Subject Code: 20CS403PC	SET-I	HT NO:			7	R					

CMR TECHNICAL CAMPUS

UGC AUTONOMOUS

B. Tech. IV Semester Regular & Supply End Examinations, July/August-2023

Design Analysis &Algorithm

Common to CSE & IT

Time: 3 Hours **Max. Marks: 70**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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PART-A

10 X 02 = 20 Marks

			Marks	CO	BL
1.	a	Define a connected and bi-connected component.	2 M	CO1	L1
	b	Explain the significance of both space complexity and time complexity in the context of a program.	2 M	CO1	L2
	c	Write the differences between divide and conquer and greedy method.	2 M	CO2	L3
	d	List the applications of greedy method.	2 M	CO2	L2
	e	Define the Dynamic 0/1 Knapsack Problem	2 M	CO3	L1
	f	State the principle of optimality	2 M	CO3	L1
	g	Write the Control Abstraction of iterative Backtracking method.	2 M	CO4	L2
	h	Differentiate between Backtracking and Branch & Bound techniques.	2 M	CO4	L3
	i	Define class P and class NP.	2 M	CO5	L1
	j	State Cook's theorem.	2 M	CO5	L2

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.	a	Why do we use asymptotic notations in the study of algorithms? Briefly describe the commonly used asymptotic notations.	5M	CO1	L4
	b	Give a simple way to implement Disjoint-set data structure.	5M	CO1	L2
		OR			
3	a	Consider the following recurrence $T(n)=T(n/3)+T(2n/3)+n$ Obtain asymptotic bound using recursion tree method.	5M	CO1	L4
	b	Differentiate between Ω and ω notations used to represent	5M	CO1	L4

		complexity. Use growth of function concept to explain your answer.			
4	a	Show the result of running Quick sorting technique on the sequence 38,27,43,3,9,82,10	5M	CO2	L4
	b	Derive the Average case time complexity of Quick sorting technique.	5M	CO2	L3
		OR			
5	a	State the Job – Sequencing with deadlines problem. Find an optimal sequence to the n=5 Jobs where profits (P1,P2,P3,P4,P5) = (20,15,10,5,1) and deadlines (d1,d2,d3,d4,d5) =(2,2,1,3,3).	5M	CO2	L4
	b	Write the Binary search algorithm and analyze for its best, worst and average case time complexity.	5M	CO2	L3
6	a	Explain how travelling sales person problem uses the dynamic programming technique with example.	5M	CO3	L3
	b	Describe the Dynamic 0/1 Knapsack Problem. Find an optimal solution for the dynamic programming 0/1 knapsack instance for n=3, m=6, profits are (p1, p2, p3) = (1,2,5), weights are (w1,w2,w3)=(2,3,4).	5M	CO3	L4
		OR			
7	a	Describe All-pairs shortest path algorithm with example. Give the time complexity of the algorithm.	5M	CO3	L3
	b	Explain how Matrix – chain Multiplication problem can be solved using dynamic programming with suitable example.	5M	CO3	L3
8	a	What is a Hamiltonian Cycle? Explain how to find Hamiltonian path and cycle using backtracking algorithm.	5M	CO4	L2
	b	Discuss the 4 – queen's problem. Draw the portion of the state space tree for n = 4 queens using backtracking algorithm.	5M	CO4	L4
		OR			
9		Write a backtracking algorithm to solve sum of subsets problem with m=35, w= {20, 18, 15, 12, 10, 7, 5} to the variable tuple size formulation.	10 M	CO4	L4
10	a	Let X be a problem that belongs to the class NP. Then X may be NP complete. Justify.	5M	CO5	L5
	b	What is the methodology of non-deterministic algorithms	5M	CO5	L4
		OR			
11	a	Write nondeterministic algorithm for sorting of an array.	5M	CO5	L3
	b	Briefly explain the classes NP hard and NP complete	5M	CO5	L2

CO : Course Outcomes

BL : Bloom's Taxonomy Levels **L 1 : Remembering** **L 2 : Understanding** **L 3 : Applying** **L 4 : Analysing** **L 5 : Evaluating** **L 6 : Creating**

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