Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – MAY/ JUNE 2025

Date: 04-06-2025 **Time:** 01:00 pm – 04:00 pm

School: SOE	**Program:** B .Tech-EEE	
Course Code: CSE2001	**Course Name**: Data Structures and Algorithms	
Semester: IV	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	24	24	26	26	-

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	Identify the characteristics of a queue in data structures.	**2 Marks**	**L1**	**CO1**
2.	Provide an example of a real-life application of a stack.	**2 Marks**	**L2**	**CO1**
3.	State two advantages of linked lists over arrays.	**2 Marks**	**L1**	**CO2**
4.	Define the base condition in recursion?	**2 Marks**	**L1**	**CO2**
5.	List any two properties of binary trees.	**2 Marks**	**L1**	**CO3**
6.	Name two types of graph representation.	**2 Marks**	**L1**	**CO3**
7.	Recognize the difference between a directed and an undirected graph?	**2 Marks**	**L1**	**CO3**
8.	Identify the key idea behind binary search?	**2 Marks**	**L2**	**CO4**
9.	Define best case and worst case time complexity.	**2 Marks**	**L1**	**CO4**
10.	List any two sorting algorithms.	**2 Marks**	**L1**	**CO4**

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	Develop a code snippet to demonstrate the following operations in a Stack: Is empty, Is full, Peek, Display.	**10 Marks**	**L3**	**CO1**
	b.	What are the different types of queues? Explain each with a diagram.	**10 Marks**	**L3**	**CO1**
		Or			
12.	**a.**	A train platform operates on a queue-based system. Explain how front and rear change as passengers arrive and leave.	**10 Marks**	**L3**	**CO1**
	b.	Solve the evaluation of the following postfix expression: a) 5 6 2 + * 12 4 / - b) 10 2 8 * + 3 - 1 2 3 * + -	**10 Marks**	**L3**	**CO1**

13.	**a.**	A university maintains student attendance using a linked list. Each student is represented as a node with details like ID, Name, and Attendance Percentage. Write a program to implement this system with functions to add a student, delete a student, and display the attendance list.	**10 Marks**	**L3**	**CO2**
	b.	Implement a recursive function to solve a common problem, such as calculating factorial or Fibonacci numbers. Provide detailed code and explain how recursion works in the solution.	**10 Marks**	**L3**	**CO2**
		Or			
14.	**a.**	A music streaming app wants to create a continuous playlist feature where the last song plays before restarting from the first song. Write a function to insert a new song, delete a song, and traverse the playlist continuously using a circular linked list.	**10 Marks**	**L3**	**CO2**
	b.	The Tower of Hanoi problem involves moving a set of discs from one rod to another, with the constraint that no larger disc can be placed on top of a smaller one. The solution is inherently recursive. How would you approach solving the Tower of Hanoi problem using recursion? Write a recursive function to solve the Tower of Hanoi problem for 3 discs and explain the recursive process step by step.	**10 Marks**	**L3**	**CO2**

15.	**a.**	Write a program to implement a doubly linked list with the following operations: • Insertion at the beginning • Deletion from the end Explain each operation with an example.	**10 Marks**	**L3**	**CO3**

	b.	Given the inorder and preorder traversal of a binary tree, construct the tree and display the postorder traversal. Inorder: D B E A F C Preorder: A B D E C F	**10 Marks**	**L3**	**CO3**
Or					
16.	**a.**	Describe in detail the concept of tree traversal and write algorithms for in-order, pre-order, and post-order traversals.	**10 Marks**	**L3**	**CO3**
	b.	Differentiate between the following pairs of terms with examples: i. Undirected Graph vs Directed Graph ii. Connected Graph vs Disconnected Graph iii. Path vs Cycle	**10 Marks**	**L3**	**CO3**

17.	**a.**	Write an algorithm for insertion sort and analyze its time complexity in all cases.	**10 Marks**	**L3**	**CO4**
	b.	A student record system has unsorted names of 1000 students. Design an algorithm to search for a student using sequential search and discuss its performance.	**10 Marks**	**L3**	**CO4**
Or					
18.	**a.**	Trace the selection sort algorithm for the list: [29, 10, 14, 37, 13].	**10 Marks**	**L3**	**CO4**
	b.	Define asymptotic notations. Explain Big O, Big Omega, and Big Theta notations with graphical representation and suitable examples.	**10 Marks**	**L3**	**CO4**