MCAE/D-21   24021

DATA STRUCTURES USING C++

Paper–MCA-20-12

Time Allowed : 3 Hours]   [Maximum Marks : 75

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

Compulsory Question

1. (i) How strings are stored in computer memory?

    (ii) How can you create a node for a doubly linked list in C++ and allocate memory to the node?

    (iii) What is a Heap?

    (iv) State major applications of graphs?

    (v) Comment on the need of bucket sort. $5 \times 3 = 15$

UNIT-I

2. (a) What is meant by complexity of algorithms? How can you find it? Explain using suitable examples.   7½

    (b) Write a program in C++ to sort the given data using bubble sort.   7½

3. (a) Write down algorithm/program in C++ to search an element from the given data using binary search.   7½

    (b) What is a sparse matrix? How can you store it in computer memory for saving space? Explain using suitable examples.   7½

UNIT-II

4. Explain various types of linked lists? Write and explain algorithms for insertion at the beginning of each type of list.   15

5. Write down a program in C++ to convert an infix expression into postfix expression and evaluate the postfix expression.   15

UNIT-III

6. What is a binary tree? How it is stored in computer memory? Write a recursive and non-recursive algorithm to traverse a binary tree using postorder traversal. 15

7. Compare and contrast M-way search tree, B-tree and B+ tree on various count. Also discuss deletion in these trees using suitable examples. 15

UNIT-IV

8. How can you insert and delete a node in a graph? Explain by writing algorithms and suitable examples. 15

9. (a) Write down the algorithm for sorting the given data using counting sort. 7½

   (b) Explain different types of hash functions in details using suitable examples. 7½