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

CLASS: M.TECH. **SEMESTER : I**
BRANCH: CSE/AIML **SESSION : MO/2025**

SUBJECT: CS531 DATA STRUCTURES AND ALGORITHMS

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.

			CO	BL
Q.1(a)	Write the properties of an algorithm. Also define and explain the following Asymptotic Notations mathematically: (O, θ, Ω).	[5]	1	3
Q.1(b)	Write the following algorithms for Circular Doubly Linked List: a) Inserting a new node at the beginning b) Deleting the last node	[5]	1	3
Q.2(a)	Write an algorithm to traverse a given graph using a Queue. Trace the algorithm to traverse an example graph.	[5]	2	4
Q.2(b)	Write an algorithm to convert an Infix-expression to a prefix-expression. Trace this algorithm to convert a given Infix-expression to corresponding prefix-expression.	[5]	2	
Q.3(a)	Write the following algorithms for Binary Search Tree: a) Counting total number of nodes of a given tree b) Deleting a node from a given tree	[5]	3	4
Q.3(b)	Write the properties of a B Tree. Create a B Tree of order 5 by inserting the following elements: 3,14,7,1,8,5,11,17,13,6,23,12,20,26,4,16,18,24,25,19	[5]	3	4
Q.4(a)	Write an algorithm for k-way merging. Also use an example to show this merging of k lists tracing the steps of above algorithm.	[5]	4	4
Q.4(b)	Find the complexity of Quick Sort Algorithm in Worst-case and in Average-case using Recurrence relations.	[5]	4	3
Q.5(a)	Use example graphs to show the following types of representations: a) Circuit Matrix b) Cut-set matrix c) Incidence matrix d) Adjacency list e) Path-matrix	[5]	5	3
Q.5(b)	Write an algorithm to obtain the minimum cost spanning tree from a connected undirected graph. Also trace the algorithm to find the minimum-cost spanning tree for an example graph.	[5]	5	3

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