

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

**Term-End Examination**

**June, 2007**

**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.*

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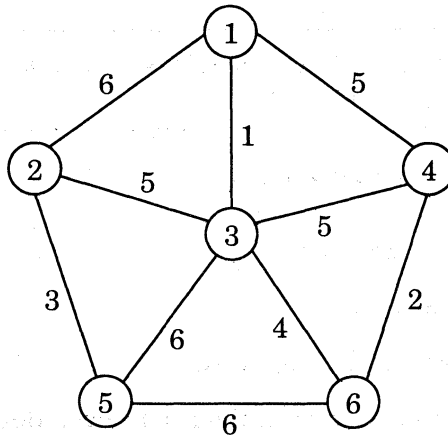
**SECTION A**

1. State *true/false* for the following statements :
  - (i) Arrays are always two dimensional.
  - (ii) Only queues are used to evaluate expressions.
  - (iii) It is always advantageous to use singly linked lists over doubly linked lists.
  - (iv) The height of a tree is always equal to the number of nodes in the tree.
  - (v) A graph has always at least one vertex.
  
2.
  - (a) What do you mean by the term data structures ? What are the different types of structures used in handling the data ? How are arrays different from linked lists ?
  - (b) What are the types of linked lists that are available to a programmer ? Give structure of each type of linked list using C-language.
  
3.
  - (a) What is array data structure ? Schematically describe with the help of a diagram, how a 2-D array is stored in memory. While passing an array as an argument to a function "we need to pass array as a whole or only its base address is needed to be passed". Give reason to support your answer.
  - (b) What is a stack ? Stack falls in which category of data structures ? Can we implement stacks by using linked lists or is arrays the only way to implement it ? Write an algorithm to perform PUSH and POP operations of a stack.

**SECTION B**

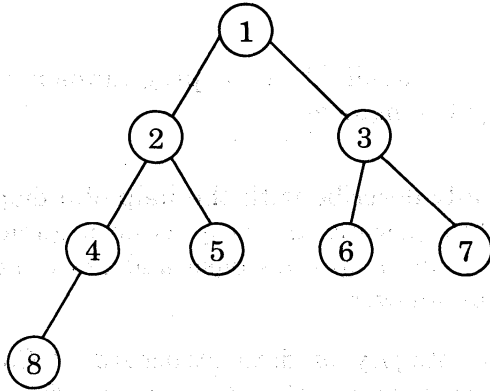
Attempt any **two** questions from this section.

4. (a) What is a threaded binary tree ? Briefly describe an application of a threaded binary tree ? Give two differences between B-trees and B<sup>+</sup> trees.
- (b) Write an algorithm for insertion of an element in a singly linked list at the following positions :
- (i) At the end of linked list
  - (ii) In between the linked list
5. (a) Draw the minimum cost spanning tree for the following graph. Also, indicate the minimum cost.



(b) Traverse the tree given below in :

- (i) In-order
- (ii) Pre-order
- (iii) Post-order



6. (a) Write the quick sort algorithm.
- (b) Write an algorithm for the deletion of a node from a Binary tree.