

Roll No.

Total No. of Pages : 3

BT-3/D06

8496

DATA STRUCTURES

Paper : CSE-203-E

Time : Three Hours]

[Maximum Marks : 100

Note :— Attempt any **FIVE** questions.

1. (a) Define abstract data type and give any three applications of ADTS. 5
(b) Write an algorithm which translates a POSTFIX expression to an INFIX expression. 8
(c) Show with an example how a UNION is implemented. Also differentiate between a UNION and a STRUCTURE in C. 7
2. (a) Show with an example how an array is passed as a parameter in C. 7
(b) What are the main types of PRIORITY QUEUES ? Explain each one in detail. 8
(c) Show how to implement three stacks in one array. 5
3. (a) What are the advantages and disadvantages of representing a group of items as an array versus a linear linked list ? 7
(b) What are the steps to inserting a new item at the head of a linked list ? Use one short English sentence for each step. 5
(c) Write a program to swap two adjacent elements by adjusting only the pointer (and not the data) using :
 - (i) Singly linked lists.
 - (ii) Doubly linked lists. 8

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(Contd.)

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4. (a) Explain in detail why dynamic data structures are needed. 7
- (b) What are the three primitive operations that can be applied to Queues ? Explain briefly. 5
- (c) Write an algorithm to reverse the order of items on a list. Prove that your algorithm works correctly. 8
5. (a) Explain the following :—
- (i) STRICTLY binary tree.
- (ii) Complete binary tree.
- (iii) Almost complete binary tree. 6
- (b) The order of nodes of a binary tree in PREORDER and INORDER Traversal are as under :
- PREORDER — B C E D F A G H.
- INORDER — A B C D E F G H.
- Draw the corresponding Binary Tree. 5
- (c) Two binary trees are similar if they are both empty or both non-empty and have similar left and right subtrees. Write a function to decide whether two binary trees are similar. 9
6. (a) Write a note on :
- (i) Efficiency of Binary Search tree operations.
- (ii) Balanced trees. 5
- (b) Write an algorithm to find K^{th} element of a list represented by a tree and also show that the number of tree nodes examined in finding the K^{th} list element is less than or equal to 1 more than the depth of the tree. 7
- (c) What are the broad categories of non-binary trees ? Describe any one in detail. 8

7. (a) Write a non-recursive depth first traversal algorithm for graphs. 10
(b) Explain Prim's algorithm in detail. 10
8. (a) What is the purpose of hashing? Describe any one method used to handle collisions in hashing. 8
(b) Sort the list 3, 1, 4, 1, 5, 9, 2, 6, 5, 3, 5, 8, 9, 7 using any one of them :
(i) Heapsort.
(ii) Quicksort.

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