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CMCA/M-20 10527

# DATA STRUCTURES

Paper–MCA–16-24

Time Allowed : 3 Hours] [Maximum Marks : 75

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

## Compulsory Question

1. Write short notes on the following : 5×3=15

   (a) Asymptotic notations.

   (b) Priority queues.

   (c) Threaded binary trees.

   (d) Types of Sorting.

   (e) Dynamic memory management.

## UNIT–I

2. (a) Explain how one-dimensional and two-dimensional arrays are stored in computer memory ? Write an algorithm to find the transpose of the input matrix. 7½

   (b) Write and explain the algorithms to insert and delete a string from a given text. 7½

3. (a) What is Data structure ? Explain various classifications of Data structure in detail. 10

(b) What is meant by complexity of algorithms ? Explain using suitable example. 5

UNIT–II

4. (a) Write and explain an algorithm to convert an infix expression to postfix expression using stack. 7½

(b) Write and explain an algorithm to insert an element in a queue using arrays and linked list. 7½

5. (a) Write and explain an algorithm to search an element in a linked list. 7½

(b) Write a program in C/C++ to create and display a linked list. 7½

UNIT–III

6. (a) What is a Binary tree ? How can you store binary tree in computer memory ? Explain various traversal techniques using suitable examples. 7½

(b) What is a B+ tree ? How can you insert and delete an element in a B+ tree ? Explain using suitable examples. 7½

7. What is Binary Search tree ? Write and explain algorithms for inserting and deleting an element in a BST using suitable examples. 15

UNIT–IV

8. (a) Write and explain the Dijkstra's algorithm for finding the shortest path in a graph. 7½

(b) Write a program in C/C++ to search an element in an array using recursive binary search. 7½

9. What is Hashing ? Explain any three hash functions in detail. Also explain any three collision handling mechanisms in hashing. 15