Roll No. .....

Subject Code—6798

M.C.A. (Second Year) EXAMINATION

(5 Years Integrated Course)

(Main Batch 2009)

MCA-201

DATA STRUCTURES AND ALGORITHMS

Time : 3 *Hours* *Maximum Marks :* 70

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) What are Data Structures ? Why do we need data structure ?

   (b) Write advantages and disadvantages of Dynamic Storage Allocation over Static Storage Allocation.

2. (a) What are advantages of linked lists as compared to arrays ? Give suitable examples of applications where you would prefer linked lists than array.

(b) Explain the boundary conditions for an empty and full queue. (Assume that queue is implemented as an array). What is a Dequeue ?

3. (a) What is a Stack ? Explain various operations performed using stack with examples.

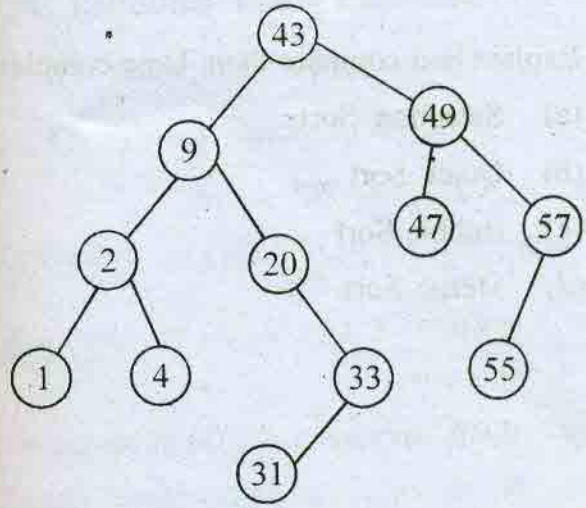
(b) What do you mean by tree traversal ? Write an algorithm for pre-order tree traversal.

4. Define a Binary Search Tree. Write an algorithm to search an item in a binary search tree. Discuss the complexity of the search.

5 .(a) Translate the following expression from Infix to Postfix :

((A + B)/D) * ((E – F) * G)

(b) Use the following tree to write the pre-order, post-order and in-order tree traversal expression :



6. (a) Explain what is meant by terms Directed groups, Undirected graph and Bipartite graph.

(b) Write an algorithm to search for an edge in a graph.

7. Write an algorithm to insert an item in a heap. Draw a minimum heap from the following data :

15, 22, 16, 40, 20, 35

8. Explain and compare their Time complexities :
   (a) Selection Sort
   (b) Quick Sort
   (c) Bubble Sort
   (d) Merge Sort.