

**FIRST SEMESTER M.Sc. DEGREE EXAMINATION
NOVEMBER 2010**

Computer Science

CS 102 – ADVANCED DATA STRUCTURE

(2005 Admissions)

Time : Three Hours

Maximum : 80 Marks

Part A

Answer any **five** questions.
Each question carries 8 marks.

1. (a) Define a structure for a circular queue using an **array**. Explain *add* and *delete* functions for a circular queue.
(b) Explain how a stack can be implemented using linked list,
2. (a) What is a doubly linked list? Write a function to add a node on a doubly linked list.
(b) What is a binary search tree? Create a binary search tree using the following data entered as a sequential set
14, 23, 7, 10, 33, 56, 80, 66, 70.
3. (a) Explain how a graph can be represented by an adjacency matrix with the help of an example.
(b) Explain any one graph traversal method.
4. (a) Write and explain a recursive algorithm to find factorial of a given positive number.
(b) What is a *skip list*? Explain its use.
5. (a) Define halting. Explain the properties of a good hash function.
(b) What is *primary* and *secondary* clustering problem in hashing? Explain.
6. (a) Explain the structure and properties of *k-d* trees.
(b) What is a *trie*? Explain its use.
7. (a) Explain how a heap is represented in an array using an example.
(b) What are *splay trees*? Explain their properties.

(5 x 8 = 40 marks)

Part B

Answer any **four** questions.
Each question carries 10 marks.

1. (a) Describe queue data structure and operations on it.
(b) Explain how a stack can be used to evaluate **postfix** expressions.

Turn over

2. (a) Two lists L_1 and L_2 are given. Describe an algorithm to find out $L_1 \vee L_2$ and $L_1 \cap L_2$.
- (b) A binary tree has eight nodes. The postorder and inorder traversals of the tree are given below. Draw the tree.
- Postorder : **F E C H G D B A**
- Inorder **F C E A B H D G**
3. (a) Describe the generalized list ADT. Draw a picture showing the linked list representation of a generalized list.
- (b) Describe, giving an example the *mid-square* hash function.
4. (a) Define and explain the Treap data structure.
- (b) Draw the *B-Tree* of order 4 created by inserting the following data arriving in sequence.
92, 24, 6, 7, 11, 8, 22, 4, 5, 16, 19, 20, 78
5. (a) What is a *red black* tree? List down the properties of *red black* tree.
- (b) Draw and explain skew and split procedures for an *AA-tree*.
6. (a) Describe, giving an example the procedure of combining binomial trees into a binomial queue.
- (b) Explain the basic Fibonacci heap operations.

(4 x 10 = 40 marks)