

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

PAPER ID : 2482

Roll No.

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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 $M \times N$, 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.