MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL 576104

(Constituent College of Manipal University)

FOURTH SEMESTER B.TECH DEGREE MAKEUP EXAMINATIONS, JULY – 2016
SUBJECT: OPEN ELECTIVE – I: FUNDAMENTALS OF DATA STRUCTURES AND ALGORITHMS(ICT 3283)
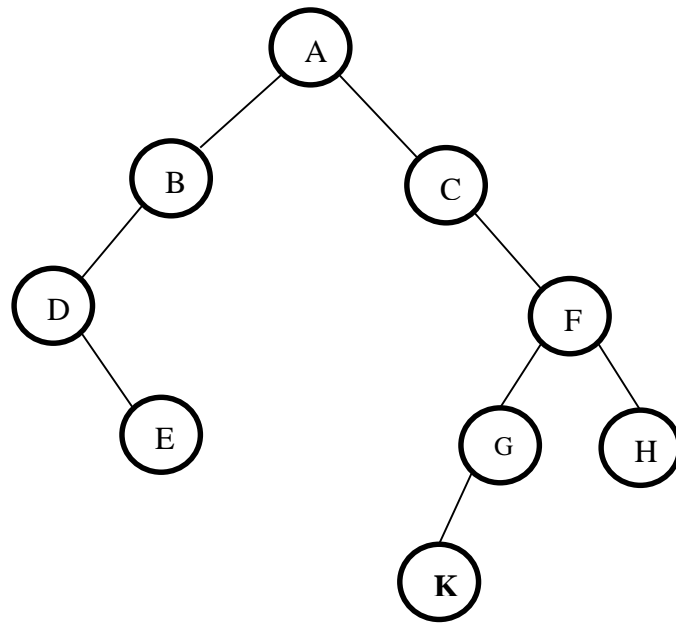**(REVISED CREDIT SYSTEM)**

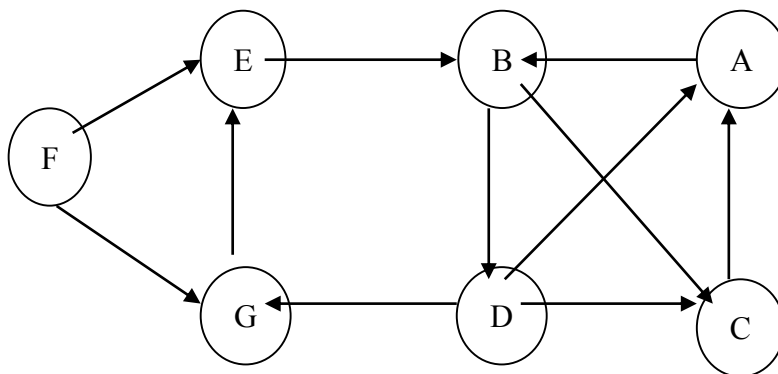| TIME: 3 HOURS	09/07/2016	MAX. MARKS: 50

Instructions to candidates
- Answer all the questions.
- Missing data, if any, may be suitably assumed.

1A.   How can you represent a polynomial using linked list? Write the structure definition. Write the necessary functions to add two polynomials.

1B.   What is an expression tree? Write an expression tree for the following infix expression.
        A/(B-C)+(D*(E-A)*C)

1C.   What is a threaded binary tree? Explain with a proper example.   (5+3+2)

2A.   Write functions for the following operations on a doubly linked list.
   a) Create
   b) Delete a node given the key
   c) Print

2B.   Sort the following elements using radix sort.
   12, 11, 15, 63, 43, 46, 98, 4, 18, 38, 67, 91

2C.   Determine the time and space requirement of the following function:

```
        int RSum(int a[], int n)

        {
          if(n>0)
            return (a, n-1)+a[n-1];
          return 0;
        }                                                      (5+3+2)
```

3A.   What is the difference between linear queue and a double ended queue? Write functions to implement different operations on a dequeue.

3B.   Write a function to exchange two nodes in a singly linked list by updating pointers

3C.   How can you represent a binary tree using an array? Explain with an example.   (5+3+2)

4A.   Write functions to perform preorder, inorder and postorder traversals of a tree. Perform those operations on the tree shown in Fig.Q.4A.

4B.   Write a function to count the number of leaf nodes in a binary tree.

4C.   What is a sparse matrix? Explain with an example.   (5+3+2)

5A.   Write a function to traverse a graph using Breadth First Search. Trace the function for the graph shown in Fig. Q.5A.

5B.   Evaluate the following expression using stack: 9/4-7-3/6*3

5C.   Discuss the time requirement to perform binary search and linear search.   (5+3+2)

Fig. Q.4A

Fig. Q.5A