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MCA/M-20 10532

DATA STRUCTURES

Paper–MCA-14-24

Time Allowed : 3 Hours] [Maximum Marks : 80

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. Answer the following questions in brief :

(i) How are Data Structures classified ?

(ii) What do you mean by Complexity of an algorithm ?

(iii) Describe one application of queue where use of other data structures may not be feasible.

(iv) What is a doubly linked list ?

(v) Describe any two ways in which a binary tree can be traversed ?

(vi) What properties are satisfied by a 2-3 Tree ?

(vii) Describe one application in which graph will be used as a data structure.

(viii) What is the advantage of using Hashing ?

UNIT–I

2. What is the importance of an array as a data structure in solving problems ? When is a two dimensional array used for solving problems ? Explain with the help of a suitable example.

3. Answer the following questions in brief :

   (a) Describe any two major operations defined on strings.

   (b) What is a Sparse matrix ? Name one application of Sparse matrix.

   (c) When is the use of pointers preferred in Programming ?

UNIT–II

4. Distinguish between a stack and a queue and describe the following :

   (a) Applications of Stacks.

   (b) Deque.

   (c) Circular queue.

5. Describe the advantages of Linked Lists over arrays. How is an element inserted and deleted in a Linked list ? How will you perform searching and sorting in a Linked list ?

UNIT–III

6. What is a Binary Tree, a binary search tree, and an AVL tree ? Use an example to show how an element may be inserted in all these trees.

7. (a) Give a formal definition of a B-tree along with its properties. How is a B-tree different from AVL and Red-black trees ? Using a suitable example, show the construction of a B-tree of order 3.

   (b) What is a Spanning tree ? Describe its properties and applications.

UNIT–IV

8. What do you mean by Traversal of a Graph ? Describe the breadth-first and depth first traversal of a graph.

9. Distinguish between the following :

   (a) Linear Search and Binary Search.

   (b) Radix sort and Merge sort.