C 17330

Name..

Reg. No...................................

SECOND SEMESTER M.C.A DEGREE EXAMINATION, AUGUST 2006

MCA 2K 204—DATA STRUCTURES AND ALGORITHMS

(New Scheme)

Time : Three Hours   Maximum : 100 Marks

Answer any five full questions.
All questions carry equal marks.

1. (a) Solve the recurrence relation

$$T(n) = \begin{cases} T(n-1) + C + T(n-1); & \text{if } n > 1 \\ C & ; & \text{if } n = 1. \end{cases}$$

   (b) Explain the methods used to determine time and space complexity of algorithms.

2. (a) A double ended queue is a linear list where additions and deletions can be performed at either end. Represent the data structure using an array. Write functions for additions and deletions of elements.

   (b) Write a function to copy one stack to another assuming the stack is implemented using linked list.

3. (a) Explain representation of graphs using adjacency matrix and adjacency list. Give examples.

   (b) Define representation of a binary tree using an array. Write a function to traverse the tree in preorder manner.

4. (a) Write an algorithm to find connected components of a graph.

   (b) Explain set implementation using bit string.

5. (a) Explain graph data structure. Illustrate a practical use of graph data structure.

   (b) What is an expression tree ? Draw an example expression tree of height 3. Illustrate basic traversals on the tree.

6. (a) Give a definition for binary search tree. Write algorithms to insert and delete keys from a BST.

   (b) What is double hashing ? Illustrate double hashing using a suitable example.

7. (a) Illustrate merge sort using a suitable example.

   (b) Discuss external sort algorithms.

(5 × 20 = 100 marks)