EEC012

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

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

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) $T(n) = aT(n-1) + bn^{\epsilon}$

(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 mth and n^{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.