

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

CLASS: BCA
BRANCH: BCA

SEMESTER : II
SESSION : SP/2025

SUBJECT: CN121 INTRODUCTION TO DATA STRUCTURES

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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		CO	BL
Q.1(a)	Write an algorithm to evaluate a postfix expression using a stack. Evaluate the expression: 5 6 2 + * 12 4 / -	[5] 4	3
Q.1(b)	What are the advantages of a circular queue over a linear queue? Illustrate with a diagram.	[5] 2	2
Q.2(a)	Given the following linked list of integer values: HEAD → [10 *] → [20 *] → [30 *] → [40 NULL] Write the steps and draw diagrams to insert a new node with value 25 after node 40 and then delete the node with value 30. Show the updated linked list after each operation.	[5] 2	3
Q.2(b)	Write an algorithm/code/steps to implement linked based stack.	[5] 2	3
Q.3(a)	Construct a binary search tree (BST) for the following set of values: 35, 20, 65, 10, 30, 40, 70 Also perform In-order, Pre-order and Post-order Traversal of the resultant BST	[5] 3	3
Q.3(b)	What is an AVL Tree? Construct an AVL tree by inserting the following elements one by one: 20, 10, 8, 5, 15, 25, 40, 45	[5] 3	4
Q.4(a)	Compare the performance of linear search and binary search based on time complexity.	[5] 1	4
Q.4(b)	Explain the Heap Sort algorithm and show the step-by-step sorting of the following elements in ascending order: 40, 15, 20, 5, 65, 36	[5] 4	3
Q.5(a)	Define graph. Explain the different memory representation for undirected graph with suitable example	[5] 5	2
Q.5(b)	Explain Breadth-First Search (BFS) with a suitable example.	[5] 5	3

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