Reg. No.										

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MANIPAL INSTITUTE OF TECHNOLOGY

THIRD SEMESTER B.TECH. (IT/CCE) DEGREE MAKEUP EXAMINATION, JAN - 2016
SUBJECT: DATA STRUCTURES (ICT-2103)
(REVISED CREDIT SYSTEM)

TIME: 3 HOURS **03/01/2016** **MAX. MARKS: 50**

Instructions to candidates

- Answer all **FIVE** questions
- Missing data, if any, may be suitably assumed

1A. Explain multiple queue concept. Write a complete C++ program to implement multiple queues.

1B. Explain different types of constructor with suitable example.

1C. Write a recursive user defined function to find the GCD of two numbers. Write a main function to read the two numbers and pass it to the GCD function.

(5+3+2)

2A. Write a class definition for implementing a stack data structure. Use this stack class to convert a given infix expression to a prefix expression. Show the contents of the stack at each step.

Infix expression: A + (B * C - (D / E - F) * G) * H

2B. Explain with suitable example, how stacks can be used in (i)recursion (ii)finding whether the string is a palindrome or not.

2C. Consider a sparse matrix represented using array of objects. Write a user defined function which takes this sparse matrix as an argument and displays the corresponding 2D matrix.

(5+3+2)

3A. Write a menu driven program which performs the following operations on doubly linked list.

i. Insert a node at the end

ii. Delete a specific element given as input by the user

iii. Reverse the List

iv. Display the contents of the list.

3B. Write user defined functions to:

i. Delete duplicate nodes from a singly linked list.

ii. Delete the last node of the singly linked list and append it at the beginning of the list.

3C. What is time complexity? Explain with suitable example.

(5+3+2)

4A. Define max heap. Explain with an example. Write user defined functions to insert an element into a max heap and delete an element from a max heap.

4B. Explain the significance of threaded binary tree. Show the memory representation for an empty threaded tree. Draw the threaded representation for the tree given in Figure Q.4B.

4C. Given the adjacency matrices for an undirected graph and a directed graph, how to find the degree of a vertex?

(5+3+2)

5A. Write a complete C++ program to implement quick sort. For the following set of numbers show each step in the sorting process: 10, 20, 9, 19, 5, 11, 2

5B. Write a function to perform the depth first search traversal on a given graph. The parameter to the function is the index from which the traversal should start. For the adjacency matrix M given below, draw the equivalent graph. Also write the Breadth First Search and Depth First Search sequences starting from the vertex A in the graph. Consider the increasing numerical order for traversal.

$$M = \begin{array}{c} \\ A \\ B \\ C \\ D \\ E \end{array} \begin{array}{c} \begin{array}{ccccc} A & B & C & D & E \end{array} \\ \begin{pmatrix} 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 & 1 \\ 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{pmatrix} \end{array}$$

5C. Construct an appropriate tree using the traversal sequence given below. Also write the level order traversal sequence for the constructed tree.

PREORDER: G B Q A C K F P D E R H

INORDER: Q B K C F A G P E D H R

(5+3+2)

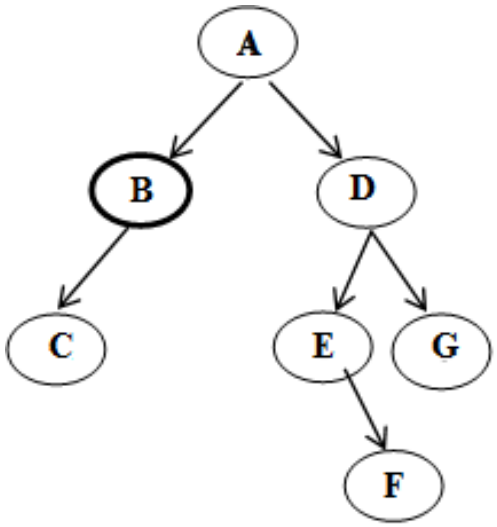

Figure Q.4B