Advanced Diploma in Information Technology (ADIT) / Bachelor in Information Technology (BIT)

Term-End Examination

December, 2006

CST-103 : DATA STRUCTURES AND ALGORITHMS

Time : 2 Hours *Maximum Marks : 50*

Note : *There are two sections in this paper. All questions in Section A are* ***compulsory****. Answer any* ***two*** *questions from Section B.*

SECTION A

1. State *true/false* for the following statements : *1×5=5*

(i) After **pop** operation **top** of the stack is incremented by one.

(ii) Prefix expression, of expression (A + B) * (C — D) will be *+AB — CD.

(iii) Array implementation of list data structure will take less memory compared to its pointer implementation.

(iv) Graph data structure is a suitable option for representing a road map connecting major towns of a country.

(v) Empty tree is by definition, a 'binary tree'.

2. Define the following terms in the context of data structures and give two problems for each, where they can be used to provide solutions :

(i) Linked List

(b) Directed Graph

3. (a) Using a stack, convert the following infix expression into prefix expression

(a — b * c) / (a + b)

(b) What is binary search ? Explain how you will find whether '20' exists in the list using binary search algorithm.

10, 12, 14, 20, 28, 29, 40, 45, 80, 100

Explain all the steps involved in this process.

SECTION B

*Attempt any **two** questions from this section.*

4. (a) What is a binary tree ? Write a program in C to create a binary tree.

(b) Build an AVL tree for the following list of elements :

20, 10, 40, 8, 7, 6

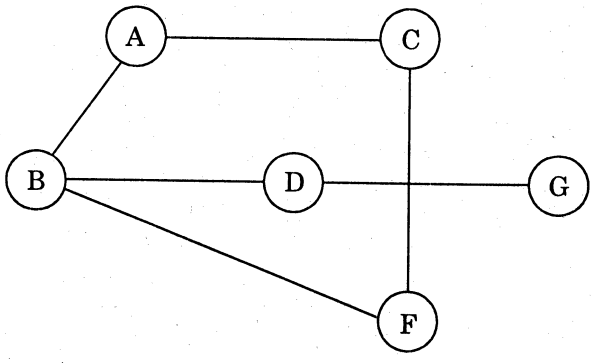
5. (a) Using QuickSort, sort the following list of elements :

10, 40, 2, 80, 6, 90

Clearly state all the steps of the sorting method.

(b) Write an algorithm to insert a given element at the end of the linked-list. After inserting the element, the algorithm should find and display the total number of elements in the linked-list.

6. (a) Traverse the graph given below in DFS (Depth First Search) order :



(b) What is hashing ? Why do hash clashes occur ? Explain one technique to resolve hash clashes.