

B. Tech. III Semester (Main/Back) Examination-2014
Electronic Instrumentation & Control
3E12 Data Structures and Algorithms
(Common to EC & EIC)

Time : 3 Hours

Maximum 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.)

Unit - I

1. a) What do you understand by complexity of Algorithm? Explain Big 'O', Omega ' Ω ' and theta Notation ' θ ' with example. (8)
- b) Suppose multidimensional arrays A and B are declared using.
 $A(-2:2, 2:22)$ and $B(1:8, -5:5, -10:5)$
 - i) Find the length of each dimension and the number of elements in A and B
 - ii) Consider the element $B[3,3,3]$ in B. Find the effective indices E_1, E_2, E_3 and the address of the element, assuming Base (B) = 400 and there are $\omega = 4$ words per memory location. (8)

OR

1. a) Explain the Row major and column major method to Calculate the memory address for a particular element in 2-D Array. (8)
- b) Determine the frequency counts for all statements in the following program segments.
 - i)

```
for ( i=1; i <=n; i++)
{
for (j = 1; <=m; j++)
{
for (K=1; K <=P; K++)
{
```

```

    ((i) [i]+=a[i] [K]*b [k] [j]
    }
    }
    }

```

- ii) for (i=1; i <=n; i++)
 for (j=1; j <=i; j++)
 X = x+1

Also compute the time complexity for both segments. (8)

Unit - II

2. a) What do you mean by sparse matrix. Explain addition of two sparse matrixes. (8)
- b) Circular Queue is to be implemented using a array of 10 elements. Write a pseudo code for implementation of inserting an element in queue and checking whether queue is empty or not. (8)

OR

2. a) Translate, by using stack each infix expression in its equivalent postfix expression
- i) $(A-B) * (D/E)$
- ii) $(A+B^D)/(E-F)+G$
- iii) $A*(B+D)/E-F*(G+H/K)$ (9)
- b) How to define priority queue? Explain one way and array representation of priority queue. How Dequeue different from Queue? (7)

Unit - III

3. a) Write an algorithm to perform the following operations in singly linked list.
- i) to count no of nodes in linked list.
- ii) to reverse a given linked list. (8)
- b) Write an algorithm to add two polynomials using doubly linked list. (8)

OR

3. a) Write an algorithm to perform the following operations in doubly linked list
- i) to delete a node at the end
- ii) to delete a specified node. (8)
- b) Explain the Insertion and deletion operations in stack and queue using linked list. (8)

Unit - IV

4. a) Define the different type of binary tree. Explain the representation of binary tree in memory. (8)
- b) What do you understand by AVT tree. Insert the following element in AVL tree define each rotation.
 64,1,44,26, 13, 110, 98,85 (8)

OR

4. a) A binary tree T has 9 nodes. The inorder and pre-order traversals for T yield the following sequence of nodes.
In order: E A C K F H D B G
Pre-order: F A E K C D H G B (8)
- b) Write an algorithm for deleting a node from binary search tree take all possible case. (8)

Unit - V

5. a) Write Dijkstra's Algorithm for shortest path. Explain it with example. (8)
- b) Write an algorithm for insertion sort. Sort the following list by your algorithm.
77, 33, 44, 11, 88, 22, 66, 55 (8)

OR

5. a) Explain BF's and DF's algorithm for graph traversal with example. (8)
- b) Explain following sorting method
- i) Heap sort
 - ii) Topological sort. (8)