Reg. No.:

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MID TERM EXAMINATIONS – July 2024

Programme	:	B.Tech.	Semester	:	Fall Semester 2024-2025
Course Title/ Course Code	:	Data Structures and Analysis of Algorithms/CSD3009	Slot	:	A24+B24+E23+F21+F22
Time	:	1 ½ hours	Max. Marks	:	50

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks
1		Explain the need for and significance of primitive and non-primitive data structures. Illustrate with suitable examples.	10
2	(a)	Briefly discuss the significance of asymptotic notations in the context of performance behavioural analysis. In the following situation, analyze and indicate whether $f = O(g)$ or $f = \Omega(g)$, or both, i.e., $f = \Theta(g)$: $f(n) = n!$, $g(n) = 2^n \log n$ Note: O represents 'Big-O Notation', Ω represents 'Omega Notation', and Θ represents 'Theta Notation'.	5
	(b)	Solve the following recurrence relation and give a Θ bound for time complexity analysis: $T(n) = 9T(n/3) + n^2$	5
3		Discuss the computational advantages and limitations of Arrays and Linked List data structures. Consider the scenario of random access of an element from a given linear list, which data structure between these two will have lesser time complexity in this data retrieval operation? Support your explanation with logic.	10
4		Write the algorithmic steps for Infix to Postfix conversion using a Stack. Apply the algorithm logic to convert the following expression from Infix to Postfix: Expression given: a + b * c *Note:* a, b, c are operands; +, * are binary operators.	10
5		Explain the significance of Binary Trees as a non-linear, and hierarchical data structure in computer science. Provide a practical example illustrating the advantages of Binary Trees over other data structures in algorithm design and data management.	10

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