CSPC2002 DATA STRUCTURES (3-0-0)

Module –I (12 hrs)

Introduction: Introduction to data structures, types, concept of Abstract Data Types, Data Structure Operations: Insertion, deletion, traversal, merging, etc., Strings and Arrays, Operations on Arrays and strings, Concept of Sparse Matrix, Address calculation and Representation of Matrices in Row-Major and Column-Major Order, Searching: Linear Search and Binary Search Techniques and their complexity analysis

Module –II (8 hrs)

Stacks and Queues: ADT Stack and its operations: Algorithms , Applications of Stacks: Conversion from infix to prefix and infix to postfix expressions- corresponding algorithms and their analysis, Recursion using Stack, Queues: Types: Simple Queue, Circular Queue, Priority Queue; Insertion and Deletion algorithms Application of Queues, Array Implementation of Stack and Queue

Module-III (8 hrs)

Linked Lists: Concept of Linked Lists, Advantages of Linked Lists over Arrays, Representation in Memory, Types of Linked Lists: Single Linked-Lists, Double Linked-Lists,

Circular Linked Lists, Operations on Linked Lists: Insertion, Deletion, Merging, Updation,; Linked Representation of Stack and Queue, Single Linked-Lists: Operations and algorithms; Double Linked-Lists: Operations and algorithmic analysis, Circular Linked-Lists: Operations and algorithmic analysis

Module-IV (10 hrs)

Trees: Terminologies, types of trees: Binary Trees, Threaded Binary Trees, Binary Search Trees, AVL Trees, Operations on these trees: algorithms and their analysis, Applications of Binary Trees, B-Trees, B+-Trees: Definitions, algorithms and analysis

Graphs: Terminologies and Representations, Types of graphs, Graph Search and Traversal algorithms and their analysis, Shortest-path algorithms- Dikjstra, Warshall's, Spanning Tree algorithms-Kruskal, Prims

Module-V (7 hrs)

Sorting and Hashing: Objective and analysis of different sorting algorithms: Selection Sort, Bubble Sort, Merge Sort, Heap Sort, Quick Sort, Radix Sort, Insertion Sort; Hashing Techniques

Course Outcomes (COs):

CO1: Understand basic data structures such as arrays, strings, and linked lists.

CO2: Study linear data structures such as stacks and queues and understand their difference.

CO3: Describe the hash function and concepts of collision and its resolution methods.

CO4: Understand the concept of memory management.

CO5: Study tree, heap and graphs along with their basic operations.

CO6: Study different techniques for solving problems like sorting and searching

Text Books:

"Data Structures using C and C++", Tenenbaum, PHI Publication

Reference Books:

"Data Structures using C", Reema Thareja, Oxford Press

"Data Structures using C", Amiya Kumar Rath and Alok Kumar Jagadev, ECT Publications