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

CLASS: BTECH **SEMESTER : V**
BRANCH: COMMON FOR ALL (MINOR) **SESSION : MO/2025**

SUBJECT: CS263 DATA STRUCTURES AND ALGORITHM

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

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Q.1(a)	Calculate the time complexity of the following pseudo-code and justify your answer:
	for i = 1 to n
	  for j = 1 to n
	  if A[i] == A[j]
	  print "Found"
		[5]	1	3

Q.1(b)	Solve the following recurrence relations using the Master Theorem and determine their time complexities: (a) $T(n) = 2T(n/2) + n$ (b) $T(n) = 4T(n/2) + n^2$ (c) $T(n) = T(n/2) + 1$ For each case, identify: • The values of a, b, and $f(n)$ • Which case of the Master Theorem applies • The final time complexity $T(n)$	[5]	1	3
Q.2(a)	Evaluate the following postfix expression using a stack and show all intermediate steps: 12 3 4 + * 2 / 5 6 - +	[5]	2	3
Q.2(b)	Compare circular queue and linear queue. Discuss situations where a circular queue is preferred.	[5]	2	2
Q.3(a)	What are the main advantages and disadvantages of using linked lists over arrays?	[5]	3	2
Q.3(b)	Write a C program to create a singly linked list with nodes containing values 10->15->23->40->45. Now, insert 35 after the node containing 23 and delete the node containing 45. Show the final linked list structure.	[5]	3	3
Q.4(a)	Insert the following values into a BST in the given order: 50, 30, 70, 20, 40, 60, 80. Draw the resulting tree and perform inorder traversal.	[5]	4	3
Q.4(b)	For the given adjacency list, perform BFS starting from vertex A and list the order of exploration: A → [B, C] B → [A, D] C → [A, E] D → [B, F] E → [C] F → [D]	[5]	4	3
Q.5(a)	What is radix sort? Describe the concept and list its advantages over comparison-based sorting algorithms.	[5]	5	2
Q.5(b)	Explain Heap Sort. Write the heapify process for the array.	[5]	5	1

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