

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

PAPER ID : 2482

Roll No.

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**B. Tech.2**

(SEM. VI) THEORY EXAMINATION 2010-11

**DATA STRUCTURES**

*Time : 2 Hours*

*Total Marks : 50*

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

(2) All questions carry equal marks.

(3) Assume suitable data wherever necessary.

1. Attempt any two parts of the following :

(a) Solve the following recurrence equations where  $T(1) = 0(1)$  :

(i)  $T(n) = T(n/2) + bn \log(n)$

(ii)  $T(n) = aT(n-1) + bn^e$

(b) A lower triangular array A is an  $n \times n$  array in which  $a[i][j] = 0$  if  $i < j$ . What is the maximum number of non zero elements in such an array ? How can these elements be stored sequentially in memory ?

(c) Write a subroutine to interchange the  $m^{\text{th}}$  and  $n^{\text{th}}$  elements in a linked list.

2. Attempt any **two** parts of the following :

(a) Evaluate the following post fix expression. Assume  $A = 1$ ,  
 $B = 2$ ,  $C = 3$ .

(i)  $AB + C - BA + C \wedge -$

(ii)  $ABC + * CBA - + *$

(operators have standard meaning)

(b) Write a recursive solution to solve TOWERS of HANOI problem.

(c) How would you implement a queue of stacks ? Write routines to implement the appropriate operations for this data structure.

3. Attempt any **two** of the following:

(a) Prove that a strictly binary tree with  $n$  leaves contains  $2n - 1$  nodes.

(b) Explain, by writing subroutines, how to traverse a binary tree in preorder and postorder.

(c) Explain with the help of an example how threaded binary tree would be useful and efficient in implementing the tree traversal ?

4. Attempt any **two** of the following :

(a) Give an algorithm that determines whether or not a given undirected graph  $G = (V, E)$  contains a cycle ?

- (b) Explain one application of Depth First Search (DFS) with the help of an example ?
  - (c) Explain Kruskal's algorithm to find minimum spanning tree in a weighted directed graph. Can there be two minimum spanning trees of a given weighted directed graph ?
5. Attempt any **two** of the following :
- (a) Compare and contrast average case behaviour of Quick Sort and Merge Sort.
  - (b) Write and explain radix sort algorithm for a given set of  $n$  strings where the largest number of characters in a string is  $K$ .
  - (c) Write a note on B+ tree storage management.