

**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.*

SECTION A

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

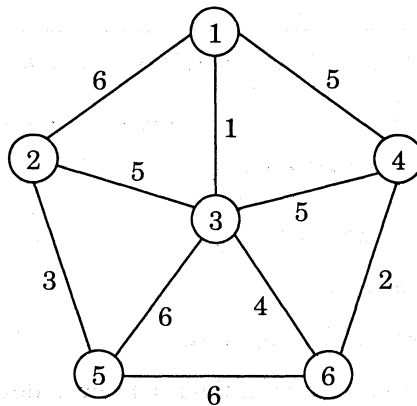
2. (a) What do you mean by the term data structures ? What are the different types of structures used in handling the data ? How are arrays different from linked lists ? 3
(b) What are the types of linked lists that are available to a programmer ? Give structure of each type of linked list using C-language. 5

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. 6
(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. 7

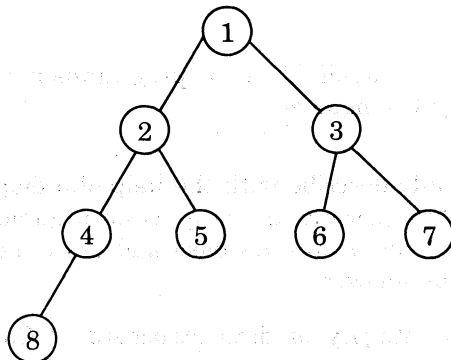
SECTION B

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⁺ trees. 7
- (b) Write an algorithm for insertion of an element in a singly linked list at the following positions : 5
- (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. 6



- (b) Traverse the tree given below in : 6
- (i) In-order
- (ii) Pre-order
- (iii) Post-order



6. (a) Write the quick sort algorithm. 5
- (b) Write an algorithm for the deletion of a node from a Binary tree. 7