4. Attempt any two parts of the following : 10x2=20

(a) Explian the following :

(i) Radix Sort

(ii) Sparse Matrices

(b) Discuss the complexity of Binary Search Tree (BST)? Construct the BST for following insertion in order:

12,45,5,38,19,29,12,18,78,27,18,2,20, Show the steps.

(c) Write short notes on any two :

(i) Dynamic Memory Allocation

(ii) Graph representations

(iii) Threaded Binary Tree

5. Attempt any two parts of the following : 10x2=20

(a) Discuss the complexity of Tower of Hanoi function.

(b) Write the algorithm of Quick sort. Using Quick sort algorithm sort the following numbers,

42,11,55,18,37,12,158,312,198,56

(c) Write a function in C to perform all traversals of a tree using recursion. Formulate an algorithm to find the number of leaf nodes in a binary tree.

—x—

Printed Pages :4

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336

NEC-401

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 131401

Roll No.

B.Tech. (Sem. IV)

SPL. THEORY EXAMINATION, 2014-15

DATA STRUCTURES

Time : 3 Hours] *[Total Marks : 100*

Note: (1) Attempt questions from each section as per instructions.

(2) All questions are compulsory.

1. Attempt any four parts of the following : 4x5=20

(a) Consider an array A [-20:20, 10:35] whose elements require 2 bytes of storage. Base address of array is 400. Calculate the address of element A [0][30] in row major and column major order.

(b) Write an algorithm to search an element in the linked list.

(c) The preorder and inorder traversal of binary tree is given below, construct the tree -

preorder : G,B,Q,A,C,K,F,P,D,E,R,H

inorder : Q,B,K,C,F,A,G,P,E,D,H,R

(d) Implement Circular Queue using Linked List.

(e) Illustrate the execution of HEAP SORT on the array

A=<18, 14, 9, 222, 22, 11, 52, 2, 97>

(f) Differentiate between time complexity and space complexity of an algorithm.

2. Attempt any four parts of the following : 5x4=20

(a) Consider the following 'for' loops, calculate the total computation time for the following :

1. Set j=N
2. Repeat step 3 and 4 while j>1
3. Module A
4. Set j: =j/2
5. Return

(b) Convert the following infix expression into postfix expression: ((A+B)/D) ^ ((E-F)*G), where operator ^ have highest precedence over all other operators.

(c) Write C function/Algorithm to Reverse the directions of links in singly linked list.

(d) Write the algorithm for the selection sort. Sort the following using selection sort method :

125,21,20,17,8,9,11,14,3,5

(e) What is the advantage of array over linked list. Also write a C function to insert an element in the beginning of a circular linked list at a specified location.

(f) Differentiate between Prim's and Kruskal's algorithm for minimum spanning tree.

3. Attempt any two parts of the following : 10x2=20

(a) How a polynomial equation can be represented through link list? Explain the method to add two given polynomial equations using link list.

(b) What are the applications of stack? Explain how can you reverse a string using stack with the help of an example? Also write a C function for this.

(c) Write the algorithm for binary search and insertion sort. Explain their best case and worst case complexities.