09442

MCA (Revised)

Term-End Examination

June, 2010

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) Write a program to store the roll numbers and names of students in a binary search tree. Write a function to accept a number and display the name of the student, whose roll number matches with this number. Give suitable messages if the roll number does not exist in the binary search tree. **15**

(b) Consider the algorithm given below : **10**

```
(i)   Scanf ("%d"; & max);
(ii)  {for (int i=1; i<=max; i++){
(iii) for (int j=1; j<=max; j++)
(iv)  Printf ("%d", i * j);
```

Calculate the complexity (both space and time) of the above code by using Big 'O' notation.

(c) Write a program to simulate a circular queue using pointers with functions for insertion, deletion. (Use singly linked list). **10**

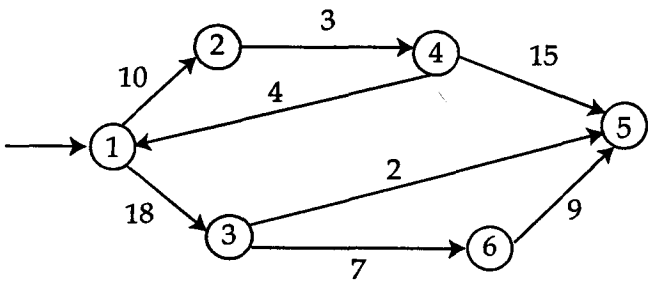
(d) Write an algorithm for pushing an element into a stack. **5**

2. (a) Write a program to find the frequency of words in a given text. The list of words and their corresponding frequency should be in the alphabetical order of words. **15**

(b) Explain the properties and operations of AA trees. **5**

3. (a) What is a sparse matrix ? What is its 3-tuple representation ? Also, write an algorithm that accepts 5x4 sparse matrix and outputs its 3 tuple representation. **10**

(b) Find minimum cost spanning tree from the following graph using Prim's Algorithm. **10**



4. (a) Show step by step construction of an AVL tree resulting from the inserting of the following sequence of keys. **10**

10, 3, 18, 4, 6, 8, 16, 14

Now, Delete key "8" from the constructed AVL tree and show the resultant tree.

(b) What are the essential features of a binary tree ? Explain, how a general tree can be converted into a binary tree ? **10**

5. (a) Pre-order traversal of a certain binary tree produces **10**

A D F G H K L P Q R W Z

and in order traversal produces :

G F H K D L A W R Q P Z

Using Pre-order and in-order traversal, draw the corresponding binary tree.

(b) Write an algorithm to balance a Red-Black tree after deleting a node. **10**