1st Semester Syllabus

Semester: I

Course Name: **MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS**

Course Code	23MCA11	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

Sets, Relations and Functions: Basics of set theory, Cartesian product of sets. Relations, Properties of relations, Zero-one matrices and directed graphs, Hasse diagram, Equivalence relations and partitions. Functions- types of functions: composition function and Inverse function. Permutation of functions

Module – 2

Logic: Propositions-Truth Value, Conjunction, Disjunction, Negation, Implication, Converse, Inverse, Contrapositive, Biconditional, Order of Precedence, Tautology, Contradiction,
Logical Equivalences, Quantifiers: Predicates, De Morgan's Laws, Arguments: Valid and Invalid Arguments, rules of inference

Module – 3

Statistical Methods: Measures of Central Tendency (Mean, Median, Mode, Other averages), Measures of Dispersion (range, mean deviation, standard deviation), Curve fitting by method of least squares. Fit curves of the forms $y=ax+b$, $y=ax^2+bx+c$ and $y=ax^b$. Correlation and regression analysis

Module – 4

Probability Distributions: Random variables- discrete and continuous, probability mass function, probability density function, Cumulative density function. Binomial distribution, Poisson distribution, Exponential distribution and Normal distribution. (only examples)

Module – 5

Graph Theory: Graphs and Graphs models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Planar Graphs, Graph Coloring.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Discrete Mathematics and its Applications	Kenneth H Rosen	McGraw Hill publications	7th Edition
2	Probability and Statistics for engineers and Scientist	Wolpole Myers Ye	Pearson Education	8th edition
3	Graph Theory: With Application to Engineering and Computer Science	NarsinghDeo	Prentice Hall of India	16th Edition 2003
Reference Books				
1	Probability and statistics for engineers	Richard A Johnson and C.B Gupta	Pearson Education	
2	Discrete Mathematics	J.K Sharma	Mac Millian Publishers India	3rd Edition 2011

Semester: I

Course Name: **OPERATING SYSTEM with UNIX**

Course Code	23MC12	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Total Hours of Pedagogy	40+20	Total Marks	100
Credits	4	Exam Hours	03

Module – 1

File System: The File, What's in a File name, The Parent-Child Relationship, The HOME Variable: The Home Directory, pwd, cd, mkdir, rmdir, Absolute Pathnames, Relative Pathnames, The Unix File System. The vi Editor: vi Basics, Input Mode, ex Mode and Command Mode.
Basic File Attributes: ls options, File Ownership, File Permissions, chmod, Directory Permissions, Hard link and soft link

8 Hours

Module – 2

The Shell: The Shell's Interpretive Cycle, Shell Offerings, Pattern Matching-The Wild-cards, Escaping and Quoting
Redirection: The Three Standard Files, grep command
Two Special Files: /dev/null and /dev/tty, pipes, tee, Command Substitution
The Process: Process Basics, ps: Process Status, System Processes, Mechanism of Process Creation, Internal and External Commands, Running Jobs in Background, Killing Processes with Signals, Job Control, at and batch, cron

8 Hours

Module – 3

Introduction to operating systems, System structures: Operating systems functionalities, Computer system organization, Computer system architecture, Operating system structure, Operating system operations, Process management, Memory management, Storage management; Protection and Security, Distributed system, Special-purpose systems.
Operating System Services: User - Operating system interface, System calls, Types of system calls, System programs, Operating system design and implementation, Virtual machines, System boot.

8 Hours

Module - 4

Process Management: Process concept, Process scheduling, Operations on processes, Inter process communication.
Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, thread scheduling.

8 Hours

Module – 5

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery from deadlock. **Memory Management:** Background, Swapping, Contiguous memory allocation, Paging, Structure of page table, Segmentation. **8 Hours**

PRACTICAL COMPONENT 20 Hours

SN	List of Experiments
1	Write a shell script that accepts a path name and creates all the components in that path name as directories. For example, if the script is named as mpc, then the command mpc a/b/c/d should create sub-directories a, a/b, a/b/c, a/b/c/d.
2	Write a shell script that accepts two filenames as arguments, checks if the permissions for these files are identical and if the permissions are identical, output common permissions otherwise output each filename followed by its permissions
3	Install an operating system on a physical or logical (virtual) machine.
4	Design, develop and implement program to simulate the working of Shortest Remaining Time First scheduling algorithm. Experiment with different length jobs.
5	Design, develop and implement program to simulate the working of Round Robin (RR) scheduling algorithms. Experiment with different quantum sizes for RR algorithm.
6	Design, develop and implement a Banker's algorithm. Assume suitable input required to demonstrate the results.
7	Write a shell script that takes a valid directory name as a argument recursively descend all the sub-directors, find the maximum length of any file in that hierarchy and writ the maximum value to the standard output

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Operating Systems Principles	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne	Wiley – India	8th Edition
2	UNIX Concepts and Applications	Sumitabha Das	Tata McGraw Hill	4th Edition, 2006
Reference Books				
1	An Introduction to Operating Systems: Concepts and Practice	P.C.P. Bhatt	PHI(EEE)	4th Edition, 2014

Semester: I

Course Name: **DATA STRUCTURES AND APPLICATIONS**

Course Code	23MCA13	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

Introduction to Data Structures: Basic concepts, classification of data structures, operations on data structures.
Searching techniques: Linear search and Binary search.
Sorting techniques: Bubble sort, selection sort, pointer declaration and initialization, pointer and function (pass by address method), DMA, Recursion.

8 Hours

Module - 2

Linear Data Structures
Stacks: Primitive operations and its implementation of stacks using Arrays, applications of stacks, arithmetic expression conversion and evaluation.
Queues: Primitive operation and Implementation of Ordinary Queue using Arrays, applications of linear queue, Circular queue, Priority Queue, Sparse Matrix Representation in Triplet Format.

8 Hours

Module – 3

Linked Lists: Introduction, representation of a linked list in memory, Types of linked lists and implementation: Single linked lists, Circular linked lists, doubly linked lists, operations on a single linked list.
Applications of linked lists: Polynomial representation and sparse matrix representation using linked list. **8 Hours**

Module – 4

Non-Linear Data Structures
Trees: Basic concept, binary tree, properties of binary tree, binary tree representation, binary tree traversal, Binary search trees, application of trees.
Graphs: Basic concept, graph terminology, graph implementation, graph traversals: DFS, BFS, Application of graphs. **8 Hours**

Module – 5

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, Brute force Approach.

8 Hours

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Fundamentals of Data Structures in C	Ellis Horowitz and Sartaj Sahni	Universities Press	2nd Ed, 2014
2	Data Structures using C	Reema Thareja	Oxford press	3rd Ed, 2012
3	Introduction to the Design and Analysis of Algorithms	Anany Levitin	Pearson	2nd Ed, 2009
Reference Books				
1	Data Structures: A Pseudo-code approach with C	Gilberg and Forouzan	Cengage Learning	2nd Ed, 2014

Semester: I

Course Name: **SOFTWARE ENGINEERING & PROJECT MANAGEMENT**

Course Code	23MCA14	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

Introduction to Software Engineering: Software Crisis, Need for Software Engineering. Professional Software Development, Software Engineering Ethics.
Software Process Models: Waterfall Model, Incremental Model and Spiral Model, Rational Unified Process (RUP).
Requirements Engineering Process: Requirements Elicitation and Analysis, Functional and Non-Functional Requirements, Software Requirements Document, Requirements Specification, Requirements Validation, Requirements Management.

8 Hours

Module - 2

System Model: Context Models, Interaction Models, Structural Models, Behavioral Models. **Object-oriented design:** OO Themes, **The Three Models:** Class Modelling, Object and Class, Link and associations, Generalization and Inheritance, Object Oriented Design Process, Use Case, Sequence and State Diagrams.

8 Hours

Module – 3

Software Testing and Maintenance: Development Testing, Test-Driven Development, Release Testing, User Testing, Test Automation. **Evolution Process:** Program Evolution Dynamics, Software Maintenance, Legacy System Management.

8 Hours

Module – 4

Project Planning: Software Pricing, Project Scheduling, Estimation Techniques, Software Standards, Software Quality, Reviews and Inspections, Software Measurement and Metrics

8 Hours

Module – 5

Case Studies: Real-life examples such as Patient Health Care System, Weather Station, Microwave Oven, Washing Machine etc.

8 Hours

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Software Engineering	Ian Sommerville	Pearson Education Ltd	9th Edition 2001
2	Software Engineering	Pankaj Jalote	Wiley India Pvt Ltd	2010
3	Object-Oriented Modelling and Design with UML	MichelBlaha, James Rumbaugh	Pearson	2nd edition 2007
Reference Books				
1	Object oriented software engineering	Stephan R. Schach	Tata McGrawHil	2008
2	Applying UML and Patterns	Craig Larman	Pearson Education	2005

Semester: I

Course Name: **WEB TECHNOLOGIES**

Course Code	23MCA15	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

Introduction to Web: Internet, www, web browsers and web servers, URLs, MIME, HTTP, **Introduction to HTML:** Basic structure, HTML formatting tags, adding images to web page, creating lists, tables, linking web pages, making forms, frames

8 Hours

Module - 2

Cascading Style sheets(CSS): Introduction to style sheets, levels of style sheets, style specification formats, Selector forms, property value forms, font properties, background images, colors and properties, borders and boxes, CSS2

8 Hours

Module – 3

Introduction to JavaScript: Need of JavaScript, adding Javascript to HTML programs, variables, expressions, data types, conditional statements, loops, arrays, writing user defined functions, Events and event handling using Javascript, handling mouse events, window events, validating form elements using Javascript, pattern matching using regular expressions, DOM2 event model, the navigator object

8 Hours

Module – 4

Introduction to JQuery: Syntax, selectors, events, JQuery HTML, JQuery Effects, JQuery CSS.

8 Hours

Module – 5

Introduction to Angular JS: Directives, Expressions, Directives, Controllers, Filters, Services, Events, Forms, Validations, Examples

8 Hours

Suggested Learning Resources:

SN	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 2008
2	Web Technologies	Black Book	Dreamtech Press	2018
2	Web Programming	Chris Bates	Wiley Publications	
3	Angular JS	Krishna Rungta		2018
Reference Books				
1	Internet and World Wide Web How to program	P.J. Deitel & H.M. Deitel	Pearson	4th Edition, 2012

Semester: I

Course Name: **DATA STRUCTURES LAB**

Course Code	23MCAL16	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:4	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	2	Exam Hours	03

List of Experiments:

Program 1: Design, Develop and Implement a menu driven Program in C for the following **Array** operations
a. Creating an Array of **N** Integer Elements
b. Display of Array Elements with Suitable Headings
c. Searching an Element using Binary Search
d. Sorting an Array elements using Bubble Sort Technique
e. Exit
Support the program with functions for each of the above operations.

Program 2: Design, Develop and Implement a menu driven Program in C for the following operations on **STACK** of Integers (Array Implementation of Stack with maximum size **MAX**)
a. ***Push*** an Element on to Stack
b. ***Pop*** an Element from Stack
c. Demonstrate how Stack can be used to check ***Palindrome***
d. Demonstrate ***Overflow*** and ***Underflow*** situations on Stack
e. Display the status of Stack
f. Exit
Support the program with appropriate functions for each of the above operations

Program 3: Design, Develop and Implement a Program in C Language for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: +, -, *, /, % (Remainder), ^ (Power) and alphanumeric operands

Program 4: Design, Develop and Implement a menu driven Program in C Language for the following operations on QUEUE of Integers (Array Implementation of Queue with maximum size MAX)
a. Insert an Element on to QUEUE
b. Delete an Element from QUEUE
c. Demonstrate Overflow and Underflow situations on QUEUE
d. Display the status of QUEUE
e. Exit
Support the program with appropriate functions for each of the above operations

Program 5: Design, Develop and Implement a menu driven Program in C for the following operations on **Singly Linked List (SLL)** of Student Data with the fields: ***USN, Name, Branch, Sem, PhNo***
a. Create a **SLL** of **N** Students Data by using ***front insertion***.
b. Display the status of **SLL** and count the number of nodes in it
c. Perform Insertion / Deletion at End of **SLL**
d. Perform Insertion / Deletion at Front of **SLL(Demonstration of stack)**
e. Exit

Program 6: Design, Develop and Implement a menu driven Program in C for the following operations on **Doubly Linked List (DLL)** of Employee Data with the fields: ***SSN, Name, Dept, Designation, Sal, PhNo*** a. Create a **DLL** of **N** Employees Data by using ***end insertion***. b. Display the status of **DLL** and count the number of nodes in it c. Perform Insertion and Deletion at End of **DLL** d. Perform Insertion and Deletion at Front of **DLL** e. Demonstrate how this **DLL** can be used as **Double Ended Queue** f. Exit
Program 7: Design, Develop and Implement a menu driven Program in C for the following operations on **Binary Search Tree (BST)** of Integers a. Create a BST of **N** Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2 b. Traverse the BST in Inorder, Preorder and Post Order c. Search the BST for a given element (**KEY**) and report the appropriate message d. Exit
Program 8: Design, Develop and Implement a menu driven Program in C for the following operations on **Binary Search Tree (BST)** of Integers a. Create a BST of **N** Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2 b. Insert a given element (**KEY) into** Binary Search Tree**.** c. Delete an element **(KEY)** from Binary Search Tree d. Exit
Program 9: Design, Develop and Implement a Program in C for the following operations on **Graph(G)** of Cities a. Create a Graph of **N** cities using Adjacency Matrix. b. Print all the nodes **reachable** from a given starting node in a digraph using DFS/BFS method
Program 10: Given a set of cities and the distances between each city, find the shortest possible route that visits each city exactly once and return to the starting city using brute force technique (The Traveling Salesman Problem (TSP) problem).

Semester: I

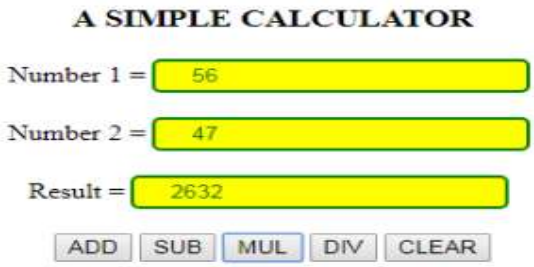
Course Name: **WEB TECHNOLOGIES LABORATORY**

Course Code	23MCAL17	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:4	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	2	Exam Hours	03

List of Experiments:

Part - A
1. Create an XHTML page that provides information about your department. Your XHTML page must use the following tags: a) Text Formatting tags b) Horizontal rule c) Meta element d) Links e) Images f) Tables (Use of additional tags encouraged)
2. Develop and demonstrate the usage of inline, external and internal style sheet using CSS. Use XHTML page that contains at least three paragraphs of text, listed elements and a table with four rows and four columns.
3. Develop and demonstrate a XHTML file that includes Javascript script for the following problems: a) Input : A number n obtained using prompt Output : The first n Fibonacci numbers b) Input : A number n obtained using prompt Output : A table of numbers from 1 to n and their squares using alert
4. Develop, test and validate an XHTML document that has checkboxes for apple (59 cents each), orange (49 cents each), and banana (39 cents each) along with submit button. Each check boxes should have its own onclick event handler. These handlers must add the cost of their fruit to a total cost. An event handler for the submit button must produce an alert window with the message 'your total cost is $xxx', where xxx is the total cost of the chose fruit, including 5 percent sales tax. This handler must return 'false' (to avoid actual submission of the form data). Modify the document to accept quantity for each item using textboxes.
5. a) Develop and demonstrate, a HTML document that collects the USN (the valid format is : A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by three upper-case characters followed by two digits; (no embedded spaces are allowed) from the user. Use JavaScript that validate the content of the document. Suitable messages should be display in the alert if errors are detected in the input data. Use CSS and event handlers to make your document appealing. b) Modify the above program to get the current semester also(restricted to be a number from 1 to 6)
6. Develop and demonstrate a HTML file which includes JavaScript that uses functions for the following problems: a. Parameter: A string Output: The position in the string of the left-most vowel. b. Parameter: A number Output: The number with its digits in the reverse order.
7. Develop and demonstrate a HTML5 page which contains a) Dynamic Progressive bar. b) Display Video file using HTML5 video tag.

8. Develop a simple calculator to perform arithmetic (addition, subtraction, multiplication and division) operations on given two numbers. Use an HTML tag that allows the user to input two numbers and to display the result of arithmetic operation. Write suitable HTML and JavaScript and CSS to your simple calculator. The following figure show sample document display.



9. Develop and demonstrate using jQuery to solve the following: a) Limit character input in the text area including count. b) Based on check box, disable/enable the form submit button.
10. Develop and demonstrate using jQuery to solve the following: a) Fade in and fade out all division elements. b) Animate an element, by changing its height and width.

Part-B

Develop a web application (course-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
    a. Introduction
    b. Requirement Analysis
    c. Software Requirement Specification
    d. Analysis and Design, Implementation
    e. 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 to do prior art search as part of literature survey before submitting the synopsis for the Course-project projects.
5. Rubrics may be used to evaluate the Course-Project.

Semester: I

Course Name: **RESEARCH METHODOLOGY AND IPR**

Course Code	23MCA18	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

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

8 Hours

Module - 2

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.

8 Hours

Module – 3

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

8 Hours

Module – 4

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.

8 Hours

Module – 5

Intellectual Property (IP) Acts: Introduction to IP: Introduction to Intellectual Property (IP), different types of IPs and its importance in the present scenario, Patent Acts: Indian patent acts 1970.Design Act: Industrial Design act 2000. Copy right acts: Copyright Act 1957. Trade Mark Act, 1999

8 Hours

Suggested Learning Resources:

SN	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, 2018.
2	Research Methodology a step-by- step guide for beginners.	Ranjit Kumar	SAGE Publications Ltd	3rd Edition, 2011
3	Intelectual property	Debirag E. Bouchoux	Cengage learning	2013
Reference Books				
1	Research Methods: the concise knowledge base	Trochim	Atomic Dog Publishing	2005
2	Conducting Research Literature Reviews	Fink A	Sage Publications	2009

Semester: I

Course Name: **BASICS OF PROGRAMMING AND COMPUTER ORGANISATION (**BRIDGE COURSE**)**

Course Code	23MCA110-BC	CIE Marks	100
Teaching Hours/Week (L:T:P)	2:0:0	SEE Marks	---
Total Hours of Pedagogy	30	Total Marks	100
Credits	0	Exam Hours	---

Course Objectives:

1. Elucidate the basic architecture and functionalities of a computer
2. Apply programming constructs of C language to solve the real-world problems
3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems
4. Apply the concept of structures and files to solve the real-world problems
5. Design and Develop solutions to problems using structured programming constructs such as functions and procedures

Module – 1

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

8 Hours

Module – 2

Introduction: History of C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, tokens, Input/output statements in C, tokens, data types in C, Operators in C Type conversion and typecasting

8 Hours

Module - 3

Decision Making and Looping statements: Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.

8 Hours

Module – 4

Functions: Introduction using functions, function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions.

Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions, two dimensional arrays, operations on two-dimensional arrays, two- dimensional arrays to functions, multidimensional arrays, applications of arrays.

8 Hours

Module – 5

Strings: Introduction, string taxonomy, operations on strings, miscellaneous string and character functions, arrays of strings.
Pointers: Introduction to pointers, declaring pointer variables, types of pointers, passing arguments to functions using pointers

8 Hours

Course Outcomes:

1. Demonstrate the application of logic gates in solving some societal/industrial problems
2. Demonstrate the key concepts introduced in C programming by writing and executing the programs.
3. Demonstrate the concepts of structures and pointers for the given application/problem.
4. Implement the single/multi-dimensional array for the given problem.
5. Develop applications using the concepts of Structures, Pointers and Files

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Computer fundamentals and programming in C	Reema Thareja	Oxford University	2nd Edition 2017
2	Computer Organization	Carl Hamacher	Tata McGraw-Hill	5th edition 2011
Reference Books				
1	Programming in ANSI C	E. Balaguruswamy	Tata McGraw-Hill.	7th Edition
2	The 'C' Programming Language	Brian W. Kernighan and Dennis M. Ritchie	Prentice Hall of India	

2nd Semester Syllabus

Semester: II

Course Name: **DATABASE MANAGEMENT SYSTEM**

Course Code	23MCA21	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

Introduction to Databases: 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.

8 Hours

Module - 2

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.

8 Hours

Module – 3

SQL: Overview of the SQL Query Language, 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.

8 Hours

Module – 4

Normalization: Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. Examples on normal forms.

8 Hours

Module – 5

Transaction Processing: 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.

8 Hours

Suggested Learning Resources:

SN	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	Addison - Wesley	5th Edition 2011
2	Data base System Concepts	Silberschatz, Korth and Sudharshan	Tata McGraw Hil	6th Edition 2011
Reference Books				
1	An Introduction to Database Systems	C.J. Date, A. Kannan, S. Swamynatham	Pearson Education	8th Edition 2006
2	Database Management Systems	Raghu Ramakrishnan and Johannes Gehrke	McGraw-Hill	3rd Edition 2003

Semester: II

Course Name: **OBJECT ORIENTED PROGRAMMING WITH JAVA**

Course Code	23MCA22	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays.
Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The? Operator, Operator Precedence, Using Parentheses.
Control Statements: Java's Selection Statements, Iteration Statements

8 Hours

Module - 2

Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, "This" Keyword, Garbage Collection.
A Closer Look at Methods and Classes: Overloading Methods.
Inheritance: Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.

8 Hours

Module – 3

Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces.
Exception Handling: Exception- Handling Fundamentals, Exception Types, Uncaught Exceptions, using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exceptions.

8 Hours

Module – 4

Generics Concept: General Form of a Generic Class, Bounded Types, Generic Class Hierarchy, Generic Interfaces, Restrictions in Generics. Introduction to Lambda expression, Block Lambda Expressions, Generic Functional Interfaces. Passing lambda expressions as arguments - Lambda expressions and exceptions, Lambda expressions and variable capture.

8 Hours

Module – 5

Collections: Collection Interface, List Interface, Set Interface, SortedSet Interface, Queue Interface, ArrayList Class, LinkedList Class, HashSet Class, Using an Iterator, The for Each Statement.
Introduction to JDBC: Connecting to the database, Basic JDBC Operations, Essential JDBC Classes, JDBC Drivers, JDBC-ODBC Bridge, Connecting to a database with drivermanager, JDBC database URL

8 Hours

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Java The Complete Reference	Herbert Schildt	The McGraw Hill	8th Edition, 2015
2	J2EE Complete Reference	C Thomos	The McGraw Hill	2nd Edition, 2001
Reference Books				
1	Programming with Java	Mahesh Bhave and Sunil Patekar	Pearson Education	1st Edition,2008
2	Programming with Java A primer	E Balagurusamy	Tata McGraw Hill	3rd Edition,2007

Semester: II

Course Name: **COMPUTER NETWORKS**

Course Code	23MCA23	CIE Marks	50
Teaching Hours/Week (L:T:P)	4:0:0	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	4	Exam Hours	03

Module – 1

Foundation: Problem, Requirements, Network Architecture, Implementing network software, Performance

10 Hours

Module - 2

Direct Link Networks: Hardware building blocks, Encoding, Framing, Error Detection, Reliable Transmission, Ethernet, Rings, Wireless

10 Hours

Module – 3

Packet Switching: Switching and Forwarding, Bridges and LAN Switches, Cell Switching, **Internetworking:** IP, Routing, Global Internet, Multicast.

10 Hours

Module – 4

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

10 Hours

Module – 5

Network Security and Applications: Cryptographic Tools, Key Redistribution, Firewalls, Traditional Applications, Web Services, Multimedia Applications

10 Hours

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Computer Networks A Systems Approach	Larry L Peterson and Bruce S Davie	MKP	5th Edition 2012
2	Computer Networking, A Top-Down Approach	James F Kurose and Keith W Ross	Pearson	6th Edition 2017
3	Computer and Communication Networks	Nader F Mir	Pearson	2nd Edition 2014
Reference Books				
1	Communication Networks – Fundamental Concepts & key architectures	Alberto Leon Garcia	Tata McGraw-Hill	2nd Edition
2	Computer Networks	Andrew S Tanenbaum	Pearson	5th Edition 2014

Semester: II

Course Name: **INTRODUCTION TO PYTHON**

Course Code	23MCA24	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Total Hours of Pedagogy	40+20	Total Marks	100
Credits	4	Exam Hours	03

Module – 1

Python Basics: Variables, expressions and statements, Conditional execution, Functions

8 Hours

Module - 2

Iteration: While statement, Infinite Loops, definite loops, Loop patterns
Strings: String traversal, String Slices, in operator, String methods Format operator
Files: Persistence, Opening, reading from text files, using try, except and open, writing to text files

8 Hours

Module – 3

Lists: List Operations, slices, methods, lists and functions, list and strings, objects and value, Aliasing, List arguments
Dictionaries: Dictionary as a set of counters, Dictionaries and files, Looping and Dictionaries, Advanced text parsing

8 Hours

Module – 4

Tuples: Comparing tuples, Tuple assignment, Dictionaries and tuples, Sequences, List comprehension
Regular Expressions: Character matching in regular expressions, extracting data using regular expressions, Combining searching and extracting, Escape character

8 Hours

Module – 5

Classes and objects: Programmer-defined types, Attributes, Instances as return value, Objects are mutable, Copying
Classes and functions: Pure functions, modifiers, prototyping versus planning
Classes and methods: Object oriented features, init method, str method, operator overloading, type-based dispatch, polymorphism, Interface and implementation

8 Hours

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Python for Everybody: Exploring Data Using Python	Charles R. Severance	CreateSpace Independent Publishing Platform	1st Edition, 2016
2	Think Python: How to Think Like a Computer Scientist	Allen B. Downey	Green Tea Press	2nd Edition, 2015
Reference Books				
1	Introduction to Computer Science Using Python	Charles Dierbach	Wiley India Pvt Ltd	1st Edition
2	Programming Python	Mark Lutz	O'Reilly Media	4th Edition, 2011

PRACTICAL COMPONENT **20 Hours**

SN	List of Experiments
1	Write a python program to demonstrate the use of Conditional execution statements
2	Write a python program to demonstrate the use of Iterative statements
3	Write a python program to demonstrate the use of Files
4	Write a python program to demonstrate the use of List and Dictionaries
5	Write a python program to demonstrate the use of Tuples
6	Write a python program to demonstrate the use of Regular Expressions
7	Write a python program to demonstrate the use of Classes and methods

Semester: II

PROFESSIONAL ELECTIVE - 1

Course Name: **COMPUTER GRAPHICS WITH OPEN GL**

Course Code	23MCA251	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

Overview: Computer Graphics and OpenGL: Computer Graphics: Basics of computer graphics, Application of Computer Graphics, Video Display Devices: Random Scan and Raster Scan displays, graphics software. OpenGL: Introduction to OpenGL, coordinate reference frames, specifying two-dimensional world coordinate reference frames in OpenGL, OpenGL point functions, OpenGL line functions, point attributes, line attributes, curve attributes, OpenGL point attribute functions, OpenGL line attribute functions, Line drawing algorithms (DDA, Bresenham's), circle generation algorithms (Bresenham's).

8 Hours

Module - 2

Fill area Primitives, 2D Geometric Transformations and 2D viewing:

Fill area Primitives: Polygon fill-areas, OpenGL polygon fill area functions, fill area attributes, general scan line polygon fill algorithm, OpenGL fill-area attribute functions. 2DGeometric Transformations: Basic 2D Geometric Transformations, matrix representations and homogeneous coordinates. Inverse transformations, 2DComposite transformations, other 2D transformations, raster methods for geometric transformations, OpenGL raster transformations, OpenGL geometric transformations function, 2D viewing: 2D viewing pipeline, OpenGL 2D viewing functions.

8 Hours

Module – 3

Clipping, 3D Geometric Transformations, Color and Illumination Models:

Clipping: clipping window, normalization and viewport transformations, clipping algorithms,2D point clipping, 2D line clipping algorithms: cohen-sutherland line clipping only -polygon fill area clipping: Sutherland-Hodgeman polygon clipping algorithm only.3DGeometric Transformations: 3D translation, rotation, scaling, composite 3D transformations, other 3D transformations, affine transformations, OpenGL geometric transformations functions. Color Models: Properties of light, color models, RGB and CMY color models. Illumination Models: Light sources, basic illumination models-Ambient light, diffuse reflection, specular and phong model, Corresponding openGL functions.

8 Hours

Module – 4

3D Viewing and Visible Surface Detection:

3DViewing:3D viewing concepts, 3D viewing pipeline, 3D viewing coordinate parameters, Transformation from world to viewing coordinates, Projection transformation, orthogonal projections, perspective projections, The viewport transformation and 3D screen coordinates. OpenGL 3D viewing functions. Visible Surface Detection Methods: Classification of visible surface Detection algorithms, depth buffer method only and OpenGL visibility detection functions.

8 Hours

Module – 5

Input & interaction, Curves and Computer Animation:
Input and Interaction: Input devices, clients and servers, Display Lists, Display Lists and Modeling, Programming Event Driven Input, Menus Picking, Building Interactive Models, Animating Interactive programs, Design of Interactive programs, Logic operations. Curved surfaces, quadric surfaces, OpenGL Quadric-Surface and Cubic-Surface Functions, Bezier Spline Curves, Bezier surfaces, OpenGL curve functions. Corresponding openGL functions.

8 Hours

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Computer Graphics with OpenGL Version	Donald Hearn & Pauline Baker	Pearson Education	4th Edition 2011
2	Interactive Computer Graphics- A Top Down approach with OpenGL	Edward Angel	Pearson Education	5th Edition 2008
1	Computer graphics with OpenGL	James D Foley, Andries Van Dam, Steven K Feiner, John F Huges	Pearson Education	
2	Computer Graphics ,sham"s outline series	Xiang, Plastock	TMG	2nd Edition

Semester: II

PROFESSIONAL ELECTIVE - 1

Course Name: **CYBER SECURITY**

Course Code	23MCA252	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

Introduction to Cybercrime:
Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, who are Cybercriminals.
Classifications of Cybercrimes: An Indian Perspective, Hacking and Indian Laws., Global Perspectives

8 Hours

Module - 2

Cyber Offenses:
How Criminals Plan Them: Introduction, how criminals plan the attacks, Social Engineering, Cyber Stalking, Cyber Cafe & cybercrimes.
Botnets: The fuel for cybercrime, Attack Vector

8 Hours

Module – 3

Tools and Methods used in Cybercrime: Introduction, Proxy Servers, Anonymizers, Phishing, Password Cracking, Key Loggers and Spyways, Virus and Worms, Trozen Horses and Backdoors, Steganography, DoS and DDOS Attacks, Attacks on Wireless networks.

8 Hours

Module – 4

Phishing and Identity Theft: Introduction, methods of phishing, phishing, phishing techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft.

8 Hours

Module – 5

Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, network forensics.

8 Hours

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives	Sunit Belapure and Nina Godbole	Wiley India Pvt Ltd	1st Edition, 2011
Reference Books				
1	Cyber-security Lessons for Everyone	Neil Daswani, Moudy Elbayadi Big Breaches		2021

Semester: II

PROFESSIONAL ELECTIVE - 1

Course Name: **USER INTERFACE DESIGN**

Course Code	23MCA253	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

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.

8 Hours

Module - 2

Development Processes:
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

8 Hours

Module – 3

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

8 Hours

Module – 4

Command and Natural Languages: 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
Design Issues Quality of Service: Introduction, Models of Response-Time Impacts, Expectations and Attitudes, User Productivity, Variability in Response time, Frustrating Experiences Balancing Function and Fashion: Introduction, Error Messages, Non anthropomorphic Design, Display design, web page design, Window Design, Color

8 Hours

Module – 5

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.

8 Hours

Suggested Learning Resources:

SN	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 2010
Reference Books				
1	Human-Computer Interaction	Alan Dix, Janet Finalay, Gregory D Abiwdm Russel Bealel	Pearson Education	3rd Edition 2008
2	User Interface Design	Eberts	Wiley-Dreamtech India Pvt Ltd	2011

Semester: II

PROFESSIONAL ELECTIVE - 1

Course Name: **INTRODUCTION TO DATA ANALYTICS**

Course Code	23MCA254	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

Introduction to Data Analytics:
Introduction, Business Intelligence, Pattern Recognition, Data Processing Chain, Business Intelligence Concepts and Applications: Introduction, BI for better decisions, decision types, BI tools, BI skills, BI applications. **8 Hours**

Module - 2

OLTP and Data Warehousing:
Online Transaction Processing, OLTP system characteristics, OLTP merits and demerits, need of data warehouse, characteristics of DW, main components of data warehouse, approaches for constructing a data warehouse, dimensional modeling used in DW design-facts, dimensions and attributes, types of schemas, ETI and other tools sets available in market. **8 Hours**

Module – 3

Business Intelligence and its Deeper Dynamics:
Business Intelligence, BI characteristics, data quality: a real challenge, data quality best practices, structured versus unstructured, differences between structured and unstructured data, data lake, data lake versus data warehouse, main components of a data lake, modern business intelligence system, benefits and use cases of modern BI. **8 Hours**

Module – 4

Data Visualization-1:
Presenting data visualization, aims of data visualization, history at a glance, importance of data visualization, types of data visualization-hierarchical, tree diagram, tree map, ring chart, dendogram, temporal, bar chart, line graph, stacked graph, Gantt chart, scatter plot, stacked area chart, sparkline, network, word cloud, matrix chart, node link diagram, multi-dimensional, pie chart, histogram. **8 Hours**

Module – 5

Data Visualization-2:
Decision tree problem, decision tree construction, decision tree algorithms.
Advanced data visualization- structure, objective, types of advanced data visualization-bubble chart, word cloud, geospatial heat map/ hot spot mapping, data visualization trends, introducing data visualization tools, data visualization best practices.
8 Hours

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Data Analytics	Anil Maheshwari	Mc Graw Hill Education	2018
Reference Books				
1	Data Analytics: Principles, Tools,and Practices	Dr.Gaurav Aroraa Chitra Lele Dr.Munish Jindal	BPB Publications	1st Edition, 2022

Semester: II

PROFESSIONAL ELECTIVE - 2

Course Name: **INTRODUCTION TO ARTIFICIAL INTELLIGENCE**

Course Code	23MCA261	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

Introduction: Definition of AI, The foundation of Artificial Intelligence, The history of Artificial Intelligence.
Intelligent Agents: Agents and Environments
Good Behavior: The concept of rationality, the nature of Environments, the structure of Agents.
8 Hours

Module - 2

Problem solving by searching: Problem solving agents, Example problems, Searching for solutions, Uniformed search strategies, Informed search strategies, Heuristic functions
8 Hours

Module – 3

Introduction to Machine Learning: Need for Machine Learning, Machine Learning Explained, and Machine Learning in relation to other fields, Types of Machine Learning. Challenges of Machine Learning, Machine Learning process, Machine Learning applications.
Understanding Data: What is data, types of data, Big data analytics and types of analytics, Big data analytics framework, Descriptive statistics, univariate data analysis and visualization.
8 Hours

Module – 4

Understanding Data: Bivariate and Multivariate data, Multivariate statistics, Essential mathematics for Multivariate data, Overview hypothesis, Feature engineering and dimensionality reduction techniques,
Basics of Learning Theory: Introduction to learning and its types, Introduction computation learning theory, Design of learning system, Introduction concept learning.
Similarity-based learning: Introduction to Similarity or instance based learning, Nearest-neighbour learning, weighted K- Nearest - Neighbour algorithm.
8 Hours

Module – 5

Artificial Neural Network: Introduction, Biological neurons, Artificial neurons, Perceptron and learning theory, types of Artificial Neural Network, learning in multilayer Perceptron, Radial basis function neural network, self-organizing feature map.
8 Hours

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Artificial Intelligence A Modern Approach	Stuart Russel, Peter Norvig	Pearson Education	3rd Edition, 2015
	Machine Learning	S. Sridhar, M Vijayalakshmi	Oxford	2021
Reference Books				
1	Artificial Intelligence	Elaine Rich, Kevin Knight	Tata McGraw Hill	3rd Edition, 2009
2	Principles of Artificial Intelligence	Nils J. Nilsson	Elsevier	1980

Semester: II

PROFESSIONAL ELECTIVE - 2

Course Name: **MOBILE APPLICATION DEVELOPMENT**

Course Code	23MCA262	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

Enumerations, Autoboxing and Annotations(metadata): Enumerations, Enumeration fundamentals, the values() and valueOf() Methods, java enumerations are class types, enumerations Inherits Enum, example, type wrappers, Autoboxing, Autoboxing and Methods, Autoboxing/Unboxing occurs in Expressions, Autoboxing/Unboxing, Boolean and character values, Autoboxing/Unboxing helps prevent errors, A word of Warning. Annotations, Annotation basics, specifying retention policy, Obtaining Annotations atruntime by use of reflection, Annotated element Interface, Using Default values, Marker Annotations, Single Member annotations, Built-In annotations.

8 Hours

Module - 2

String Handling : The String Constructors, String Length, Special String Operations, String Literals, String Concatenation, String Concatenation with Other Data Types, String Conversion and toString( ) Character Extraction, charAt( ), getChars( ), getBytes( ) toCharArray(), String Comparison, equals( ) and equalsIgnoreCase( ), regionMatches( ) startsWith( ) and endsWith( ), equals() Versus == , compareTo( ) Searching Strings, Modifying a String, substring( ), concat( ), replace( ), trim( ), Data Conversion Using valueOf( ), Changing the Case of Characters Within a String, Additional String Methods, StringBuffer , StringBuffer Constructors, length( ) and capacity( ), ensureCapacity( ), setLength( ), charAt( ) and setCharAt( ), getChars( ),append( ), insert( ), reverse(), delete( )and deleteCharAt( ), replace( ), substring( ), Additional StringBuffer Methods, StringBuilder

8 Hours

Module – 3

Getting Started with Android Programming: Definition of Android, Features of Android, Android Architecture, obtaining the required tools, launching your first android application.

Activities, Fragments and Intents: Understanding activities, linking activities using intents, fragments

8 Hours

Module – 4

Getting to know the Android User Interface: Views and ViewGroups, FrameLayout, LinearLayout, TableLayout, RelativeLayout, ScrollView

Designing User Interface with Views: TextView view – Button, ImageButton, EditText, Checkbox, ToggleButton, RadioButton and RadioGroupViews, ProgressBar View, AutoCompleteTextView View, TimePicker View, DatePickerView, ListView View, SpinnerView

8 Hours

Module – 5

Understanding Specialized Fragments: List Fragment, DialogFragment, PreferenceFragment **Creating and using Databases:** Creating the DBAdapter Helper class, using the database programmatically **8 Hours**

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	JAVA The Complete Reference	Herbert Schildt	Tata McGrawHill	7th/9th 2007
2	J2EE The Complete Reference	Jim Keogh	Tata McGrawHill	2007
3	Beginning Android Programming with Android Studio	J. F. DiMarzio	4thEdition	2017
Reference Books				
1	Android Programming for Beginners	John Horton	1stEdition	2015
2	Head First Android Development	Dawn Griffiths & David Griffiths	O'Reilly, 1stEdition	2015

Semester: II

PROFESSIONAL ELECTIVE - 2

Course Name: **DISTRIBUTED OPERATING SYSTEM**

Course Code	23MCA263	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

Fundamentals: Definition, Meaning of Distributed Computing Systems, Evolution of Distributed Computing System, Distributed Computing System Models, 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.

8 Hours

Module - 2

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.

8 Hours

Module – 3

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

8 Hours

Module – 4

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.

8 Hours

Module – 5

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.

8 Hours

Suggested Learning Resources:

SN	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	2007
Reference Books				
1	Distributed Operating Systems	Andrew S. Tanenbaum	Pearson Education	2013

Semester: II

PROFESSIONAL ELECTIVE - 2

Course Name: **NATURAL LANGUAGE PROCESSING**

Course Code	23MCA264	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Module – 1

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.

8 Hours

Module - 2

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.

8 Hours

Module – 3

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

8 Hours

Module – 4

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

8 Hours

Module – 5

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.

8 Hours

Suggested Learning Resources:

SN	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	1999
2	Natural Language Processing and Information Retrieval	Tanveer Siddiqui, U.S. Tiwary	Oxford University Press	2008

Semester: II

Course Name: **DBMS LAB**

Course Code	23MCAL27	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:4	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	2	Exam Hours	03

Instructions:
1. Draw ER diagram based on 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.
6. Design a front end to retrieve the data
7. Generate Reports

1.Create the following tables with properly specifying Primary keys, Foreign keys and solve the following queries.

BRANCH (Branchid, Branchname, HOD)
STUDENT (USN, Name, Address, Branchid, sem)
BOOK (Bookid, Bookname, Authorid, Publisher, Branchid)
AUTHOR (Authorid, Authorname, Country, age)
BORROW (USN, Bookid, Borrowed_Date)

Execute the following Queries:

i. List the details of Students who are all studying in 2nd sem MCA.
ii. List the students who are not borrowed any books.
iii. Display the USN, Student name, Branch_name, Book_name, Author_name, Books_Borrowed_Date of 2nd sem MCA Students who borrowed books.
iv. Display the number of books written by each Author.
v. Display the student details who borrowed more than two books.
vi. Display the student details who borrowed books of more than one Author.
vii. Display the Book names in descending order of their names.
viii. List the details of students who borrowed the books which are all published by the same publisher.

2. Consider the following schema:

STUDENT (USN, name, date_of_birth, branch, mark1, mark2, mark3, total, GPA)

Execute the following queries:

i. Update the column total by adding the columns mark1, mark2, mark3.
ii. Find the GPA score of all the students.
iii. Find the students who born on a particular year of birth from the date_of_birth column.
iv. List the students who are studying in a particular branch of study.
v. Find the maximum GPA score of the student branch-wise.
vi. Find the students whose name starts with the alphabet "S".
vii. Find the students whose name ends with the alphabets "AR".
viii. Delete the student details whose USN is given as 1001.

3. Design an ER-diagram for the following scenario, Convert the same into a relational model and then solve the following queries.

Consider a Cricket Tournament "ABC CUP" organized by an organization. In the tournament there are many teams are contesting each having a Teamid, Team_Name, City, a coach. Each team is uniquely identified by using Teamid. A team can have many Players and a captain. Each player is uniquely identified by Playerid, having a Name, and multiple phone numbers, age. A player represents only one team. There are many Stadiums to conduct matches. Each stadium is identified using Stadiumid, having a stadium_name, Address (involves city, area_name, pincode). A team can play many matches. Each match played between the two teams in the scheduled date and time in the predefined Stadium. Each match is identified uniquely by using Matchid. Each match won by any of the one team that also wants to record in the database. For each match man_of_the match award given to a player.

Execute the following Queries:

i. Display the youngest player (in terms of age) Name, Team name, age in which he belongs of the tournament.
ii. List the details of the stadium where the maximum number of matches were played.
iii. List the details of the player who is not a captain but got the man_of _match award at least in two matches.
iv. Display the Team details who won the maximum matches.
v. Display the team name where all its won matches played in the same stadium.

4. 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, belongs to a state, Number of kilometers away from the capital city of that state,history. There are many Tourists visits tourist places every year. Each tourist is identified uniquely by using Tourist_id, having a Name, age, Country and multiple emailids. 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 at different dates. A Tourist place can be visited by many tourists either in the same date or at different dates.

Execute the following Queries:

i. List the state name which is having maximum number of tourist places.
ii. List details of Tourist place where maximum number of tourists visited.
iii. List the details of tourists visited all tourist places of the state "KARNATAKA".
iv. Display the details of the tourists visited at least one tourist place of the state, but visited all states tourist places.
v. Display the details of the tourist place visited by the tourists of all country.

5. 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. Thereare many parties. Each party is uniquely identified by using Party_id, having Party_Name, Party_symbol. A candidate can contest from many constituencies under a 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 belongs to different parties. Each voter votes only one candidate of his/her constituency.

Execute the following Queries:

i. List the details of the candidates who are contesting from more than one constituencies which are belongs to different states.
ii. Display the state name having maximum number of constituencies.
ii. Create a stored procedure to insert the tuple into the voter table by checking the voter age. If voter's age is at least 18 years old, then insert the tuple into the voter else display the "Not an eligible voter msg".
v. 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 "CONSTITUENCY" table , AFTER inserting a tuple into the "VOTERS" table.

Part-B

Design, Develop and implement an application software(course-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 course 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
    a. Introduction
    b. Requirement Analysis
    c. Software Requirement Specification
    d. Analysis and Design, Implementation
    e. 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 to do prior art search as part of literature survey before submitting the synopsis for the Course-project projects.
5. Rubrics may be used to evaluate the Course-Project.

Semester: II

Course Name: **JAVA PROGRAMMING LAB**

Course Code	23MCAL28	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:4	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	2	Exam Hours	03

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. Write a program in Java for String handling which performs the following:
   a. Checks the capacity of String Buffer objects.
   b. Reverses the contents of a string given on console and converts the resultant string in upper case.
   c. Reads a string from console and appends it to the resultant string of (ii).
4. Write a JAVA program to demonstrate Inheritance.

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

5. Write a JAVA program which has:
   a. A Class called Account that creates account with Rs. 500 minimum balance, a deposit() method to deposit amount, a withdraw() method to withdraw amount and also throws LessBalanceException 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 withdraw 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 take appropriate action for the same.
6. Write a JAVA program using Synchronized Threads, which demonstrates Producer Consumer concept.
7. Write a JAVA program to implement a Queue using user defined Exception Handling (also make use of throw, throws).
   a. Complete the following:
   b. Create a package named shape.
   c. Create some classes in the package representing some common shapes like Square, Triangle, and Circle.
   d. Import and compile these classes in other program.
8. Write a JAVA program to implement AarrayList class in collection
9. Write a Java program to implement a lambda expression to remove duplicates from a list of integers
10. Write a JAVA program to establish connection to JDBC-ODBC Bridge

Basavarajeswari Group of Institutions
ಬಳ್ಳಾರಿ ಇನ್ಸ್ಟಿಟ್ಯೂಟ್ ಆಫ್ ಟೆಕ್ನಾಲಜಿ & ಮ್ಯಾನೇಜ್‌ಮೆಂಟ್, ಬಳ್ಳಾರಿ
BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT
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10-02-2024

Proceedings of BoS Meeting

Meeting of Board of Studies – Department of **Master of Computer Applications** is convened on 10/02/2024 at 10:45AM in Board Room, BITM, Ballari to approve the scheme and syllabus of I/II semester of MCA Department for the academic year 2023-24.

The following Members were Present

S.N	Name of the Member	Designation	Organization
1	Dr. Girish Kumar D	Chairperson	Professor & HOD, MCA Department, BITM, Ballari
2	Dr. R N Kulkarni	Special Invitee	Professor & HOD, CSE Department, BITM, Ballari
3	Dr. Dayanand J	Member	Professor & HOD, AIML Department, GNDEC, Bidar, Karnataka
4	Dr. Sangamesh C Jalade	Member	Professor & HOD, ISE Department, YIT, Mangaluru
5	Dr. Rajesh L	Member	Dr. Rajesh L Associate Professor, ISE Department DSATM, Bengaluru
6	Mr. Raveendra Kumar Medicherla	Member	Principal Scientist, TCS, Bengaluru
7	Mr. Yatish K S	Member	Oracle DBA at IBM Kyndryl at IBM, Bengaluru
8	Mrs. Renukambika P	Member	Principle Software Engineer, DELL Technologies, Bengaluru
9	Dr. S D N Hayath Ali	Member	Associate Professor, MCA Department, BITM, Ballari

At the outset, the Chairman welcomed all the Honorable members for the 1st meeting of Board of Studies (PG) for discussing and finalizing the Scheme and Syllabus for MCA I & II Sem. for year 2023-2024. The subjects proposed for MCA I & II Sem. are:

MCA I & II Sem

I SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	BSC	23MCA11	Mathematical Foundation for Computer Applications	MATHS	3	0	0		03	50	50	100	3
2	IPCC	23MCA12	Operating System with UNIX	MCA	3	0	2		03	50	50	100	4
3	PCC	23MCA13	Data Structures and Applications	MCA	3	0	0		03	50	50	100	3
4	PCC	23MCA14	Software Engineering & Project Management	MCA	4	0	0		03	50	50	100	4
5	PCC	23MCA15	Web Technologies	MCA	3	0	0		03	50	50	100	3
6	PCCL	23MCAL16	Data Structures Laboratory	MCA	0	0	4		03	50	50	100	2
7	PCCL	23MCAL17	Web Technologies Laboratory	MCA	0	0	4		03	50	50	100	2
8	MCC	23MCA18	Research Methodology and IPR	MCA	3	0	0		03	50	50	100	3
9	AUD/ AEC	23MCA19	BOS Recommended ONLINE Courses	Classes and evaluation procedures are as per the policy of the online course providers (Infosys Spring Board, NPTEL Courses)									PP
									Total	400	400	800	24

Bridge Course is a non-credit course introduced to the students who are from non-computer science background

II SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ DRAWING	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	PCC	23MCA21	Database Management System	MCA	3	0	0		03	50	50	100	3
2	PCC	23MCA22	Object Oriented Programming with JAVA	MCA	3	0	0		03	50	50	100	3
3	PCC	23MCA23	Computer Networks	MCA	4	0	0		03	50	50	100	4
4	IPCC	23MCA24	Introduction to Python	MCA	3	0	2		03	50	50	100	4
5	PEC	23MCA25X	PROFESSIONAL Elective-1	MCA	3	0	0		03	50	50	100	3
6	PEC	23MCA26X	PROFESSIONAL Elective-2	MCA	3	0	0		03	50	50	100	3
7	PCCL	23MCAL27	DBMS Lab	MCA	0	0	4		03	50	50	100	2
8	PCCL	23MCAL28	JAVA Programming Lab	MCA	0	0	4		03	50	50	100	2
9	SEM	22MCA29	SEMINAR	MCA	0	0	4		03	100	--	100	2
									Total	500	400	900	26

Note: PCC: Professional core courses, PEC: Professional Elective Courses, IPCC-Integrated Professional Core Courses.

PROFESSIONAL Elective-1		PROFESSIONAL Elective-2	
Course Code under 22MCA25X	Course Title	Course Code under 22MCA26X	Course Title
23MCA251	Computer Graphics with Open GL	23MCA261	Introduction to Artificial Intelligence
23MCA252	Cyber Security	23MCA262	Mobile Application Development
23MCA253	Software Testing	23MCA263	Distributed Operating System
23MCA254	Introduction to Data Analytics	23MCA264	Natural Language Processing

The Chairman of the Board of Studies presented the Scheme and Syllabus for 2023 scheme subjects.

The suggestions and the action taken is given below:

OS 23MCA12	Suggestions	• Incorporate at least one module with respect to UNIX command and operating system
	Action Taken	• Incorporated two modules with respect to UNIX commands and operating system and the title is also appropriately changed
DBMS 23MCA21	Suggestions	• Include a separate module on Normal forms
	Action Taken	• Incorporated in the syllabus
OOP using JAVA 23MCA22	Suggestions	• Incorporate lambda concepts instead of event handling and java swings
	Action Taken	• Incorporated in the syllabus
Online Course 23MCA19	Suggestions	• The members suggested to introduce various online course s (relevant courses from NPTEL, MOOCS, Infosys Spring Board, Quantum Learning) out of which the student has to select one course and complete the certification on that course
	Action Taken	The list of certification course are: • C Programming • Web Technology • Research Methodology • Data Structures • Operating System • Unix programming • Software Project Management

YADAVALLI BASAVARAJ

Digitally signed by YADAVALLI BASAVARAJ
DN: cn=YADAVALLI BASAVARAJ c=IN o=Personal
Reason: I am the author of this document
Location:
Date: 2024-12-19 11:49+05:30

Overall Summary:

Suggestions given by the honorable members were taken into consideration and the corrections are been incorporated in the syllabus. The honorable members expressed that the syllabus is well framed and satisfies the requirements. Also, the syllabus covers all the aspects of the learning as per the standards. It is quite apt and relevant as it will definitely enhances the learning experience of the students.