8496

BT-3/D06

DATA STRUCTURES

PAPER - CSE-203E

Time : 3 Hrs.   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 tpes 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

(3th sem. Electronic + Math/Eco.)   59

c. Write a program to swap two adjacent elemetns by adjusting only the pointer (and not the data) using :

(i) Singly linked lists

(ii) Doubly linked lists   8

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 :-   6

(i) STRICTLY binary tree

(ii) Complete binary tree

(iii) Almost complete binary tree

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 on note on :

(i) Efficiency of Binary Search tree operations

(ii) Balanced trees   5

(3th sem. Electronic+ Math/Eco.)   60

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 fidning the Kth list elements 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   12

(3th sem. Electronic + Math/Eco.)   61