

Roll No.

Total Pages : 03

MCAE/D-23

24021

DATA STRUCTURES USING C++
MCA-20

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

Compulsory Question

1. (a) What are the various ways to classify the data structures ?
- (b) Differentiate between arrays and linked lists.
- (c) How can binary trees be stored in computer memory ?
- (d) What is an adjacency matrix ?
- (e) State applications on B+ trees.
- (f) State applications minimum spanning trees.

6×2.5=15

Unit I

2. (a) What is an array ? How can you find address of an element in one and twodimensional arrays ? Write a program in C++ to check whether the input matrix is a triangular matrix or not.

10

- (b) Discuss the various ways to store string in computer memory. 5
- 3. (a) Write down algorithm/program in C++ to sort the given data using bubble sort. 7.5
- (b) Write a program in C++ to find the number of vowels in the input text. 7.5

Unit II

- 4. (a) Write and explain algorithms to traverse the elements in all types of linked lists. 10
- (b) Explain operation of adding two polynomial using a linked list in brief. 5
- 5. What is a stack ? How can you insert and delete an element from a stack using both array and linked list representation ? Write and explain the algorithms/programs for the same. 15

Unit III

- 6. What is meant by the following : 15
 - (i) Complete Binary Tree
 - (ii) Binary Search Tree
 - (iii) Similar Trees
 - (iv) Threaded Binary Tree
 - (v) Heap.

- 7. (a) Write and explain algorithm for traversing a tree using post-order traversal. 7.5
- (b) Explain the process of inserting an element in an AVL tree using suitable examples. Explore all possible operations during insertion. 7.5

Unit IV

- 8. (a) Write and explain the DFS algorithm. 7.5
- (b) Write and explain the Warshall's algorithm for finding the shortest path. 7.5
- 9. What is meant by hashing ? Explain various types of hash functions and various collision handling techniques in detail. 15