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

CLASS: B. TECH   SEMESTER: VI
BRANCH: CP&P/MECH/PROD/ECE   SESSION: SP/2023

SUBJECT: CS206 DESIGN AND ANALYSIS OF 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.

			CO	BL
Q.1(a)	State Master's theorem? Solve the given recurrence relation using iterative method: $T(n) = \{1$ if n=1, $T(n/2) + n$ if $n > 1\}$	[5]	CO1	BL3
Q.1(b)	How do you measure the efficiency of an Algorithm? Determine the best and worst conditions for the insertion sort algorithm's complexity?	[5]	CO1 CO3	BL2
Q.2(a)	Write the outline of a sorting algorithm which consumes *O (N log N)* time for a list of size *N* in the best, worst and average cases. Explain the claimed time complexity and also determine its space complexity?	[5]	CO2	BL4
Q.2(b)	Explain Strassen's matrix multiplication and analyze its complexity?	[5]	CO4 CO5	BL3
Q.3(a)	Discuss the dynamic programming technique of tabulation and memoization. Give an example to support your argument?	[5]	CO2 CO3	BL4
Q.3(b)	How would you use dynamic programming to explain the longest common subsequence problem?	[5]	CO2 CO3	BL3
Q.4(a)	What strategy should be applied to the greedy method? Compute the optimal solution for the fractional knapsack problem using greedy method, number of Objects (N=5), Capacity (M=60 KG), Profits (P1, P2, P3, P4, P5) = (30, 40, 45, 77, 90) and Weights (W1, W2, W3, W4, W5) = (5, 10, 15, 22, 25).	[5]	CO2 CO3	BL1 BL3
Q.4(b)	Discuss 4-queen problem using backtracking method and while solving, also draw a portion of the corresponding state space tree or solution tree containing at least one solution?	[5]	CO2 CO3	BL5
Q.5(a)	Why are randomized algorithms necessary? Explain two types of algorithms used in random number for solving deterministic algorithm?	[5]	CO4	BL3
Q.5(b)	Briefly discuss NP-hard and NP-Complete problems?	[5]	CO4	BL3

::::::02/05/2023::::::M