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

School of Computer Science and Engineering

Winter Semester 2022-2023

Continuous Assessment Test – 2

Programme Name & Branch : B.Tech. Computer Science and Engineering **SLOT: A2+TA2**

Course Name & code: Data Structures and Algorithms (BCSE202L)

Class Number (s): VL2022230506314, 5850, 5856, 5839, 5843, 5858, 5841, 6333, 5848

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Exam Duration: 90 Min. **Maximum Marks: 50**

Q. No.	Question	Max Marks
1.	Suppose List1 and List2 are two sorted linked lists with distinct elements. Write an algorithm which combines these two lists into a single sorted linked list. Now from this sorted linked list if we delete all the numbers greater than 7, then what changes will happen as far as algorithm is concerned? Justify your answer with proper example.	10
2.	a) Suppose the following sequences list the nodes of a binary tree T in preorder and inorder respectively: 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 Construct a Binary Tree for the same. (6 Marks) b) Construct the expression tree for the following arithmetic expression: A + B * (C -6) / 5 + D (4 Marks)	10
3.	a) Given an array of 1,00,000 pixel color values, each of which is an integer in the range [0,255]. Which sorting algorithm is preferable for sorting them? Write the algorithm for the same? (5 Marks) b) Quick-sort is run on two inputs shown below to sort in ascending order i. 1,2,3 ....n ii. n, n- 1, n-2, ... 2, 1 Let C1 and C2 be the number of comparisons made for the inputs (i) and (ii) respectively. Illustrate the relation between C1 & C2 in terms of complexity. (5 Marks)	10
4.	a) For each of the following statements, either explain why it is true, or give an example to show that it is false: i. Every subtree of Binary Search Tree (BST) is another BST. ii. If both the left and right subtrees of a binary tree T are BSTs, then T must be a BST.	10

	iii. If the same keys are inserted in different order to build a BST, the resulting BST will be the same. (6 Marks) b) Suppose the numbers 7, 5, 1, 8, 3, 6, 0, 9, 4, 2 are inserted in that order into an initially empty BST. Construct BST and what is the height of the resultant tree? (4 Marks)	
5.	Construct max heap by considering set of numbers {50, 20, 30, 10, 40, 70, 60, 25}. Illustrate the step by step insertion procedure. Delete number 25 and then number 70 from the constructed max heap. Illustrate the step by step deletion procedure for the same.	10