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

PAPER ID : 1065 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. III) ODD SEMESTER THEORY EXAMINATION 2010-11

DATA STRUCTURE USING C

Time : 3 Hours *Total Marks : 100*

Note : Attempt **all** questions.

1. Answer any **two** parts : **(10×2=20)**

(a) (i) Consider a three dimensional array X whose subscript limits are :

$$0 \le i \le 10, 0 \le j \le 50, 0 \le k \le 30.$$

Assume that storage for the array begins at 2000 in memory and 4 bytes are required to hold each element of the array. Compute the actual address of the element X[5, 20, 10] assuming that array is stored in row major order.

(ii) Explain the following terms :

(A) Time Complexity

(B) Sparse Matrix

(C) Algorithm

(D) Recursion.

(b) (i) Write an algorithm to convert an infix expression to postfix expression.

(ii) What is stack ? Give an implementation of stack in 'C' language.

(c) (i) Explain the Tower of Hanoi problem and write a recursive algorithm to solve it.

(ii) Write a 'C' program to check whether a given string is palindrome or not.

2. Answer any two parts : **(10×2=20)**

(a) Define queue. Formulate insertion and deletion algorithms for a circular queue.

(b) Write a routine which inserts a given element in a sorted singly linked list at correct position.

(c) Give a dynamic implementation of singly linked list in 'C' language.

3. Answer any two parts : **(10×2=20)**

(a) (i) Define the following :

(A) Binary Search Tree

(B) Complete Binary Tree

(C) Depth of a Tree

(D) Leaf of a Tree

(ii) Inorder and Postorder traversal of a tree T is given as follows :

Inorder : B A E F D C G

Postorder : E F A B G C D

Draw the Tree T.

(b) What do you mean by threaded binary tree ? Write a function to traverse a threaded binary tree in postorder.

(c) (i) Describe Huffman algorithm with the help of suitable examples.

(ii) Write a 'C' program to search an element in a sorted set of integers using binary search algorithm.

4. Answer any two parts : **(10×2=20)**

(a) Write an algorithm for sorting a set of positive integers in ascending order using Quick Sort procedure. Give worst case and average case time complexity of the algorithm.

Illustrate this procedure for following keys :

50, 78, 8, 11, 3, 95, 65, 36.

(b) Write an algorithm for insertion in a Binary Search Tree. Show the Binary Search Tree built from a sequence of insertions for the following sequence of keys :

8, 17, 10, 15, 5, 2, 16, 19, 13, 1, 4.

(c) Define AVL tree. Starting with an empty tree, build the AVL tree by following sequence of insertions :

D, J, A, M, J, O, F, N.

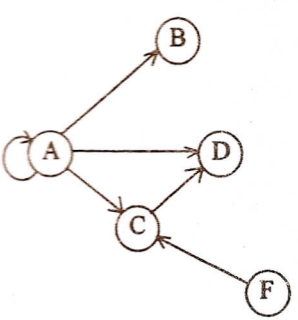
Also label the rotations according to their types.

5. Answer any two parts : **(10×2=20)**

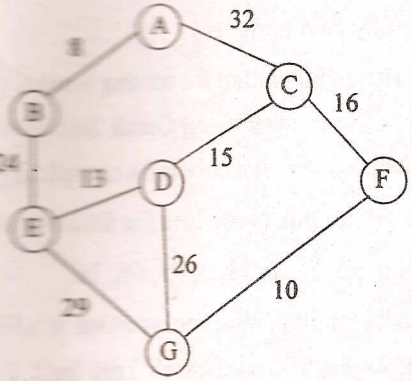
(a) (i) For the given graph :

(A) Find its adjacency matrix.

(B) Find its path matrix using adjacency matrix.



(ii) Obtain the minimum cost spanning tree using Kruskal's algorithm for the given graph.



(b) Write an algorithm to determine the number of connected components in a given graph.

(c) Write short note on File organization.