REG.NO.:

SLOT: E1+ TE1

VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

Programme Name & Branch	: B.Tech. & CSE
Course Code and Course Name	: BCSE202L and Data Structure and Algorithms
Faculty Name(s)	: Common to ALL
Class Number(s)	: Common to ALL
Date of Examination	: 09 October 2025
Exam Duration	: 90 minutes

Maximum Marks: 50

General instruction(s):

- Answer All Questions

Q. No	Question	Module	Marks	CO	BL
1.	A) Develop a pseudocode for a function **addPolynomials**(poly1, poly2) that takes two such polynomial lists and returns a new circular linked list representing their sum. **[5 M]** **Illustrate the complete process** by adding the following two polynomials. Show the initial lists and the final resulting list with diagrams. • $P_1(x) = 8x^2 + 3x^2 + 10x + 5$ • $P_2(x) = 4x^3 - 3x^2 + 2x + 5$ B) Given a singly linked list $L: L_0 \rightarrow L_1 \rightarrow L_2 \ldots \rightarrow L_{n-1} \rightarrow L_n$ the task is to reorder it $L: L_0 \rightarrow L_n \rightarrow L_1 \rightarrow L_{n-1} \rightarrow L_2 \rightarrow L_{n-2} \ldots$ without using any extra data structures for storage (i.e., O(1) space complexity). Develop a pseudocode for a function **reorderList(head)** that performs this operation. **[5 M]** **input_list: 10 → 20 → 30 → 40 → 50 → 60 → NULL** **output_list: 10 → 60 → 20 → 50 → 30 → 40 → NULL**	M02	10	2	6
2.	Demonstrate the Quicksort on the array [45, 20, 60, 35, 10, 50, 35] using first element as pivot. Write the generic recurrence relation for the Quicksort and list its worst case, best case and average case time and space complexity. Justify whether Quicksort is in-place and stable algorithm or not?	M03	10	3	3
3.	a) You are given the preorder and inorder traversals of a binary tree T. Construct the unique binary tree that corresponds to these traversals and draw it clearly. • **Preorder Traversal:** M, B, A, D, C, E, P, Q, S, R • **Inorder Traversal:** A, B, C, D, E, M, P, Q, R, S	M04	5	4	4
	b) Now, analyze the tree you constructed in Part (a). i. Is the constructed tree a Binary Search Tree (BST)? Justify your answer in one or two sentences. ii. Write an efficient **pseudocode** for a function **isBST**(root) that takes the root of a binary tree and returns **true** if the tree is a	M04	5		

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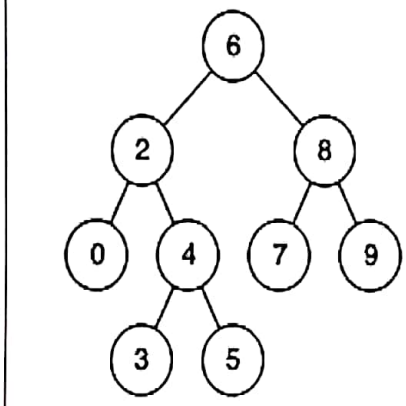
	valid BST and **false** otherwise. The function should correctly handle the entire structure of the tree.				
4.	a) Construct the binary expression tree for the following infix expression. Then, perform a **preorder traversal** on your constructed tree to derive the corresponding Prefix (Polish Notation) expression. **Infix Expression:** ((A * B) + (C / D)) ^ (E - F)	M04	5	4	
	b) The **Lowest Common Ancestor (LCA)** between two nodes, **n1** and **n2**, in a tree is the lowest (i.e., deepest) node that has both **n1** and **n2** as descendants. Write an efficient **pseudocode** for a function **findLCA**(root, n1, n2) that finds the Lowest Common Ancestor of two given nodes in a **Binary Search Tree**. Your algorithm should leverage the properties of a BST to run faster than it would on a regular binary tree.  **LCA**(2,8) = 6 **LCA**(2,4) = 2 **LCA**(0,5) = 2	M04	5		
5.	Create a new AVL tree and insert the following keys in the given order: **Sequence:** 30, 20, 10, 25, 28. For each insertion, draw the resulting tree. If an insertion causes an imbalance, you must: **a)** Identify the unbalanced node. **b)** Name the type of imbalance (**LL, RR, LR, or RL**) and rotation required. **c)** Draw the final, rebalanced tree before proceeding to the next insertion. Take the final, balanced AVL tree you constructed after all insertions and delete the node 10.	M07	10	5	4

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