TCS/TIT-303 1083

Odd Semester Examination, 2017-18

B.TECH. (SEMESTER-III)

DATA STRUCTURES

Time: 03:00 Hours **Max Marks : 100**

Note:- Attempt **all** questions. All questions are compulsory.

1. Attempt **any four** questions. [5×4=20]

   a. What is Bubble sorting. Explain best case and worst case complexity Involved in it. Is Bubble sorting in place? Give reason to support your answer.

   b. Write an algorithm to implement one Stack using two Queues ? Can we implement it using single Queue??Give reason to support your answer.

   c. Write an Algorithm to evaluate Prefix Expression ? Convert the following infix Expression into Equivalent Prefix Expression ?

      Q : ((A + B) * D) *(E – F)

   d. What is a Linked List ? Write a Program to reverse a Singly Linked list only using recursion?

   e. Write a program to find smallest element in a binary tree. Also Mention the complexity involved in it.

2. Attempt **any four** questions. [5×4=20]

   a. Write two advantages and two disadvantages of doubly linked list over single linked list.

   b. Find complexity of the following:

      i. $T(n)=4T(n/2)+\log n$

      ii. $T(n)=3T(n/3)+n/2$

   c. Explain Garbage Collection & Compaction ?

d. Write recursive algorithm to implement Factorial of a number. Also Analyze the complexity involved.

e. Write short notes on:

i. Threaded binary trees

ii. Ordered list

iii. Indexing

3. Attempt **any two** questions. [10 ×2=20]

a. Write a program to sort numbers using Quick sort algorithm. Also mention the complexity involved. Show steps involved In Quick sort using this array.

5,2,14,1,25,18,14

b. Explain Binary search trees.What is the difference between Full Binary trees and Complete Binary trees. Write a program to print inorder,preorder and postorder Traversal of a binary tree.

c. Explain Huffman Algorithm ? Explain in steps how huffmann expression is applied.Explain some real life applications of Huffmann expression.

4. Attempt any two questions. [10×2=20]

a. Develop a BST by inserting the given sequence one by one. 6,45,98,1,64,43,4,78,47,89. Write an algorithm to delete a Particular node in a BST.Also show the resultant tree after Deleting in sequence :

i. 89

ii. 64

iii. 45

b. What is Hash Table ? Explain its Purpose .Given an array of integers Write a program to search a particular element in an array using Hashmap.

c. Given a list of elements with priorities:(a,7),(b,9),(c,5),(d,1),(e,21), (f,14).

i. Bulid a max heap on the basis of priority.

ii. Remove the max element from heap using all intermediate steps.

iii. Rebulid max heap using element (g,13).

Also write an algorithm to design a max heap using an array.

5. Attempt any two questions. [10 ×2=20]

a. What is text File ? How it is different from other types of Files List the other Advantages & Disadvantages of Sequential , Direct & Indexed File organization.

b. N people have decided to elect a Leader by arranging themselves in a circle and eliminating every M^{th} person around the circle closing ranks as each person drops out. Write a program using circular linked list who will be last person left and Will be elected as leader.

c. Given an array of n integers, write a pseudo code to find the pair whose sum is equal to k.

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