D 41452 (Pages : 2) Name

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

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, JANUARY 2008

Computer Science

CS 102—ADVANCED DATA STRUCTURE

(2005 admissions)

Time : Three Hours Maximum : 80 Marks

Part A

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

1. (a) What are various stack operations ? Explain.

   (b) Explain the applications of stack for conversion of infix to postfix.

2. (a) Prove the inequality that bracket the height of a binary tree with n vertices :

   [log 2 n] < h < n-1.

   (b) Define spanning tree. Give an example.

3. Explain the following :

   (i) Reference counts. (ii) Adjacency lists.

   (iii) Heap property. (iv) Deque.

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

   (b) Explain about application of graphs.

5. (a) Can an undirected graph G has n verticles and e edges and is represented as adjacency matrix. What is the time required to determine the total number of edge in G.

   (b) Write a note on application of graph.

6. (a) Explain min-max heaps.

   (b) Explain pairing heaps and skew heaps.

7. (a) What are the minimum and maximum numbers of elements in a heap of height h ?

   (b) Prove that the maximum number of nodes of a binary tree of depth k is 2k-1.

(5 x 8 = **40** marks)

Part B

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

1. (a) Write a function to insert and delete elements in a stack.

   (b) Compare stack and queue.

2. (a) Explain how the linked list is implemented using array.

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

3. (a) Explain what is meant by a hashing function.

   (b) Describe in details one hash method with a suitable method.

Turn over

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

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

5. (a) Show how to merge two skew heaps with one top-down pass and reduce the merge cost to 0(1) amortized time.

   (b) Write the deletion procedure for red-black trees

6. (a) Prove that the algorithm for deletion in AA-trees is correct.

   (b) Design a recursive linear-time algorithm that tests whether a binary tree satisfies the search tree order property at every node.

(4 x 10 = 40 marks)

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