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

PAPER ID : 2482   **Roll No.** | | | | | | | | | |

B. Tech.

(SEM. VI) THEORY EXAMINATION 2011-12

DATA STRUCTURES

Time : 2 Hours   *Total Marks : 50*

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

(2)   All questions carry equal marks.

(3)   Make suitable assumptions wherever required.

1.   Attempt any **two** parts of the following :   **(5×2=10)**

(a)   Give asymptotic upper and lower bounds for T(n) for each of the following recurrences. Assume that $T(n)_3$ is constant for n < = 2 :

(i) $T(n) = 2T(n/2) + n^3$

(ii) $T(n) = 7T(n/2) + n^2$

(b)   (i)   Define sparse matrix. How sparse matrix is represented ?

(ii)   Derive the formula to access the element A [i, j] of a two dimensional matrix A of M × N, in row major order.

(c)   Write an algorithm to count the number of nodes in a linked list and also to insert a node in the last of the linked list.

2. Attempt any **two** parts of the following : (5×2=10)

   (a) Illustrate various operations that can be done on stack. Also explain the evaluation of Postfix expression with example.

   (b) Write an algorithm to add and delete an element in a queue using linked representation. Also state the overflow and underflow conditions clearly.

   (c) Discuss in brief the following :

   (i) Tower of Hanoi Problem

   (ii) Recursion.

3. Attempt any **two** parts of the following : (5×2=10)

   (a) Define a strict binary tree. Prove that the number of vertices on each level of a strictly binary tree is at most twice the number on the level immediately above.

   (b) What do you mean by tree traversal ? Discuss the in-order tree traversal algorithm with suitable example.

   (c) Write a short note on Huffman algorithm.

4. Attempt any **two** parts of the following : (5×2=10)

   (a) What do you mean by minimum cost spanning tree ? Illustrate with an example the steps to find a minimum cost spanning tree using any one algorithm.

   (b) Define a graph. Discuss various ways of a graph representation. Illustrate with suitable examples.

(c) Explain the following with suitable examples :

    (i)   Adjacency multi list

    (ii)   Activity Network.

5.   Write short notes on any **two** of the following :   **(5×2=10)**

    (a)   Binary Search Tree and its significance.

    (b)   AVL Trees and their applications.

    (c)   Average case behavior of Insertion sort.