



VIT
Vellore Institute of Technology
Established by the Vellore Institute of Technology Society, Vellore, Tamil Nadu, India

School of Computer Science and Engineering

Winter Semester 2023-24

Continuous Assessment Test – II

SLOT: A1+TA1

Programme Name & Branch: M.Tech(5 Yrs Integrated) MIC & MID

Course Name & Code: CSI2002 -Data Structures and Algorithm Analysis

Class Number (s): VL2023240504535, 1874, 1870, 1872, 1867

Faculty Name (s): Prof. Parveen Sultana H, Prof. Murali, Prof. Goutam, Prof. Boominathan &
Prof. Parthasarathy G

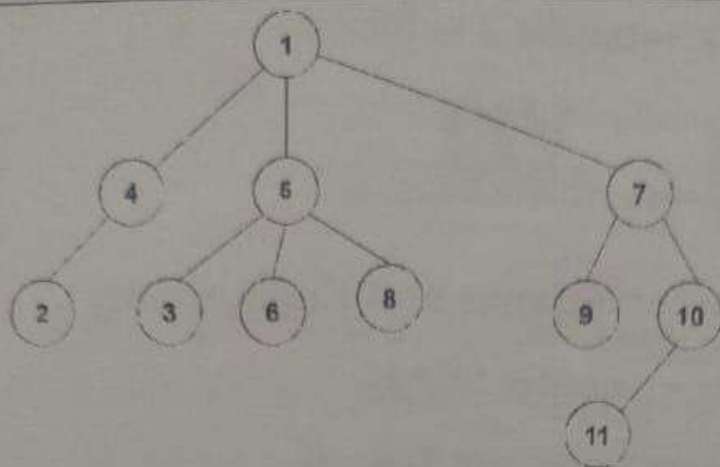
Exam Duration: 90 Min.

Maximum Marks: 50

General instruction(s):

All Questions carry Equal Marks

Q.No.	Question	Max Marks
1.	You are tasked with implementing a singly linked list to store a collection of student records. Each record contains the student's name, ID, and GPA. Describe how you would design the data structure and provide implementations for key operations such as insertion, deletion, and traversal.	10
2.	In an initially empty binary search tree, show the steps while inserting 50, 15, 62, 5, 20, 58, 91, 3, 8 in order. Write a pseudocode to find the minimum and maximum element in the resulting binary search tree.	10
3.	a. Write down the algorithm/pseudocode to convert the general tree into a binary tree and apply the algorithm to convert the following general tree into a binary tree. (5 marks)	10



b. Construct an expression tree for the given infix expression $(a + b * c) + ((d * e + f) * g)$.

(5 marks)

4.	Which sorting algorithm follows divide and conquer strategy, works on choosing a pivot element to divide the input array? Write the algorithm and show how it works on the input $\{36, 34, 43, 11, 15, 20, 28, 45, 27, 32\}$. Mention its time complexity.	10
5.	You are tasked with implementing a sorting algorithm for a list of integers. Considering the efficiency and simplicity required, explain the sorting algorithm which uses smallest element, its key steps, provide time complexity and potential applications.	10