

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: B. TECH.
BRANCH: COMMON FOR ALL (MINOR)

SEMESTER : 3
SESSION : MO/2025

SUBJECT: CS263 DATA STRUCTURES AND ALGORITHM

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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		CO	BL
Q.1(a)	Explain Asymptotic Notations with example.	[2]	1 1
Q.1(b)	Analyze the time complexity of the following C function and show your complete calculation:	[3]	1 3
	<pre>#include <stdio.h> void algorithm1(int n) { int i, j; for (i = 1; i < n; i++) { for (j = i; j < n; j++) { printf("%d %d\n", i, j); } } }</pre>		
Q.2(a)	What do you understand by Sparse Matrix?	[2]	1 1
Q.2(b)	Write a C Program to calculate Transpose of a matrix.	[3]	1 2
Q.3(a)	How dynamic memory allocation is different from the static memory allocation?	[2]	2 1
Q.3(b)	Write a C function to insert a new node at the beginning of a singly linked list and calculate the time complexity of this operation.	[3]	2 2
Q.4(a)	How to check if there is a cycle present in a singly linked list? Explain the logic with suitable diagram.	[2]	2 3
Q.4(b)	Implement a C function to delete a node from the middle of a doubly linked list given a pointer to that node. Write the complete node structure and analyze the time complexity.	[3]	2 2
	<pre>// Given structure (to be completed by student) struct DNode { // Complete this structure }; // Function to be implemented void deleteMiddleNode(struct DNode* nodeToDelete) { // Complete this function // Assume nodeToDelete is not NULL and not the only node }</pre>		
Q.5(a)	What do you understand by Abstract Data Type (ADT)? Explain with example	[2]	3 1
Q.5(b)	Implement a stack using array in C and write functions for push and pop operations. Analyze the time complexity of each operation	[3]	3 2
	<pre>#define MAX_SIZE 100 typedef struct { // Complete the structure } Stack; // Functions to implement void push(Stack* stack, int value); int pop(Stack* stack);</pre>		