MCA (Revised)

Term-End Examination

June, 2012

MCS-021 : DATA AND FILE STRUCTURES

Time : 3 hours   *Maximum Marks : 100*

(Weightage 75%)

Note :   Question number 1 is Compulsory. Attempt any three
questions from the rest. All algorithms should be written
nearer to C language.

1.   (a)   What are the pre conditions for applying   **10**
            binary search on any list containing Integer
            values ? Write the algorithm and manually
            run it on the following list of number :

            10 27 2.3-56 38 66 45

            What is worst case complexity of the above
            algorithm ?

      (b)   Differentiate between AA trees and Red -   **10**
            Black trees ? Construct an AA - Tree using
            the following nodes. Show all intermediate
            steps and balancing of tree. '

            17, 4, 25, 98, 28, 33, 42, 11, 6, 73

(c) Consider the following matrix :

$$X = \begin{bmatrix} 5 & 6 & 2 \\ 8 & 2 & 4 \\ 1 & 3 & 6 \end{bmatrix}_{3 \times 3}$$

    (i) Write the steps involved in calculating **5** the rank of X.

    (ii) Write an algorithm to find the **5** transpose of X.

(d) Write an algorithm that sort a given linked **10** list of integers. Also, write a function that splits this linked list into a linked list of even integers and a linked list of odd integers.

2. (a) Construct a binary tree using the following **10** pre - order and in - order trasversals :

Pre - order : A B G H M C D E F

In - order : B H M G A D F E C

(b) Write an algorithm for multiplication of two **10** sparse matrices.

3. (a) Explain the shell sorting technique with an **10** example. Give the complexity of above technique in terms of comparisions and storage required for both best and worst cases.

(b) Write the functions to perform Push and **10** Pop operations of stack using pointers. Using above functions, write an algorithm to convert a given infix notation to its equivalent postfix notation.

4. (a) Write an algorithm to find the frequency **10** (occurance of words) from a give text tile. The list of words and their corresponding frequency should be in the alphabetical order of words.

(b) Explain the different types of file **10** organisations available. Also, explain one advantage and one disadvantage of each.

5. (a) Using Dijkstra's algorithm, find the shortest **10** path between A and F for the following graph. Show the intermediate steps also.
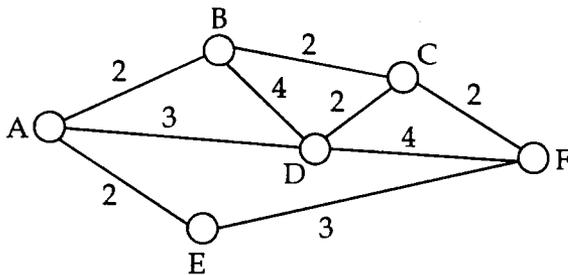
(b) Write short notes on the following with an example : **5x2=10**

(i) AVL tree

(ii) Circular Queue