# FACULTY OF INFORMATICS

### B.E. 2/4 (IT) I – Semester (New) (Main) Examination, December 2015

### Subject: Data Structures

**Time: 3 hours**                                                                 **Max. Marks: 75**

*Note: Answer all questions from Part - A. Answer any FIVE questions from Part - B.*

## PART – A

1   What is Sparse Matrix? How is sparse matrix represented?                                    (3)
2   Define the terms 'Time Complexity' and 'Space Complexity'.                                   (2)
3   Transform the following expression to prefix and postfix form:

   $(A+B)*(C+D-E)*F$                                                                             (3)
4   Define Circular queues? Give an example.                                                     (2)
5   What is Hash function? List few hash functions.                                              (2)
6   What is meant by Linked Stack and Linked Queue?                                              (3)
7   When is an undirected graph said to be 'connected'?                                          (2)
8   State the difference between full binary tree and complete binary tree.                      (3)
9   Briefly explain merge sort.                                                                  (3)
10 Define Red Black Tree.                                                                        (2)

## PART – B

11 a)  Explain String Abstract Data Type.                                                        (5)
   b)  Determine the frequency count for all statements in the following program segment.
       Clearly show step count table.                                                            (5)
```
int sum(int a[], int n)
{
int s=0;
for(int i=0;i<n;i++)
S+=a[i];
return s;
}
```

12 a)  Write an algorithm for Infix to Postfix Conversion of an expression. Trace the
       algorithm using any infix expression.                                                   (4+3)
   b)  Write an algorithm to insert an item into Queue data structure.                           (3)

13 Explain in detail how insertion and deletion operations are performed in singly linked list.
                                                                                                (10)

14 a)  Make a Binary Search Tree(BST) for the following sequence of numbers:
       {100, 50, 200, 300, 20, 150, 70, 180, 120, 30}. Traverse the obtained BST in
       Preorder, Postorder, and Inorder.                                                       (3+3)
   b)  Write about different graph representations. Use Examples                                 (4)

15 a)  Write a C++ function to perform Insertion Sort. Trace the algorithm for the elements
       {12, 2, 16, 30, 8, 28, 4}                                                               (3+3)
   b)  Define Max-Heap. Explain how to insert an element into a Max Heap.                        (4)

16 What is Minimum Cost Spanning tree (MST)? Explain Prim's algorithm to construct MST and execute prim's algorithm on the following graph. (1+5+4)
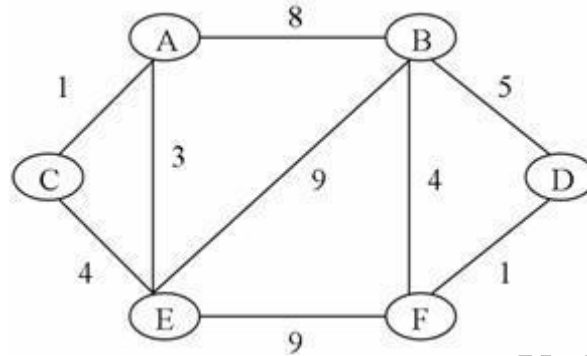


17 Write short notes on any 2 of the following: (5+5)

    i)   Asymptotic notation.
    ii)  AVL Trees
    iii) Heap Sort

****