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BT-3/D-18 **33002**

DATA STRUCTURES

Paper : CSE-203 E

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) Discuss the various built-in and user-defined data structures along with applications in computer science and real-life. 10

   (b) What is sparse matrix? How a sparse matrix is stored in computer memory? Explain using suitable examples. 10

2. What is a stack? How it is stored in computer memory? Write down algorithms for converting an infix expression into a postfix expression and evaluating a postfix expression. Explain the algorithms using suitable examples. 20

UNIT–II

3. What is deque and priority queue? How both are stored in computer memory ? Write algorithms to insert and delete an element in a priority queue using linked representation. 20

4. Write and explain the algorithms to insert and search an element form a singly, doubly and circular linked lists. 20

UNIT–III

5. (a) Write and explain an algorithm for traversing a binary tree using inorder traversal. 10

   (b) Explain the following :

   (i) External and internal nodes.

   (ii) Infix, prefix and postfix expression representation using trees. 10

6. What are B-trees and B+ trees? What is their significance? How can you perform insertions and deletions in B-tree and B+ trees? Explain with examples. 20

UNIT–IV

7. Write and explain the algorithm to sort the given data using merge-sort. Apply the merge-sort algorithm on the following data to show the sorting process step-by-step : 87, 88, 25, 11, 22, 56, 99, 66, 77, 33. 20

8. (a) Write and explain the DFS algorithm using suitable example. 10

   (b) What do you mean by hashing? Describe various hash functions using suitable examples. 10