REG.NO.: [redacted]

VIT

Vellore Institute of Technology

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

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS

CONTINUOUS ASSESSMENT TEST - I

FALL SEMESTER 2025-2026

SLOT: [redacted]

Programme Name & Branch	**: B.Tech(CSE), Artificial Intelligence and Data Engineering**
Course Code and Course Name	**: BCSE202L , Data Structures and Algorithms**
Faculty Name(s)	**: Dr. Prabukumar M and Prof. Jenila Vincent M**
Class Number(s)	**: VL2025260104030**
Date of Examination	**: 18-Aug-2025**
Exam Duration	**: 90 minutes** **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)
  1. Understand the fundamental analysis and time complexity for a given problem.
  2. Articulate linear, non-linear data structures and legal operations permitted on them.

Q. No	Question	M	CO	BL

1.	a) Determine the time complexity of the following code
	
	for (int i = 0; i < n; i++) {
	for (int j = 0; j < n; j++) {
	} }
	for (int k = 0; k < n; k++) {
	}
	for (int k = 0; k < n; k++) {
	}
		5	1	2

	b) Given the following functions, state whether the complexity is Big-Theta of n^2 and justify: i. $f(n)=3n^2+5n+2$ ii. $f(n)=n \log n + n$	5		
2.	a) Consider the recurrence relation defined by $T(n) = 2T(n/2) + n$, where n is a power of 2. Solve this recurrence using recursion tree method.	5	1	2
	b) Using the substitution method, solve the recurrence relation $T(n)=T(n-1)+n$ and determine its time complexity. Write appropriate recursive algorithm for the given recurrence relation.	5		
3.	a) Linked lists are often criticized for being memory-intensive data structures. Justify the statement "Linked lists take more memory space than arrays"	3	2	4
	b) Write an algorithm/ program for evaluating postfix expression. Evaluate the given postfix expression 6 2 3 + - 3 8 2 / + * using stack data structure and illustrate the contents of the stack after each operation during the evaluation process.	7		

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4.	A library maintains its collection of books in such a way that each book record can be traversed both forward and backward, and the last record links back to the first to form a circular structure. Write the algorithm to implement this using a circular doubly linked list with the following operations: 1. Insert a new book at the end of the list. 2. Delete a book by its title. 3. Display the list in both forward and reverse order.	10	2	3
5.	Write a pseudocode or algorithm to add two polynomials represented as singly linked lists, where each node stores the coefficient and exponent of a term, and produce the resulting polynomial as a linked list. Polynomial 1 : $5x^3+4x^2+2x+1$ Polynomial 2 : $3x^3+6x^2+4x+9$ Result : $8x^3+10x^2+6x+10$	10	2	3

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