



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

SLOT: E2 + TE2

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2025-2026

Programme Name & Branch : B.Tech CSE & ALL SPECIALIZATIONS
Course Code and Course Name : BACSE105 & Data Structures and Algorithms

Faculty Name(s) : Prof. VETRISSELVI T and others

Class Number(s) : VL2025260501379 and others

Date of Examination : 31/01/2026

Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s):

- Answer All Questions

Q. No	Question	Module	Marks	C
1.	Derive the recurrence relation for the following algorithm and determine its time complexity using the recursion tree method Algorithm F(n) 1. if $n \leq 1$ return 2. $F(n/3)$ 3. $F(2n/3)$ 4. Perform constant work	1	10	
2.	a) What is the worst-case complexity of the each of the following code fragments? Two loops in a row: for ($i = 0; i < N; i++$) { sequence of statements for ($j=0; j < N; j=j+2$) {sequence of statements}} for ($j = 0; j < M; j++$) { sequence of statements } b) For each of the following loops with a method call, determine the overall complexity. As above, assume that method f takes constant time, and that method g takes time linear in the value of its parameter. (i). for ($j = 0; j < N; j++$) f(j); (ii). for ($j = 0; j < N; j++$) g(j); (iii) for ($j = 0; j < N; j++$) g(k);	1	10	



VIT

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

SLOT: E2 + TE2

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING CONTINUOUS ASSESSMENT TEST - I WINTER SEMESTER 2025-2026

3.	Consider a circular queue implemented using an array of size 5. Initially, the queue is empty. First, perform a DEQUEUE operation. Then, perform the following operations in sequence: ENQUEUE the elements 45, 56, 67, 87, 12, and 23. After completing these ENQUEUE operations, perform the DEQUEUE operation twice. Trace each operation clearly, show the result of every DEQUEUE call, and display the elements present in the circular queue after each operation. Also write the algorithm or pseudocode for the Enqueue and Dequeue operations on a circular queue	2	10	2	3
4.	Consider two polynomials $P_1(x)$ and $P_2(x)$ represented using singly linked lists, where each node stores a coefficient and an exponent. Let $P_1(x) = 5x^3 + 4x^2 + 2x + 1$ $P_2(x) = 3x^3 + 2x^2 - 6$. Write an algorithm to perform polynomial addition using the linked list representation. Trace the addition process step by step, showing how corresponding nodes (terms with the same exponent) are compared and combined. Draw neat linked list diagrams for $P_1(x)$, $P_2(x)$, and the resultant polynomial	2	10	2	3
5.	a) Consider the given expression tree. Perform inorder, preorder, and postorder traversals of the tree. Trace each traversal step by step, showing the order in which the nodes are visited, and draw a neat, clearly labeled sketch of the expression tree to support your explanation. b) Write an algorithm to construct a binary tree from given infix expression to postfix expression: INORDER : D B H E A F C I G PREORDER : A B D E H C F G I	2	10	2	3