develop security planning for the given case study with data classification, access control and propose a technical solution

Module-1	**8Hrs**

Introduction: OSI Security Architecture, Security Attacks, Security Services, Security Mechanism, model for Network Security.
Classical Encryption Technique: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques.

Module-2	**8Hrs**

Data Encryption and advanced encryption techniques:
Block Ciphers, Data Encryption Standard and Advanced Encryption Standard Block Cipher Principles, The Data Encryption Standard, Block Cipher Design Principles and Modes of operation, Evaluation Criteria for AES, AES Cipher-Encryption and Decryption, Data Structure, Encryption Round.
Public Key Cryptography and Key Management:
Principles of Public Key Crypto system, RSA algorithm, Key management, Diffie Hellman Key exchange.

Module-3	**8Hrs**

Message Authentication and Hash Function: Authentication Requirement, Authentication Functions, Message Authentication Code, Hash Functions, Digital Signatures, Digital Signature Standard.
Authentication Applications: Kerberos, X.509 Authentication Service

Module-4	**8Hrs**

Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME **IP Security**: IP Security Overview; IP Security Architecture; Authentication Header; Encapsulating Security Payload; Combining Security Associations; Key Management.	
Module-5	**8Hrs**
Web Security: Web security Considerations; Secure Socket layer (SSL) and Transport layer Security (TLS); Secure Electronic Transaction (SET). **System Security**: Intruders, Intrusion Detection, Firewall Design Principles- Characteristics, Types of Firewall and Firewall Configuration.	

Course Outcomes:
At the end of the course the student will be able to:

23MC305D.1	Apply encryption techniques for the given problem and analyze the results.
23MC305D.2	Design the Cipher technique and analyze the functioning of Cipher for the given problem.
23MC305D.3	Implement the Public and Private key based cryptography algorithms and investigate the results of algorithms based on output.
23MC305D.4	Design and implement the cryptographic algorithms using programming languages/tools for the given problem/context.
23MC305D.5	Design the security planning for the given case study for data classification, access control and propose technical solutions, and submit the detailed report with plagiarism check.
23MC305D.6	Describe how to maintain the Confidentiality, Integrity and Availability of data.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Cryptography and Network Security – Principles and Practices	William Stallings	Pearson Education	4th Edition 2009.
Reference Books				
1	Cryptography and Network Security	Behrouz A. Forouzan and Debdeep Mukhopadhyay:	Tata McGraw-Hill	2nd Edition, 2010
2	Cryptography and Network Security	Atul Kahate	Tata McGraw-Hill	Third edition, 2007

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC305D.1	3	2						
23MC305D.2		3	2	2				
23MC305D.3			2	2				
23MC305D.4			2	2				
23MC305D.5					2	2	2	
23MC305D.6							2	2

1: Low   2: Medium 3: High

INTRODUCTION SALESFORCE ADMINISTRATOR			
Course Code	**23MC305E**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Summary of the Course:

A Salesforce Administrator solves business problems by customizing the Salesforce Platform. They build, configure, and automate technology solutions to deliver business value. Salesforce Administrators work with stakeholders to define system requirements and customize the platform. Most importantly, they enable users to get the most from Salesforce technology. A Salesforce Admin best understands how to make the platform work for their company's goals. Core responsibilities include supporting users, managing data, maintaining security standards, and delivering actionable analytics.

Course Learning Objectives:
1. Help in collaborating with business and technical stakeholders to design, configure, and implement Salesforce.
2. Develop a mindset in solving business problems using the Salesforce Platform.
3. Proactively set up processes to manage and protect customer and business data.
4. Hands on practice on provide reporting on a regular basis to help users and executives gain insights and make decisions from Salesforce data.
5. Learn how to create human-centered user experiences in Salesforce.
6. **Understand how to Create, maintain, and enhance automated business processes.**

Module-1	8Hrs

e Salesforce Platform Basics: Get Started with the Salesforce Platform, Discover Use Cases for the Platform, Understand the Salesforce Architecture, Navigate Setup, Power Up with AppExchange. Prepare Your Salesforce Org for Users : Set Up the Exchange Rate, Update the Exchange Rate with ACM, Customize the Home Page, Create a Unique Account List View, Create Chatter Groups User Management: Add New Users, Control What Your Users Can Access.
Customize an Org to Support a New Business Unit: Manage User Access, Manage Chatter, Modify Your Data Model, Configure an Email Letterhead and Template, Automate Your Business Process Identity Basics: Get to Know Salesforce Identity, Get To Know Your Salesforce Identity Users, Learn the Language of Identity

Module-2	8Hrs

Data Security: Overview of Data Security, Control Access to the Org, Control Access to Objects, Control Access to Fields, Control Access to Records, Create a Role Hierarchy, Define Sharing Rules.

Permission Set Groups: Get Started with Permission Set Groups, Create a Permission Set Group, Mute Permissions in Permission Set Groups Protect Your Data in Salesforce: Restrict Login Hours and IP Ranges, Create New Users and Allow a User to Delete Accounts, Set Organization-Wide Defaults and Create a Role Hierarchy, Create Sharing Rules, Set Up Account Teams.

Protect Your Data in Salesforce: Restrict Login Hours and IP Ranges, Create New Users and Allow a User to Delete Accounts, Set Organization-Wide Defaults and Create a Role Hierarchy, Create Sharing Rules, Set Up Account Teams.

Data Modeling: Understand Custom & Standard Objects, Create Object Relationships, Work with Schema Builder.

Module-3	8Hrs

Lightning Experience Customization: Set Up Your Org, Create and Customize Lightning Apps, Create and Customize List Views, Customize Record Highlights with Compact Layouts, Customize Record Details with Page Layouts, Create Custom Buttons and Links, Empower Your Users with Quick Actions.

Customize a Salesforce Object: Work with Standard and Custom Fields, Create Picklists and Field Dependencies, Create Lookup Filters, Create Formula Fields, Create Record Types, Create Account Page Layouts, Enable Account Field History Tracking, Create Validation Rules.

Lightning App Builder: Get Started with the Lightning App Builder, Build a Custom Home Page for Lightning Experience, Build a Custom Record Page for Lightning Experience and Salesforce Mobile App, Build an App Home Lightning Page, Work with Custom Lightning Components.

Formulas and Validations: Use Formula Fields, Implement Roll-Up Summary Fields, Create Validation Rules

Module-4	8Hrs

Service Cloud for Lightning Experience: Begin Your Customer Service Journey, Administer Service Cloud, Automate Case Management, Create Digital Engagement on Multiple Channels.

Set Up the Service Console: Set Up the Lightning Service Console, Customize Your Lightning Service Console Pages, Add the Softphone Utility to Your App, Set Up Web Chats for Your Console.

Create a Process for Managing Support Cases: Create Support Processes, Create Record Types, Create an Escalation Rule Set Up Case Escalation and Entitlements: Create Support Processes, Create Case Queues and Assignment Rules, Create a Case Escalation Rule, Create an Automation with Flow Builder, Enable Entitlements and Set Up Service Contracts, Create an Entitlement Process, Create Service Contracts with Entitlements

Module-5	8Hrs

Reports & Dashboards for Lightning Experience: Introduction to Reports and Dashboards in Lightning Experience, Create Reports with the Report Builder, Format Reports, Visualize Your Data with the Lightning Dashboard Builder, Extend Your Reporting Strategy with AppExchange

Create Reports and Dashboards for Sales and Marketing Managers: Create Report and Dashboard Folders, Create a Simple Custom Report, Filter Your Reports, Group and

Categorize Your Data, Use Summary Formulas in Your Reports, Manage Reported Data, Visualize Your Data

Approve Records with Approval Processes: Customize How Records Get Approved, Build an Approval Process Build a Discount Approval Process: Prepare Your Org, Create an Approval Process, Create Initial Submission Actions, Specify Final Approval and Rejection Actions

Build a Simple Flow: Collect Contact Info from Your User, Check for a Matching Contact in Your Org, Branch the Flow, Create or Update a Contact Flow Builder Basics: Get Started with Automation, Go with the Flow, Meet Flow Builder,
Learn About Flow Variables

Course Outcomes: At the end of the course the student will be able to:	
23MC305E.1	Understand how to manage changes to business processes, technology, and people with Salesforce.
23MC305E.2	Improve the efficiency of business operations by proactively undertaking regular process analysis and documentation.
23MC305E.3	Customize the user experience and manage profiles, permissions, roles, and groups with Salesforce.
23MC305E.4	Apply the Beginner's mind and continually stay up to date with new Salesforce technology and inspire others too
23MC305E.5	Manage the end-to-end implementation of Salesforce, including the overall strategy and day-to-day activities involved in administering Salesforce.
23MC305E.6	

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Salesforce for Beginners: A step-by-step guide to optimize sales and marketing and automate business processes with the Salesforce platform	Sharif Shaalan and Timothy Royer	PACKT Publishers	2nd Ed, 2022
2	Salesforce CRM - The Definitive Admin Handbook: Build, configure, and customize Salesforce CRM and mobile solutions	Paul Goodey	PACKT Publisher	5th Ed, 2019

3	Learn Salesforce Lightning: The Visual Guide to the Lightning UI	Felicia Duarte, Rachelle Hoffman	Wiley Apress	2018
Reference Books				
1	Salesforce Data Architecture and Management: A pragmatic guide for aspiringSalesforce architects and developers to manage, govern, and secure their data effectively	Ahsan Zafar	PACKT Publishers	2021

Web links/Video Lectures/MOOCs
● Use the Trailhead Platform: *https://www.salesforce.com/blog/what-is-trailhead/*
The Salesforce Administrator Trailmix :

● https://trailhead.salesforce.com/users/srebello7/trailmixes/salesforce-administrator-explorer

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC305E.1	2							
23MC305E.2		2						
23MC305E.3							2	
23MC305E.4				1				
23MC305E.5								
23MC305E.6								

1: Low 2: Medium 3: High

Advanced Web Laboratory			
Course Code	**23MCL306**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(1-0-2)	SEE Marks	50
Credits	**02**	Exam Hours	03

Course Learning Objectives:
1. To gain knowledge on designing and styling web pages with bootstrap.
2. Able to validate web pages at client-side.
3. Gain knowledge on server side scripting
4. Understand the basics of React and create components and lifecycle
5. Develop applications using JSX and React.
6. Develop applications using mongo DB.

PART-A

1. Create a page with Tailwind CSS product cards styled using max-w-sm, shadow-md, rounded-lg, and hover effects like hover:shadow-xl. Style the image with object-cover, rounded-t-lg, h-48 and text with font-bold, text-gray-700, and text-sm.
2. Create a developer portfolio website using Bootstrap with a responsive navbar, a hero section featuring display-4 text and a btn-primary button, and a projects section using a grid (row and col-md-4) to display three card components. Include a contact form with form-group fields for name, email, and message, and finish with a footer featuring social media icons.
3. Create a React application that includes a form with a textbox component, a dropdown component, and a submit button component. Each form element should be implemented as a separate, reusable component.
4. Build a React application that includes a form to accept a first name and a last name using Material UI components. Instead of a standard "Submit" button, implement a "Greet Me" button that, when clicked, will display an alert with the message "Hello [first name] [last name]!".
5. Build a simple React application that includes a Material UI button. When the button is clicked, it should toggle the visibility of a Material UI Card component

PART-B

1. Develop a React application that dynamically displays the capital city of a selected country. Implement the country selection dropdown as a separate, reusable component. The main application component should integrate this dropdown component and, upon selection of a country, display the corresponding capital city.
2. Develop a react application and:
    i)   Build your own Button component and render it three times. On user click, it should alert which button was clicked. (React JS).
    ii) Use the useState React hook to track how many times a button is clicked, and display the number
3. Create a custom component for rendering each joke present in an array. Using the map function, map through each object in the array. Use the custom component to render each object.
4. create a multi page React application with a navigation bar component and routes using react-router-dom.
5. Create an HTTP server listening on port 1337, which sends Hello, World! to the browser and using Express.

| 6. | Build a React app that fetches, adds, and deletes items from a mock backend server using the fetch API. Items should be displayed, and changes should update both the frontend and backend. |

Mini Project: Create a mini project that uses React and Material UI for the frontend, and a NoSQL database like MongoDB for the backend.

Note 1: In the practical exam students has to execute one program from part-A and one from part-B.

Course Outcomes:
At the end of the course the student will be able to:

23MCL306.1	Create responsive web pages using React
23MCL306.2	Implement and style pages by integrating Material UI Components.
23MCL306.3	Develop reusable React components.
23MCL306.4	Understand the application of React hooks like useState to manage state and handle user interactions effectively.
23MCL306.5	Set up and run an HTTP server using Node.js and Express, and integrating MongoDB for data storage and retrieval
23MCL306.6	Develop full-stack applications, including front-end and back-end services.

Course Articulation Matrix

(COs)	PO 1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8
23MCL306.1		2	2					
23MCL306.2			2					
23MCL306.3			2		1			
23MCL306.4	1	1		1				
23MCL306.5		1						
23MCL306.6	1	1	2	2	3			

PROGRAMMING USING C# .NET LABORATORY

Course Code	**23MCL307**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(1-0-2)	SEE Marks	50
Credits	**02**	Exam Hours	03

Course Learning Objectives:
1. Implement a C# program that accepts command-line arguments,
2. Implement boxing and unboxing operations in C#
3. Implement operator overloading in C#
4. Implement jagged arrays in C# with iteration techniques for multidimensional arrays.
5. Design and implement database interactions using ADO.NET.
6. Develop ASP.NET web applications by integrating databases in the applications.

PART-A

1.Write a Program in C# to demonstrate Command line arguments processing for the following.
a) To find the square root of a given number.
b) To find the sum & average of three numbers.
2.Write a Program in C# to demonstrate the following
a) Boxing and Unboxing b) Invalid Unboxing.
3. Write a program in C# to add Two complex numbers using Operator overloading .
4. Write a Program in C# to find the sum of each row of given jagged array of 3 inner arrays.
5. Write a Program in C# to demonstrate Array Out of Bound Exception using Try, Catch and Finally
blocks.
6.Write a Program to Demonstrate Use of Virtual and override key words in C# with a simple program.
7. Write a Program in C# to create and implement a Delegate for any two arithmetic operations
8. Write a Program in C# to demonstrate abstract class and abstract methods in C#.
9. Write a program to Set & Get the Name & Age of a person using Properties of C# to illustrate the use
of different properties in C#.
10. Write a Program in C# Demonstrate arrays of interface types (for runtime polymorphism).

PART-B

Consider the Database db_EMS (Employee Management System)
consisting of the following tables :
tbl_Designations (IdDesignation: int, Designation: string)

tbl_EmployeeDetails(IdEmployee: int, EmployeeName: string, ContactNumber: string,
IdDesignation: int, IdReportingTo: int)
Develop a suitable window application using C#.NET having following options.
1. Enter new Employee details with designation & Reporting Manager.

2. Display all the Project Leaders (In a Grid) reporting to selected Project Managers (In a Combo box).
3. Display all the Engineers (In a Grid) reporting to selected Project Leader (In a Combo box).
4. Display all the Employees (In a Grid) with their reporting Manager (No Value for PM).
NOTE: tbl_Designation is a static table containing the following Rows in it.

1 Project Manager
2 Project Leader
3 Engineer

II. Consider the Database db_LSA (Lecturer Subject Allocation) consisting of the following tables:

tbl_Subjects(IdSubject: int, SubjectCode: string, SubjectName: string)
tbl_Lecturers(IdLecturer: int, LecturerName: string, ContactNumber: string)
tbl_LecturerSubjects(IdSubject: int, SubjectCode: string, IdLecturer: int)
Develop a suitable window application using C#.NET having following options.
1. Enter new Subject Details.
2. Enter New Lecturer Details.
3. Subject Allocation with Lecturer Name in a Combo box and subjects to be allocated in Grid with
checkbox Column.
4. Display all the subjects allocated (In a Grid) to the selected Lecturer (In a Combo Box).
III. Consider the database db_VSS (Vehicle Service Station) consisting of the following tables:
tbl_VehicleTypes(IdVehicleType: int, VehicleType: string, ServiceCharge: int)
tbl_ServiceDetails(IdService: int, VehicleNumber: string, ServiceDetails: string, IdVehicleType: int)
Develop a suitable window application using C#.NET having following options.
1. Enter new Service Details for the Selected Vehicle Type (In a Combo Box).
2. Update the Existing Service Charges to Database.
3. Total Service Charges Collected for the Selected Vehicle (In a Combo box) with total amount displayed in a text box.
NOTE: tbl_VehicleType is a static table containing the following Rows in it.

1 Two Wheeler 500
2 Four Wheeler 1000
3 Three Wheeler 700

IV. Develop a web application using C#.NET and ASP.NET for the Postal System Management. The master
page should contain the hyper links for adding Area Details, Postman details, Letter distributions and View Letters.
Consider the database db_PSM (Postal System Management) consisting of the following tables:
tbl_AreaDetails(IdArea: int, AreaName: string)
tbl_PostmanDetails(IdPostman: int, PostmanName: string, ContactNumber: string, IdArea: int)

tbl_AreaLetters(IdLetter: int, LetterAddress: string, IdArea: int)
Develop the suitable content pages for the above created 4 hyper links with the following details:
1. Enter New Area Details

2. Enter New Postman Details with the Area he/she is in-charge of (display Area in a Combo box)
3. Enter all the Letters distributed to the selected Area (display Area in a Combo box)
4. Display all the Letter addresses (In a Grid) to be distributed by the selected Postman (In a Combo box)

Note 1: In the practical exam student has to execute one program from part-A and one from part-B.

Course Outcomes:
At the end of the course the student will be able to:

23MCL307.1	Demonstrate command-line arguments in C# with understanding of input handling and basic arithmetic operations.
23MCL307.2	Implement boxing and unboxing operations in C#
23MCL307.3	Implement operator overloading in C# and apply them to user-defined data types.
23MCL307.4	Implement jagged arrays in C# with iteration techniques for multidimensional arrays.
23MCL307.5	Design and implement scalable and efficient database interactions using ADO.NET.
23MCL307.6	Develop ASP.NET web application by integrating databases within.

Course Articulation Matrix

(COs)	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8
23MCL307.1	2	2						
23MCL307.2	2	2						
23MCL307.3	2	2						
23MCL307.4	2	2						
23MCL307.5		**2**		**2**				
23MCL307.6		**2**		**2**				2

COMPUTER NETWORKS LABORATORY			
Course Code	**23MCL308**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(1-0-2)	SEE Marks	50
Credits	**02**	Exam Hours	03

Course Learning Objectives:
1. To apply the basic concepts of networking and to analyze different parameters such as bandwidth, delay, throughput of the networks for the given problem.
2. To apply different techniques to ensure the reliable and secured communication in wired and wireless communication.
3. To analyze the networking concepts of TCP/IP for wired and wireless components.
4. To identify the issues of Transport layer to analyze the congestion control mechanism.
5. To design network topology with different protocols and analyze the performance using a simulator.
6. To identify the practical utilization of Networking standards and protocols.

PART-A
Implement the following Computer Networks concepts using C/C++

1. Write a program for a distance vector algorithm to find a suitable path for transmission.
2. Using TCP/IP sockets, write a client-server program to make the client send the file name and to make the server send back the contents of the requested file if present.
3. Write a program for Hamming code generation for error detection and correction.
4. Write a program for congestion control using leaky bucket algorithm.

PART-B
(Simulate the following Computer Networks concepts using any network simulators)

1. Simulate a three nodes point to point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.
2. Simulate the network with five nodes n0, n1, n2, n3, n4, forming a star topology. The node n4 is at the center. Node n0 is a TCP source, which transmits packets to node n3 (a TCP sink) through the node n4. Node n1 is another traffic source, and sends UDP packets to node n2 through n4. The duration of the simulation time is 10 seconds.
3. Simulate to study transmission of packets over Ethernet LAN and determine the number of packets drop destination.
4. Write a TCL Script to simulate working of multicasting routing protocol and analyze the throughput of the network
5. Simulate the different types of internet traffic such as FTP and TELNET over a wired network and analyze the packet drop and packet delivery ratio in the network.

Note 1: In the practical exam student has to execute one program from part-A and one from part-B.

Course Outcomes:	
At the end of the course the student will be able to:	
23MCL308.1	Apply the basic concepts of networking and to analyze different parameters such as bandwidth, delay, throughput of the networks for the given problem.
23MCL308.2	Apply different techniques to ensure the reliable and secured communication in wired and wireless communication.
23MCL308.3	Analyze the networking concepts of TCP/IP for wired and wireless components.
23MCL308.4	Identify the issues of Transport layer to analyze the congestion control mechanism.
23MCL308.5	Design network topology with different protocols and analyze the performance using a simulator.
23MCL308.6	Identify the practical utilization of Networking standards and protocols.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Computer Networks A Systems Approach (1, 2 ,3.1,3.2,3.3, 3.4,4.1, 5.1,5.2,6.2,6.36.4, 8.1,8.2,8.5, 9.1,9.3)	Larry L Peterson and Bruce S Davie	Morgan Kaufmann Publishers	5th Edition, 2012.
Reference Books				
1	Computer Networking – A Top-Down Approach Featuring the Internet	James F. Kurose, Keith W. Ross	Pearson Education	5th Edition, 2009.
2	Computer and Communication Networks	Nader. F. Mir	Pearson Prentice Hall Publishers	2010.
3	Computer Networks: An Open Source Approach	Ying-Dar Lin, Ren-Hung Hwang, Fred Baker	McGraw Hill Publisher	2011.

4	Data Communication and Networking	Behrouz A. Forouzan	Tata McGraw – Hill	4th Edition, 2011.

Web links/Video Lectures/MOOCs/papers
1. https://www.coursera.org/learn/computer-networking
2. https://www.coursera.org/specializations/computer communications

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO 8
23MCL308.1		2						
23MCL308.2			2					
23MCL308.3			2					
23MCL308.4		2						
23MCL308.5					2			
23MCL308.6					2			

1: Low   2: Medium 3: High

SUMMER INTERNSHIP- I			
Course Code	**23INT309**	CIE Marks	50
Teaching Hours/Week (L:T:P)	-	SEE Marks	50
Credits	**3**	Exam Hours	-

Course Learning Objectives:
1. To sketch out different project development needs.
2. To build interpersonal skills to improve the industry- academia culture.
3. To improve self-learning
4. To develop innovative IT applications to meet industrial and societal needs
5. To adapt themselves to changing IT requirements through life-long learning
6. To exhibit leadership skills and advance in their chosen career

Guidelines for Industry Internship:
- A mandatory summer internship of minimum 4 weeks during 2nd and 3rd semester vacation.
- Summer internship shall include inter/ intra Institutional activities
- Internship examination shall be conducted during 3rd semester and the prescribed credit shall be included in the 3rd semester.
- The student shall present the progress of the internship to the panel of members constituted by the Head of the Department (HoD), Internship Coordinator and the Guide.

Course Outcomes:
At the end of the course the student will be able to:

23INT309.1	Sketch out different project development needs.
23INT309.2	Build interpersonal skills to improve the industry- academia culture.
23INT309.3	Exhibit leadership skills and advance in their chosen career
23INT309.4	Analyze the real-time industry/research work environment with emphasis on organizational structure/job process/different departments and functions / tools /technology.
23INT309.5	Develop applications using modern tools and technologies.
23INT309.6	Demonstrate self-learning capabilities with an effective report and detailed presentation.

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23INT309.1		2						
23INT309.2					2			
23INT309.3					2			2
23INT309.4						2		
23INT309.5					2			
23INT309.6							2	

1: Low 2: Medium 3: High

St Joseph Engineering College, Mangaluru
An Autonomous Institution
Master of Computer Applications (MCA)
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
SEMESTER –IV

MOOC

Course Code	**23AEC401**	CIE Marks	-
Teaching Hours/Week (L:T:P)	(0:0:0)	SEE Marks	-
Credits	**04**	Exam Hours	-

Course Learning Objectives:
1. To provide open access to high quality education content and information
2. To promote self-learning approach
3. To provide an opportunity to enhance problem solving skills
4. To develop interdisciplinary learning approaches
5. To recognize the new technologies in their area of interest
6. To formulate the MOOC studies for lifelong learning.

Any MOOC topic (Choices are given by the department) with minimum 16 weeks to be completed between I Semester to IV Semester.

Course Outcomes:

At the end of the course the student will be able to:

23AEC401.1	Get exposure to high quality education content and information
23AEC401.2	Inculcate self-learning approach
23AEC401.3	Choose courses to enhance problem solving skills
23AEC401.4	Develop interdisciplinary learning approaches
23AEC401.5	Recognize the new technologies in their area of interest
23AEC401.6	Formulate the MOOC studies for lifelong learning

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23AEC401.1	2	2	2	2	-		-	3
23AEC401.2	-	-	2	-	2	-		-
23AEC401.3	-	-	2	-	-	-		2
23AEC401.4	-	-	-	2	2	-	-	2
23AEC401.5	-	2	-	2	-	-		2
23AEC401.6	2							2

1: Low 2: Medium 3: High

PROJECT WORK			
Course Code	**23MCP402**	CIE Marks	50
Teaching Hours/Week (L:T:P)	-	SEE Marks	50
Credits	**7**	Exam Hours	2

Course Learning Objectives:
1. To Identify different user requirements and perform feasibility analysis.
2. To develop innovative IT applications to meet industrial and societal needs
3. To adapt themselves to changing IT requirements through life-long learning
4. To exhibit leadership skills and advance in their chosen career.
5. To conduct testing of application using appropriate techniques and tools.
6. To formulate the project findings.

Project:
- The candidate should carry out the project in any industry or R&D organization or educational institution under a guide / co-guide.
- This is an individual project to be carried out during 3rd and 4th Semester
- The candidate has to present the work carried out before the examiners during the Semester End examination.
- The work carried out should be free from plagiarism.
- The literature study may be clearly written which may be the summary of existing work and highlight of what are the functionalities that are proposed to the project.
- Student shall indicate the different research papers, documents referred as a part of the literature study.

General Rules
1) Project work may be application/ testing or research oriented and accordingly the project report contents may vary.
2) Students are encouraged and appreciated to show their project code demo along with their power point slide show during their viva-voce exams as an added advantage.

Course Outcomes:
At the end of the course the student will be able to:

23MCP402.1	Identify different user requirements and perform feasibility analysis.
23MCP402.2	Develop innovative IT applications to meet industrial and societal needs
23MCP402.3	Adapt themselves to changing IT requirements through life-long learning
23MCP402.4	Exhibit leadership skills and advance in their chosen career.
23MCP402.5	Conduct testing of application using appropriate techniques and tools.

23MCP402.6	Formulate the project findings.

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCP402.1		2						
23MCP402.2			2					
23MCP402.3								2
23MCP402.4					2			
23MCP402.5				2				
23MCP402.6		2						

1: Low 2: Medium 3: High

INDUSTRY INTERNSHIP			
Course Code	**23INT403**	CIE Marks	50
Teaching Hours/Week (L:T:P)	-	SEE Marks	50
Credits	**9**	Exam Hours	3

Course Learning Objectives:
1. To sketch out different project development needs.
2. To build interpersonal skills to improve the industry- academia culture.
3. To improve self-learning
4. To develop innovative IT applications to meet industrial and societal needs
5. To adapt themselves to changing IT requirements through life-long learning
6. To exhibit leadership skills and advance in their chosen career

Guidelines for Industry Internship:
- The students shall undergo internship in the industry for a period of 12 weeks
- The internship shall be carried out in industry / R&D labs or institutions.
- Internship should be presented along with the report by the end of 6 weeks and shall be evaluated by the internal panel for 100 marks.
- The student shall prepare a report and submit the same to the guide allotted by the institute.

The student shall present the progress of the internship to the panel of members constituted by the Head of the Department (HoD), Internship Coordinator and the Guide.

Course Outcomes: At the end of the course the student will be able to:	
23INT403.1	Sketch out different project development needs.
23INT403.2	Build interpersonal skills to improve the industry- academia culture.
23INT403.3	Exhibit leadership skills and advance in their chosen career
23INT403.4	Analyze the real-time industry/research work environment with emphasis on organizational structure/job process/different departments and functions / tools /technology.
23INT403.5	Develop applications using modern tools and technologies.
23INT403.6	Demonstrate self-learning capabilities with an effective report and detailed presentation.

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23INT403.1		2						
23INT403.2					2			
23INT403.3					2			2
23INT403.4				2		2		2
23INT403.5					2			
23INT403.6						2	2	

1: Low 2: Medium

Core Values of the Institution

SERVICE

A Josephite will keep service as the prime goal in everything that is undertaken. Meeting the needs of the stakeholders will be the prime focus of all our endeavors.

EXCELLENCE

A Josephite will not only endeavor to serve, but serve with excellence. Preparing rigorously to excel in whatever we do will be our hallmark.

ACCOUNTABILITY

Every member of the SJEC Family will be guided to deliver on assurances given within the constraints set. A Josephite will always keep budgets and deadlines in mind when delivering a service.

CONTINUOUS ADAPTATION

Every member of the SJEC Family will strive to provide reliable and continuous service by adapting to the changing environment.

COLLABORATION

A Josephite will always seek to collaborate with others and be a team-player in the service of the stakeholders.

Objectives

- Provide Quality Technical Education facilities to every student admitted to the College and facilitate the development of all round personality of the students.

- Provide most competent staff and excellent support facilities like laboratory, library and internet required for good education on a continuous basis.

- Encourage organizing and participation of staff and students in in-house and outside Training programmes, seminars, conferences and workshops on continuous basis.

- Provide incentives and encouragement to motivate staff and students to actively involve in research-innovative projects in collaboration with industry and R&D centres on continuous basis

- Invite more and more number of persons from industry from India and abroad for collaboration and promote Industry-Institute Partnership.

- Encourage consultancy and testing and respond to the needs of the immediate neighbourhood.

St Joseph Engineering College

AN AUTONOMOUS INSTITUTION

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Accredited by NAAC with A+ Grade
B.E. (CSE, ECE, EEE, ME, CIV), MBA & MCA Accredited by NBA, New Delhi

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