B. Tech. (Sem. III) (Main/Back) Examination, January - 2012
Electrical & Electronics
3EX6.1 Data Structures & Algorithm (Common for CP & IT)

Time : **3** Hours]

[Total Marks : **80**
[Min. Passing Marks : **24**

Instructions to Candidates :

*Attempt any **five questions** selecting **one question** from each unit. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. _____ **Nil** _____   2. _____ **Nil** _____

UNIT-I

1 (a) Define and discuss various asymptotic notations.

5

(b) Write algorithm to insert a new node in begining of a doubly linked list.

5

(c) Prove that $f(n) = 5n^2 + 3n + 6$ is $\theta(n^2)$.

6

OR

1 (a) Write formulae for address of element $A[R][C]$ for column major array $A[R1...R2][C1.....C2]$ assuming BASE as address of first element.

7

(b) In column major array $A[3....5][7....10]$ calculate address of element $A[4][9]$, if base address of array is 2073.

3

(c) Write note on skip lists.

5
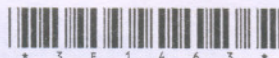
UNIT-II

2   (a)   Write algorithm and explain insertion operation in a Queue.

            5

      (b)   Write algorithm and explain deletion operation in a Queue.

            5

      (c)   Show all the steps to convert following infix expression into postfix expression $\left(\left(a+b*c-d\right)*\left(e-f\right)*g/h\right)$.

            6

OR

2   (a)   State Tower of Hanoi problem. Discuss recursive solution of the problem.

            5

      (b)   Give algorithm for evaluation of a postfix operation.

            5

      (c)   What is a stack ? Write pop( ) and push( ) operations for stack implemented using array.

            6

UNIT-III

3   (a)   Construct binary tree using following information :
            In order traversing : B G C H I A E L J M D K F
            Pre order traversing : A B C G H I D E J L M F K

            7

      (b)   Traverse the tree constructed in Q. 3(a) in Post order.

            2

      (c)   Define binary search tree. Construct a binary search tree for following input sequence : 30, 25, 55, 18, 9, 28, 100, 90

            2+5

OR

3   Derive AVL tree. Discuss insertion and deletion operations in light of various rotations applied to maintain AVL tree balance factors, after these operations.
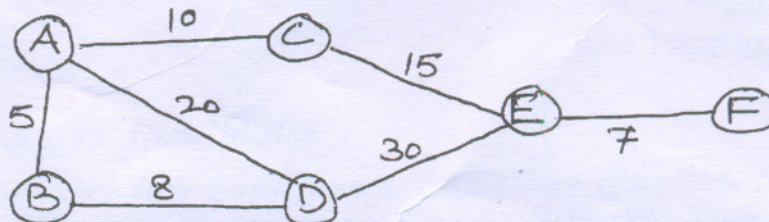
            16

UNIT-IV

4   (a)   Define a graph. Discuss methods to represent graph in memory.

                                                           8

       (b)   What is a spanning tree ? Show all steps for finding MST using Kruskal algorithm, for graph given below :

                                                            8

OR

4   (a)   Write DFS algorithm for graph traversal.

                                                            8

       (b)   Discuss Dijkstra's algorithm and state the purpose of the algorithm.

                                                            8

UNIT-V

5   (a)   Show all the steps to sort following list using Redix sort : 9347, 3292, 5680, 7556, 2182, 4564

                                                            6

       (b)   Write algorithm to find every occurance of a give pattern into a given text (string).

                                                            6

       (c)   What is hashing ?

                                                            4

OR

5   (a)   Write Binary search algorithm. Analyse the algorithm and calculate its time complexity.

                                                            8

       (b)   Write Quick sort algorithm. Prove that the algorithm performs the worst when input is already sorted.

                                                            8