D 12665 **(Pages : 2)** **Name**

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, JANUARY 2006

Computer Science

CS 102—ADVANCED DATA STRUCTURES

(2005 Admissions)

Time : Three Hours **Maximum : 80 Marks**

Part A

Answer any* five *questions.
Each question carries equal marks.

1. (a) Explain and compare array based and pointer implementation of linked list.

(b) Explain about analysis of algorithms.

2. (a) What are queues ? Give the representation.

(b) Enumerate the application of graphs.

3. (a) Give the binary tree representation.

(b) Explain the following :

(i) Double Hashing.

(ii) Extendible Hashing.

4. (a) Distinguish between complete and' full binary tree.

(b) Can an undirected graph by cyclic ? Define directed graph and Undirected graph.

5. (a) What is the expected depth of the minimum value node in a random binary search tree ?

(b) Define directed Acyclic Graphs. Give *two* application for it.

6. (a) Prove that if the weight on the edge of a connected undirected graph are distinct then there is a unique "minimum spanning tree".

(b) Explain skew heap and Fibonacci heaps.

7. (a) Explain min-max heaps.

(b) Suppose that a graph G has a minimum spanning tree already computed, How quickly can the minimum spanning tree be updated if a new vertex and incident edges are added to G.

(5 x 8 = 40 marks)

Part B

Answer any* four *questions.
Each question carries equal marks.

1. (a) Difference between stack and Queue. Describe the Circular implementation list implementation of queue.

(b) Explain and compare array-based and pointer based implementation of linked list.

Turn over

2. (a) Explain how hashing can be applied to check whether all elements of a list are distinct. What will be the time efficiency of this application.

   (b) Prove that the height of a heap with n nodes is equal to $\lfloor \log_2 n \rfloor$.

3. (a) Enumerate and explain various hashing techniques.

   (b) Write an algorithm to get optimal binary tree and discuss its time complexity.

4. (a) What are B-trees. Give 4 properties of b-trees.

   (b) Explain the rotation used for balancing a binary search tree (use eith RED-BLACK tree).

5. (a) Given a full binary tree it is required to check whether it makes a heap or not. It is Ω-O algorithm or 0 – Complex algorithm.

   (b) What are the properties of Red-Black trees ? Give the algorithm for insertion for Red-Black trees.

6. (a) Explain Min-Max heaps.

   (b) Design an efficient algorithm for finding and deleting an element of smallest value in a heap and determine its time efficiency.

(4 x 10 = 40 marks