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Special Examination Aug 2023	
Max. Marks: 100 Class: SE(CE/CSE-AIML/CSE-DS) Course Code: CS205/AI205/DS205 Name of the Course: Design and Analysis of Algorithms	Duration: 180 Min. Semester: IV
Instruction: 1) All questions are compulsory. 2) Draw neat diagrams. 3) Assume suitable data if necessary but justify the same.	

Q. No.	Question	Max. Marks	CO-BL
Q. 1 A	Define the following terms with at least two examples of each. i) Big O Asymptotic Notation ii) Big Ω Asymptotic Notation iii) Big θ Asymptotic Notation	5	CO1-3
Q. 1 B	Give asymptotic upper and lower bounds for $T(n)$ using Master Method as well as Recursion-Tree Method in each of the following recurrences. Assume that $T(n)$ is constant for $n \leq 2$. Make your bounds as tight as possible, and justify your answers. (i) $T(n) = 3T(n/2) + n$ (ii) $T(n) = T(9n/10) + n$ (iii) $T(n) = 16T(n/4) + n^2$	15	CO1-4
Q. 2 A	Write an algorithm for greedy strategies for the knapsack problem	5	CO3-3
Q. 2 B	Illustrate with example the divide and conquer strategy. Write an algorithm for merge procedure. Also, Find the best case, worst case and average case time complexity of merge sort.	15	CO2-3
Q. 3 A	Differentiate between Prim's and Kruskal's algorithm.	5	CO3-3
Q. 3 B	Consider the following two sequences $X = \text{abdceadklbac}$ and $Y = \text{adkalc}$. Find the Longest Common Subsequence using Dynamic Programming Approach. Show all intermediate solutions and directions in terms of matrices of all common sub-sequences of X and Y .	15	CO3-3
Q. 4 A	Define formally the condition of two queen attack in 8 Queens Problem for all cases of attacking two queens.	5	CO4-4
Q. 4 B	Consider the sum of subsets problem. Find all possible subsets of $W = \{5, 12, 13, 14, 15, 16\}$ such that the sum of elements of subsets to the integer $m = 29$. Solve the sum of subset problem using backtracking for the value W and m . 1) Show the fixed size tree organization of state space of the solution to sum of subsets problem for your case of Roll No. r. 2) Show the recursive calls of function at all levels until bound function value is not false. 3) Show clearly the bounding values at the node whenever backtracking is performed to its upper level (i.e. parent).	15	CO4-3
Q. 5 A	Define Vertex Cover. Discuss any one application of Vertex Cover.	5	CO5-2
Q. 5 B	Discuss the working of Knuth-Morris-Pratt string matching algorithm. Give a suitable example.	15	CO5-5

