35244 – DATA STRUCTURES USING C

DETAILED SYLLABUS

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

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 - Pointer and Arrays – Pointers and Two Dimensional Arrays - Array of Pointers - Pointers and Strings – Implementation of arrays -

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

UNIT – II STACKS , RECURSION AND QUEUES

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

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

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 : Depthfirst search (DFS) , Breadth-first search (BFS) - Applications of Graph

UNIT – V SORTING ,SEARCHING AND HASHING

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

TEXT BOOKS

1. Data Structures SeyMour Lipschutz Schaum;s outlines, TMH Private Limited,New Delhi Indian Adapted Edition 2006. 20th Reprint 2011
2. Data Structures with C SeyMour Lipschutz Schaum;s outlines, TMH Private Limited,New First Reprint 2011
3. Data Structures A Programming approach with C Dharmender Singh Kushwaha and Arun Kumar Misra Prentice Hall of India, New Delhi 2012