



Reg. No. : .....

Name : .....

**Fourth Semester B.Tech. Degree Examination, May 2014  
(2008 Scheme)**

**08.405 : DATA STRUCTURES AND ALGORITHMS (RF)**

Time: 3 Hours

Max. Marks: 100



**PART – A**

Answer **all** questions. 4 marks **each**.

1. What are the features of an efficient algorithm ?
2. Devise an algorithm which updates  $i^{th}$  element from the top of the stack, to a new value.
3. Discuss a scheme to store sparse matrices in an efficient way.
4. Formulate an algorithm for performing an insertion into an input restricted deque.
5. What is a threaded binary tree ? Explain the different ways of threading.
6. Briefly explain the methods to represent graphs.
7. Give the storage representation of blocks of boundary tag method.
8. Is quick sort a stable sorting method ? Justify your answer.
9. Given a set of N numbers. It is required to find the largest number and delete it. Again, form the remaining numbers, find the largest number and delete repeatedly. Describe a data structure that effectively carries out both operations – finding the largest number and deletion.
10. Explain the concept of external sorting.

**PART – B**

Answer **one full** question from **each** Module.

**Module – 1**

11. a) Multiple stacks can be implemented using one-dimensional array. Devise an algorithm which performs push and pop operations for the multiple stack, assuming the stacks have already allocated.

10



- b) Write an algorithm to evaluate a valid postfix expression and hence evaluate the postfix expression  
 6 2 3 + - 3 8 2 / + \*
- All operands are single digit positive integers and operators are binary in nature. 10

OR

12. a) What are the advantages of a circular queue ? Device an algorithm for inserting and removing elements into a circular queue. 12
- b) If a one dimensional array is used to implement a priority queue, write functions for insertion and deletion from a priority queue. 8

### Module – 2

13. a) Write algorithms for inserting and deleting an element to/from a doubly linked list. 12
- b) Two strings  $S_1$  and  $S_2$  are stored using linked lists R and S denote the pointers  $S_1$  and  $S_2$  respectively. Write an algorithm to concatenate  $S_1$  and  $S_2$ . 8

OR

14. a) Write procedures for printing the key-values stored in the nodes of a binary search tree by traversing:  
 i) Pre-order ii) Post order. 10
- b) Explain the Garbage collection method. Discuss one of the Garbage collection algorithms. 10

### Module – 3

15. a) Write Merge sort algorithm. Illustrate how the following list of 10 integers will be divided at various levels of recursion tree of merge sort algorithm.  
 42, 23, 15, 38, 65, 29, 74, 50, 12, 58. 12
- b) Illustrate the steps in building a heap using the following data :  
 75, 24, 43, 18, 45, 63, 20. 8

OR

16. a) Explain the procedure of partition-exchange sort. Also write the recursive and non-recursive procedures for partition-exchange sorting of N numbers in non-decreasing order. 15
- b) Write a procedure to perform k-way disc merge. 5