

Roll No. ....

Total Pages : 2

**8102**

**BT-3/D09**

**DATA STRUCTURES**

Paper : CSE-203(E)

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *five* questions in all picking at least *one* question from each unit

**UNIT-I**

1. (a) How do you define a data structure ? Give different types of data structures.  
(b) Obtain the addressing formula for elements stored in an upper right triangular square sparse matrix A into a linear array B using both row major and column major representations. (8,12)
2. (a) Consider a sparse  $m \times n$  matrix A with  $t$  non-zero terms. Write an algorithm for finding the transpose of A which is to be stored in an array B using  $O(t + n)$  operations.  
(b) Write a function that changes a decimal number to a hexadecimal number using stacks. (12,8)

**UNIT-II**

3. (a) Write a function for a singly linked list which deletes all nodes whose keys are negative.  
(b) Implement a function to copy one queue to another when the queue is implemented as a linked list. (10,10)
4. (a) Write a function to reverse print a linked list. Now delete this linked list.

8102/14300/KD/40

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- (b) Write an algorithm that uses queue to compress a string by deleting all space characters in the string. (10,10)

### UNIT-III

5. (a) A binary tree has 10 nodes. The preorder and inorder traversals of the tree are shown below. Draw the tree.

Preorder : JCBADefIGH

Inorder : ABCEDfJGIH

- (b) Calculate the maximum number of data entries in  $m$ -way tree of height  $h$ .
- (c) What is the minimum number of keys in a B-tree of order 5 and height 3 ? (8,8,4)
6. (a) Write algorithms for AVL insert and delete.
- (b) Create a B+ tree of order 5 for the following data arriving in sequence :
- 92, 24, 6, 7, 11, 8, 22, 4, 5, 16, 19, 20, 78. (10,10)

### UNIT-IV

7. (a) Write an algorithm that traverses a graph and returns true if the graph is connected and false if it is disjoint.
- (b) What is open addressing scheme of collision resolution ? Explain any two techniques for open addressing scheme. (10,10)
8. (a) Write algorithms for depth first search and breadth first search using iteration.
- (b) Write the algorithm for insertion sort and show each step for sorting when the given sequence is 7, 5, 3, 4, 10, 1, 9, 8, 5, 2. (12,8)