MCA-14-24 DATA STRUCTURES

Maximum marks: 100 (External: 80, Internal: 20) **Time: 3 hours**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT - I

Introduction to Data Structures: Classification of Data Structures, Complexity of Algorithms, Asymptotic Notations, Abstract Data Types, Arrays, Representation of Arrays in memory, Operations on Array, Strings, Pointers, Sparse Matrices, Applications.

UNIT - II

Stacks & Queues: Representation of Stacks, Stack Operations, Applications, Queues, Operations on Queues, Circular Queues, Dequeue, Priority Queues, Applications.

Linked Lists: Introduction, Types, Operations (Insertion, Deletion, Traversal, Searching, Sorting), Applications, Dynamic Memory Management, Implementation of Linked Representations.

UNIT - III

Trees: Definition and Basic Terminologies, Representation of Trees, Binary Trees, Types of Tree, Representation of Binary Trees, Binary Tree Traversals, Threaded Binary Trees, Binary Search Trees and Operations, Minimum Spanning Tree, AVL Trees, Heap, m-way Search Trees, B-Trees, B^+ Trees, Applications.

Advanced Trees: Introduction to 2-3 Tree, Red-black Tree, Splay Trees.

UNIT - IV

Graphs: Definitions and Basic Terminologies, Representation of Graphs, Graph Traversals, Shortest Path Problem, Applications.

Sorting and Searching: Recursive Binary Search, Types of Sorting, Implementation of Different Sorting Techniques: Selection Sort, Insertion Sort, Merge Sort, Radix Sort.

Hashing & Collision handling.

Text Books:

1. G.A.V Pai, "Data Structures and Algorithms", Tata McGraw-Hill, New Delhi.
2. Drozdek, "Data Structure and Algorithms in C++", Cengage Learning.

Reference Books:

1. Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures With Applications", Tata McGraw- Hill.
2. Seymour Lipschutz, "Data Structures", Tata McGraw-Hill, Schaum's Outlines, New Delhi.
3. Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education.
4. Goodrich, "Data Structures & Algorithms in C++", Wiley India Pvt. Ltd.