Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER–II • EXAMINATION – WINTER 2013

Subject Code: 620001 **Date: 24-12-2013**

Subject Name: Data Structures

Time: 10.30 am - 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

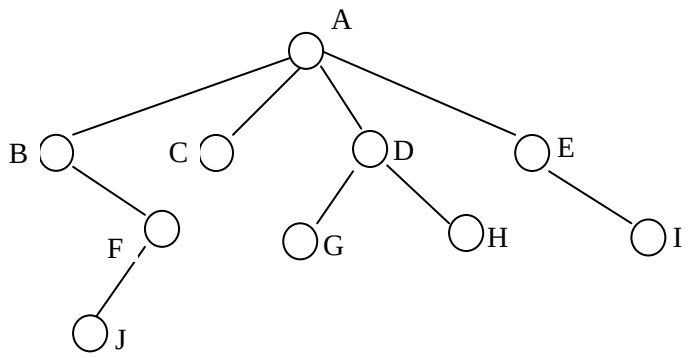
Q.1 **(a)** Answer the following

1. Briefly explain Pseudo Code conventions? **03**
2. Which data structure is used for evaluating an arithmetic expression written in Pre-fix notation? **01**
3. Derive equation for running time of insertion sort. Discuss best-case and worst-case. **03**

(b) Attempt the following

1. Explain the term 'Analysis of Algorithm'? **03**
2. What is the difference between Static memory allocation and dynamic memory allocation? When each of them is used? Explain with example. **04**

Q.2 **(a)** Convert the following tree into its equivalent binary tree. Write all the steps to get the output, when the tree is traversed in post-order traversal. **07**



(b) Write an algorithm to delete a node from a lexically ordered binary tree. Consider all the possible cases that is node to be deleted has no child, one child and two children. **07**

OR

(b) What is divide-and-conquer approach? Write the algorithm of Merge Sort. Sort the following data using Merge Sort. **07**

22, 35, 47, 14, 21, 63, 12, 46

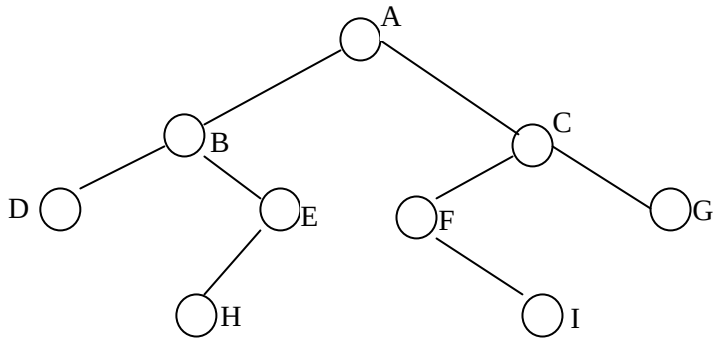
Q.3 **(a)** i. List and explain primitive functions for string manipulation **04**

ii. Describe storage representation of a string. **03**

(b) Define doubly linked list. What are its advantages and disadvantages over singly linked list? Write an algorithm to insert a node as a predecessor of a node X in a doubly linked list. **07**

OR

Q.3 **(a)** Write a short note on threaded storage representation. Consider the following binary tree and thread it using pre-order traversal. **07**



(b) i. Explain BFS and DFS with example. **04**

ii. Explain hashing function. Where it is used? **03**

Q.4 **(a)** What do you mean by data structure? State its types. 'Queue' is of which type of data structure? What is the main disadvantage of a queue? And what is the advantage of a circular queue? **07**

(b) Write an algorithm to convert an arithmetic expression written in infix notation into the expression in Reverse Polish notation. **07**

OR

Q.4 **(a)** Write an algorithm to insert a node as a predecessor of a node x in a circularly linked list. **07**

Q.4 **(b)** Define 'Stack' and write differences between stack and queue? Write atleast three applications of stacks. **07**

Q.5 **(a)** Explain heap sort to sort the data given below. While constructing the heap, indicate clearly all the changes required to be done in each step.

Data: 39, 16, 45, 89, 61, 72, 22, 48, 54 **07**

(b) i. Explain the binary search technique to search an element in an array containing at least 500 numbers with no duplication. **04**

ii. While searching when collision occurs? Give atleast two techniques to resolve the collision. **03**

OR

Q.5 **(a)** Perform Quick Sort for the data given below to get them in descending order.

Data: 56, 72, 49, 34, 68, 81, 75, 99, 13, 27, 59, 38 **07**

(b) Define Height Balance Tree (HBT). Explain how to keep the HBT balanced while inserting a node in a balanced HBT. Consider all the possible cases. **07**

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