BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2023)

CLASS: BCA **SEMESTER: III**
BRANCH: BCA **SESSION: MO/2023**

SUBJECT: CA207 INTRODUCTION TO COMPUTER ALGORITHMS

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**

			CO	BL
Q.1(a)	Define the asymptotic notation *O* (Big Oh).	[2]	B	L-1
Q.1(b)	What is the worst-case time complexity of Insertion Sort? Justify your answer.	[1+2]	B	L-2,3
Q.2(a)	$Is\ x^2 + xlog^3x = \Omega(x)$? Justify your answer.	[1+1]	B	L-3
Q.2(b)	Write *Selection Sort* algorithm. Explain with an example.	[3]	A	L-2
Q.3(a)	Apply Master's theorem to find an upper bound of T(n): T(n) = 4T(n/2) + n, T(1) = 1	[2]	A	L-2
Q.3(b)	Explain divide and conquer design paradigm with the help of *Binary Search* algorithm.	[3]	A	L-2
Q.4(a)	Compare *Merge Sort* and *Quick Sort* algorithm in terms of their space complexities.	[2]	C	L-3
Q.4(b)	Explain Merge Sort algorithm.	[3]		L-3
Q.5(a)	Explain greedy design paradigm in brief.	[2]	A	L-2
Q.5(b)	Solve the following instance of general Knapsack problem using a greedy method and hence find the maximum profit. Show all steps.	[3]	D	L-3

Capacity of the Knapsack: 12
Weight vector: < 1, 2, 2, 3, 2, 4, 1, 3 >
Profit Vector: < 5, 11, 8, 9, 12, 16, 2, 6 >

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