Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Unit of MAHE, Manipal

THIRD SEMESTER B.TECH. (INFORMATION TECHNOLOGY/COMPUTER AND COMMUNICATION ENGINEERING)

END SEMESTER EXAMINATIONS, JAN 2022

SUBJECT: DATA STRUCTURES [ICT 2153]

(REVISED CREDIT SYSTEM)

PART B
(24/01/2022)

Time:{Writeup: 9:20AM - 10:35AM, Scan & Upload: 10:35AM-10:45AM} **MAX. MARKS: 20**

Instructions to candidates:

- Answer **ALL** questions.
- Missing data, if any, may be suitably assumed.
- Do not use structure concept. Use class concepts only.
- Use only primitive data types.

1A. Convert the tree shown in Figure Q1A to binary tree using left-child right-sibling representation. Write the level order traversal for the converted binary tree. Write a user-defined function to count the number of leaf nodes, non-leaf nodes, 2-degree nodes.

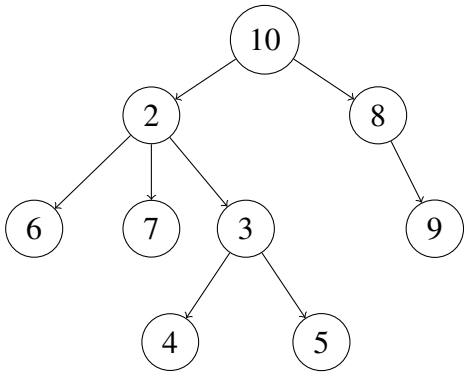

Figure Q1A

5

1B. Write a complete C++ program to convert a 2D sparse matrix MAT of order MxN to a form <row, col, value> represented using a circular singly linked list by maintaining the row major order. Read all the input from user. **3**

1C. Construct a Binary Search Tree by inserting following elements: 77, 100, 56, 99, 60, 50, 40, 6. Properly show each step of construction. **2**

2A. Write a complete C++ program to perform the following operations on a linear singly linked list using class concept. Use only primitive data types. Each operation must be implemented as a member function

i) Create the list to store a complete string in it. Each node contains a character of the string as the data field.

ii) Check whether the string stored in the linked list is palindrome. str1 and str2 are the string variables that hold the strings obtained from reading the linked list in both the directions respectively.

iii) Display k^{th} character from the last **5**

2B. Write a C++ program to implement two stacks in a single array such that the space is used efficiently. Do not read the size of each stack in advance from the user. Do not make equal partition. **3**

2C. Write a function to create a singly linked list with only odd data values (input to be given by the user and even values entered by the user to be discarded). Write another user defined function to create a doubly linked list that has the values from the even positions of the already created singly linked list. For example, if the singly linked list was created with values: $3 \rightarrow 5 \rightarrow 7 \rightarrow 9 \rightarrow 11 \rightarrow 13 \rightarrow 15$, then the doubly linked list should contain values: $5 \rightleftarrows 9 \rightleftarrows 13$. **2**

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