Printed Pages : 4   **TCS – 407**

(Following Paper ID and Roll No. to be filled in your Answer Book)
PAPER ID : 1072   Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B. Tech.

(SEM. IV) EXAMINATION, 2008-09

DATA STRUCTURING USING 'C'

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

Note :   (1) Attempt **all** questions.

(2) All questions carry **equal** marks.

1   Attempt any **two** parts of the following: **10×2=20**

(a)   Give using "Big-O" notation, the worst case running time of the following procedure as a function of 'n'

int f_2 (int n)

{   sum=0

for (i=0; i<n; i++)

for (j=0; j<i, j++)

sum ++j

}

(b)   Write a C function to implement transposition of a Sparse matrix. Choose suitable example to illustrate your function's working.

(c)   Write an algorithm to convert the postfix arithmetic expression to infix notation. Also, evaluate the following postfix expression: 8 2–4+5 6 7 – + *.

2 Attempt any **two** parts of the following: **10×2=20**

(a) A deque is an ordered set of items from which items may be deleted at either end and into which items may be inserted at either end. Call the two ends of a deque 'left' and 'right'. How can a deque be represented as a C array? Write four C routines, 'remvleft' 'remvright','insrtleft' 'insrtright' to remove and insert elements at the left and right ends of a deque. Make sure that the routines work properly for the empty deque and that they detect overflow and underflow.

(b) Write C program to perform each of the following operations in linked list :

   (i) Reverse a list, so that the last element becomes the first, and so on.

   (ii) Delete every second element from a list.

(c) (i) Differentiate between ascending priority queue and descending priority queue.

   (ii) Implement a stack using circular list.

3 Attempt any **two** parts of the following: **10×2=20**

(a) The order of nodes of a Binary Tree in Preorder and Postorder traversal are as follows:

Preorder: 14, 4, 3, 9, 7 , 5, 10, 15, 18, 16, 17, 20

Postoder: 3, 5, 7, 10, 9, 4, 17, 16, 20, 18, 15, 14

Draw the corresponding Binary tree and write its inorder traversal.

(b) Draw a Huffman Tree for the following symbols whose frequency of occurrence in a message is stated along with the symbol below:

A: 15; B:6; C:7; D:12; E: 25; F:4; G:6; H:1; I: 15

Decode the message 1110100010111011

(c)　Write a C function that accepts a pointer to a binary tree and returns a pointer to a new binary tree that is the mirror image of the first (that is, all left subtree are now right subtrees and vice versa)

4　Attempt any **two** parts of the folowing :　　10×2=20

(a)　Swo step by step the creation of a heap for the following elements in the order as shown :
25, 57, 48, 37, 12, 92, 86, 33

(b)　Show the stepwise sorting procedure of Merge Sort for following list of elements:
30, 12, 38, 8, 5, 15, 1, 40

(c)　Write short notes on the following:
　(i)　AVL Trees and Balancing Techniques.
　(ii)　Insertion Sort Technique.

5　Attempt any **two** parts of the following:　　10×2=20

(a)　Find a minimum spanning tree of the following graph using Kruskal's algorithm :
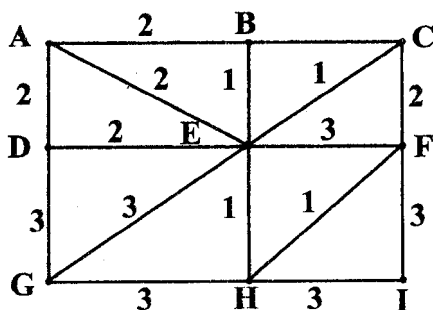
(b)   Consider the following graph:
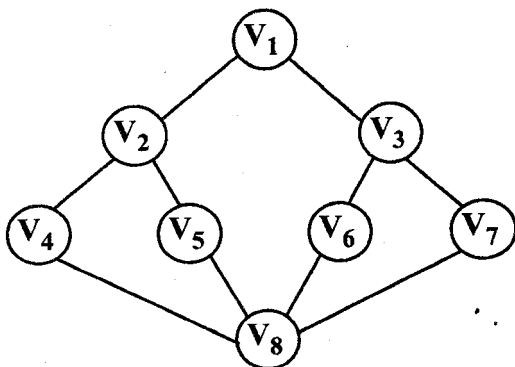
Perform a Breadth-First Search beginning at vertex V_1. List the vertices in which they are visited.

(c)   (i)   For an undirected graph G with 'n' vertices and 'e' edges show that

$$\sum_{i=1}^{n} d_i = 2e$$

where d_i = degree of vertex 'i'

(ii)   Describe Spanning Forests. List the groups in which any spanning tree divides the edges of a graph. Show by drawing a figure of a graph and its spanning forests.