SRM Institute of Science and Technology
Faculty of Engineering and Technology
DEPARTMENT OF CSE
Vadapalani Campus, Chennai 600026, Tamilnadu
Academic Year: 2024-25 Semester: ODD

Mode of Exam
OFFLINE
SET-A

Test: CLAT-2 **Date:**08.09.2024
Course Code & Title: 21CSC201J & Data Structures and Algorithms **Duration:**90 min.
Year &Sem: II/III **Max. Marks:**50

Course Articulation Matrix:

S. No.	Course Outcomes (CO)	Program Outcomes (PO)												PSO		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Develop programs using data types like structures, pointers and arrays supported by C programming language	1	-	3	-	-	-	-	-	2	-	-	-	1	-	2
2	Analyze the complexity of algorithm and if needed, modify it to improve its efficiency	2	3	2	1	-	-	-	-	-	-	-	-	1	2	-
3	Identify and use appropriate data structure for devising solution	1	3	2	-	-	-	-	-	-	-	-	-	1	1	2
4	Describe and use tree structure while developing programs	2	-	3	2	-	-	-	-	-	-	-	-	1	-	2
5	Implement the Graph structure and use it whenever deemed university for provide	3	2	3	-	-	-	-	-	-	-	-	-	1	1	2

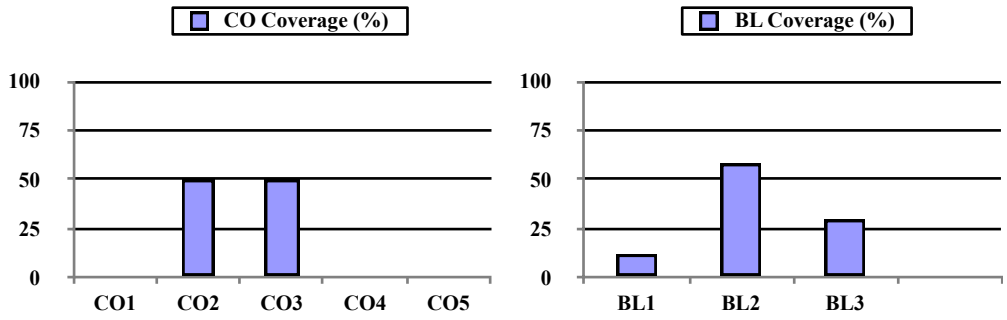
Part – A
(11 x 01 = 11 Marks)
Instructions: Answer All the Questions

Q. No	Question	Marks	BL	CO	PO
1	The asymptotic time complexity to inspect an element at a given index of an array? a) O(1) b) O(n) c) O(n2) d) O(n3)	1	2	2	2
2	In the worst case, the number of comparisons needed to search a singly linked list of length n for a given element will be? a) O(1) b) O(n) c) O(n2) d) O(n3)	1	2	2	2
3	Which of the following double linked list operations takes O(1) time? a) Insert element at start of linked list b) Insert element at end of linked list c) Delete element at the start d) All of the above	1	2	2	2

4	Linked list data structure offers considerable saving in _____ a) Computational Time b) Space Utilization c) both a & b d) Speed Utilization	1	1	2	1
5	What is the term for inserting into a full queue known as? a) overflow b) underflow c) null pointer exception d) program not compiled	1	1	3	1
6	In a queue, deletion happens at? a) rear b) front c) either front or rear d) neither front or rear	1	1	3	2
7	What happens when a pop operation is performed on an empty stack. a) Compilation error b) Stack underflow c) Runtime error d) Stack overflow	1	1	3	1
8	Here is an infix expression: 4 + 3*(6*3-12). Suppose that we are using the usual stack algorithm to convert the expression from infix to postfix notation. The maximum number of symbols that will appear on the stack AT ONE TIME during the conversion of this expression. a) 1 b) 5 c) 3 d) 4	1	2	3	2
9	The prefix form of A-B/ (C * D ^ E) is? a) -/*^ACBDE b) -ABCD*^DE c) -A/B*C^DE d) -A/BC*^DE	1	2	3	2
10	Which data structure is used for implementing recursion? a) Queue b) Stack c) Array d) List	1	1	3	1
11	In a stack, if a user tries to remove an element from an empty stack it is called _____ a) Underflow b) Empty collection c) Overflow d) Garbage Collection	1	1	2	1
Part – B **(3 * 8 =24 Marks)** **Instructions: Answer All the Questions**					
12. A	What are the advantages of using a linked list over an array? Illustrate the structure of a singly linked list. Design a pseudocode for inserting a node at the first position of a singly linked list.	8	2	3	1

	OR				
12. B	Illustrate with suitable diagrams, the deletion of an element at the end in a singly linked list.	8	2	3	1
13. A	Explain the general strategy for eliminating every kth person in a circle using a linked list.	8	2	2	2
	OR				
13. B	Explain stack data structure. Design pseudocode for pushing and popping an element from the stack.	8	2	2	3
14. A	Explain how to use a stack to evaluate expressions in postfix notation and then compute the result for 12+ 3 * 14 –5* 16 7+.	8	2	3	3
	OR				
14. B	Explain queue data structure and implementation of any one of its applications.	8	2	3	3
	Part –C **(1 * 15 =15 Marks)** **Instructions: Answer ANY ONE out of TWO**				
15.	Describe how to define a Node to represent the terms of a polynomial with coefficient and exponent values. i. Write pseudocode to implement a function add_polynomials(polyA, polyB) that takes two linked lists, polyA and polyB, representing polynomials and returns a new linked list representing the result of adding the two polynomials. ii. Outline how to handle cases where one polynomial has terms with exponents that are not present in the other polynomial.	15	3	3	3
16.	Consider you have a doubly linked list representing a student roster, Write a Pseudo code for the following. i. Insert a new student, Jane Doe, after the student with the ID 12345. ii. Delete the last student of the class. iii. Display the students list.	15	3	3	3

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions


CO Coverage (%)
100
75
50
25
0
CO1
CO2
CO3
CO4
CO5
BL Coverage (%)
100
75
50
25
0
BL1
BL2
BL3