Roll No._____ Total Pages : 3

9102

BT-3/D08

DATA STRUCTURE

PAPER - CSE-203E

Time : 3 Hrs. Maximum Marks : 100

Note : Attempted five questions in all, selecting at least one question from each unit.

UNIT-I

1. a. Define the term Data structure and its uses. What are its types ? Write algorithm to convert a decimal number to its equivalent binary.

   b. Write algorithm for finding whether a string of opening and closing parenthesis is well formed or not. 12,8

2. a. An array is declared as char A [u1][u2][u3] ... [un]. If this array is to be represented in a column major fashion then obtain the addressing formulae for the element A[i] [i2] [i3] ... [in].

   b. Implement an algorithm to copy one stack to another stack using stack operations. 12,8

UNIT-II

3. a. Write algorithm to delete a node pointed by 'p' in a singly linked list 'L. This node could be anywhere in the linked list.

   b. Implement a function to insert and delete elements from a circular queue using arrays. Obtain proper boundary conditions to test for empty and full queues. Whenever

you insert or delete elements, return number of elements present in the queue. 6,14

4. a. Write a C function to combine two singly connected linked lists such that if one list is L = (l_0, l_1, ..., l_m) and other list is M = (m_0, m_1, ..., m_n). After combining them the combined list should be (l_0, m_o, l_1, m_1, ...). No additional nodes may be used.

   b. Write algorithm to concatenate two circular linked lists producing anothe circular linked list. 10, 10

UNIT-III

5. a. What are AVL trees ? Write algorithm to delete a node from an AVL tree.

   b. Write algorithm to reconstruct a binary tree from its preorder and inorder traversal sequences.

   c. Write function to swap a binary tree. 6, 10, 4

6. a. Write algorithm to traverse a binary tree level by level. In each level, the tree is traversed from left to right.

   b. Insert the following keys into a B-tree of order (i) 3, and (ii) 5 :

   10, 24, 23, 11, 31, 16, 26, 35, 29, 20, 46, 28, 44, 54, 14, 40, 42, 43, 55, 41 8,12

UNIT-IV

7. a. What are connected components and strongly connected components of a graph ? Show examples. Write a function in C to determine whether a node is disjoint in a graph.

   b. Write the algorithm for binary search with and without recursion. What is running time complexity?10, 10

8. a. Write algorithm for quick sort. Use it to sort following sequence : 7, 15, 3, 14, 10, 1, 9, 8, 5, 2. How many steps you have taken ? Are they same as given by the algorithm ?

b. Write down any minimum cost spanning tree algorithm. Obtain its running time complexity. 10, 10