Code No. : 5347/S

FACULTY OF INFORMATICS
B.E. 2/4 (IT) I Semester (Suppl.) Examination, July 2012
DATA STRUCTURES

Time: 3 Hours] [Max. Marks : 75

Note : *Answer* ***all*** *questions from Part* ***A*** *and* ***any five*** *questions from Part* ***B****.*

PART – A **(25 Marks)**

1. Suppose a program is written to add m matrices of size n × n. Assuming time complexity of adding two matrices is $0(n^2)$. What is the complexity of whole program ?

2. What is the advantage of using array doubling technique, while inserting an element into array list ?

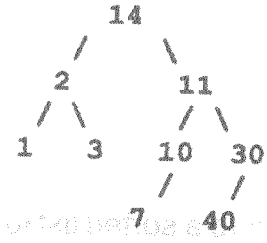
3. What is the postfix expression for the following infix : (a + b*(c – a) – d) ?

4. In circular array representation of Queue, if R points to last element in the Queue and F points to a location before the first element of Queue. How many elements are there in the Queue if maximum size of array is N ?

5. What is the advantage of using a dummy header in circular linked list ?

6. Write a function to count the number of elements in a linked list.

7. For the following tree, what is the order of nodes visited using an in-order traversal ?



8. Suppose that an array a [ ] represents a max-heap that stores the highest element in location a[1], and location a[0] is empty. Give the possible positions for third highest element.

9. For insertion sort, what arrangement of the input data will cause the worst-case performance ? The best-case performance ?

10. Suppose you have an order *m* B-tree. How many levels are required at minimum to hold 3000 keys ?

(50 Marks)

PART – B

11. a) Show the best and worst case step count analysis for the following function (insertion into sorted array)

```
Void insert (T a[ ], int & n, Const T & n)
{
    int i;
    for (i = n – 1; i > = 0 && x < a [i]; i – – )
    a [i + 1] = a[i];
    a[i + 1] = x;
    n ++;
}
```

b) Suppose a sparse matrix is represented by using arrays. Write efficient method for transposing the sparse matrix.

12. a) Suppose a stack is implemented with operation push ( ), pop ( ), is empty ( ) and make empty ( ). Use these operations to implement following operation in a stack.

Reverse (stack s, int n); // reverses top n elements of stack.

b) Write C++ code to implement following operations on queue (use linked representation).

i) Insert

ii) Delete

iii) Display

13. A singly linked list is used to store a sorted list to items in ascending order. Write C++ code to implement following function to merge lists m and n into list r without allocating additional nodes.

Void merge (List<T>&m, List<T>&n, List<T>&r).

14. a) Write C++ code to delete a node from a binary search tree.

    b) Apply depth-first and breadth first searches to the complete graph on four vertices. List the vertices in the order they would be visited.

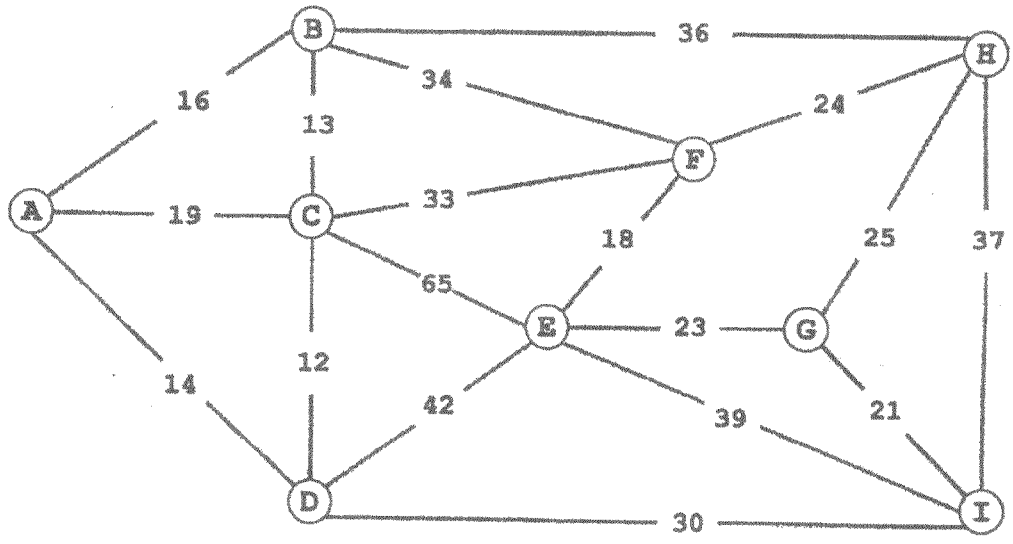
15. a) Given the following list of numbers.

    18 15 2 9 36 54 5 16 7 73 8

    Use the Quick sort algorithm to sort them. Show different passes indicating the pivot and the partitions formed.

    b) Compare the worst case height of red-black tree with n nodes and that of AVL tree with same number of nodes.

16. Consider the following weighted graph, give the list of edges in the Minimum Spanning Tree in the order that Kruskal's algorithm inserts them.



17. Write short notes on :

    a) Secure hash functions.

    b) Splay trees.

    c) Asymptotic notation.