DETAILED SYLLABUS

UNIT – I. INTRODUCTION TO DATA STRUCTURES, ARRAYS AND STRINGS 16 Hrs

1.1. **Introduction to Data Structures** : Introduction - Data and Information - Elementary data structure organization - Types of data structures - Primitive and Non Primitive data structures – Operations on data structures : Traversing, Inserting, Deleting, Searching, Sorting, Merging - Different Approaches to designing an algorithm : Top-Down approach , Bottom-up approach - Complexity : Time complexity , Space complexity - Big 'O' Notation.

1.2 **ARRAYS**: Introduction - Characteristics of Array - One Dimensional Array - Two Dimensional Arrays - Multi Dimensional Arrays – Advantages and Disadvantages of linear arrays - Row Major order - Column Major order - Operations on arrays with Algorithms (searching, traversing, inserting, deleting

1.3 **Strings**: Strings and their representations - String Conversion- String manipulation, String arrays

UNIT – II STACKS, RECURSION AND QUEUES 16 Hrs

2.1 Definition of a Stack - Operations on Stack (PUSH & POP)- Implementing Push and Pop Operations - Implementation of stack through arrays – Applications of Stack : Reversing a list - Polish notations - Conversion of infix to postfix expression- Evaluation of postfix expression - Algorithm for evaluating Infix to prefix expression.

2.2 Recursion - Recursive definition – Algorithm and C function for : Multiplication of Natural numbers - Factorial Function - GCD function - Properties of Recursive algorithms/functions – Advantages and Disadvantages of Recursion

2.3 **Queues**: The queue and its sequential representation - implementation of Queues and their operations - implementation of Circular queues and their operations - Dequeue and Priority queues (Concepts only)

UNIT – III LINKED LISTS 16 Hrs

3.1 **Terminologies**: Node, Address, Pointer, Information, Null Pointer, Empty list -. Type of lists : Singly linked list , Doubly linked list, Circular list - Representation of singly linked lists in Memory-Difference between Linked & sequential List – Advantages and Disadvantages of Linked list- Operations on a singly linked list (only algorithm) : Traversing a singly linked list , Searching a singly linked list , Inserting a new node in a singly linked list (front, middle, end), Deleting a node from a singly linked list (front, middle, rear) - Doubly linked list, Circular linked lists (Concepts only, no implementations)

UNIT – IV TREES AND GRAPHS 17 Hrs

4.1 **Trees: Terminologies**: Degree of a node, degree of a tree, level of a node, leaf node, Depth / Height of a tree, In-degree & out-Degree, Path, Ancestor & descendant nodes-, siblings - Type of Trees : Binary tree - List representation of Tree - Binary tree traversal (only algorithm) : In order traversal , Preorder traversal , Post order traversal - Expression tree – Binary Search Tree – Creation of a Binary Serach tree without duplicate node.

4.2 **Graphs** : Introduction - Terminologies: graph, node (Vertices), arcs (edge), directed graph, in-degree, out-degree, adjacent, successor, predecessor, relation, weight, path, length - Representations of a graph - Adjacency Matrix Representation - Adjacency List Representation - Traversal of graphs : Depth-first search (DFS) , Breadth-first search (BFS) - Applications of Graph

UNIT – V SORTING, SEARCHING AND HASHING **15 Hrs**

5.1 **Sorting Techniques**: Introduction – Algorithms and " C" programs for : Selection sort, Insertion sort , Bubble sort – Algorithms only : Merge Sort ,Radix sort, Shell sort , Quick sort

5.2 **Searching** : Introduction - Algorithms and " C" programs for Linear search and Binary search

5.3 **Hashing** : Hash tables – methods- Hash function - Collision resolution techniques

REFERENCES :

Sl. No	TITLE	AUTHOR	PUBLISHER	Year of Publishing / Edition
1.	Data Structures and Algorithms	G.A.Vijayalakshmi Pai	TMGH, New Delhi	6th Reprint 2011
2.	Data Structures Using C - -1000 Problems and Solutions	Sudipta Mukherjee	TMGH, New Delhi	Second Reprint 2010
3.	Introduction to Data structures Using C	Venkatesh N.Baitipuli	University Science Press, Chennai	First Edition, 2009
4.	Classic Data Structures	Debasis Samanta	Prentice Hall of India, New Delhi	2009 / Second Edition
5.	Principles of Data structures using C and C++	Vinu V.Das	New Age International Publishers, New Delhi	Reprint 2008
6.	Data structures Using C	ISRD Group	TMGH, New Delhi	Ninth Reprint 2011
7.	Fundamentals of Data structures in C	Horowitz , sahni Anderson- freed	University Press, Hyderabad	Second Edition
8.	Data and file structures	Rohit Khurana	Vikas Publishing Ltd	First Edition 2010