6/12/90

Sr. No. 016502

December 2023

B.Tech (CE(DS)) ~~5th Sem~~ - V SEMESTER

Design and Analysis of Algorithms (PCC-CS-404)

Time: 3 Hours **Max. Marks:75**

Instructions:
1. *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

		PART –A	
Q1	(a)	Solve the following recurrence relation: $T(n)= T(n^{1/3}) + c$ for $n>1$	(1.5)
	(b)	Differentiate between O-notation, Omega-notation and Theta with the help of appropriate example.	(1.5)
	(c)	How arrays can be used to store a tree? Discuss with example.	(1.5)
	(d)	How recurrence relations are used to find the time complexity of recursive algorithms, justify with the help of an example.	(1.5)
	(e)	Derive the time complexity for Strassen's Matrix Multiplication method.	(1.5)
	(f)	For which type of problems Greedy approach is generally used, discuss.	(1.5)
	(g)	In what cases, Dynamic Programming is better than Greedy Approach.	(1.5)
	(h)	Differentiate between Backtracking and Branch and Bound approach.	(1.5)
	(i)	What do you mean by Satisfiblitity?	(1.5)
	(j)	Why some times randomized algorithms are better than the general algorithms?	(1.5)
		PART –B	
Q2		What is Divide and Conquer approach for problem solving? Design a Divide and Conquer based algorithm to find out the kth smallest element from a given array. Also find out the time complexity for the algorithm.	(15)
Q3	(a)	Solve the following recurrence relation: $T(n)= T(1) + T(n-1) + cn$ for $n>1$	(8)
	(b)	Differentiate Breadth First Search (BFS) and Depth First Search (DFS) Graph traversal Algorithms.	(7)
Q4		Differentiate between Greedy and Dynamic method to solve the problems. Write and explain Single Source Shortest Path algorithm to find the Shortest Paths in a graph with example and derive its time complexity.	(15)
Q5	(a)	What is Backtracking? Design an algorithm to solve N-Queen problem by using Backtracking. Also specify the explicit and implicit constraints associated with N-Queen problem.	(8)

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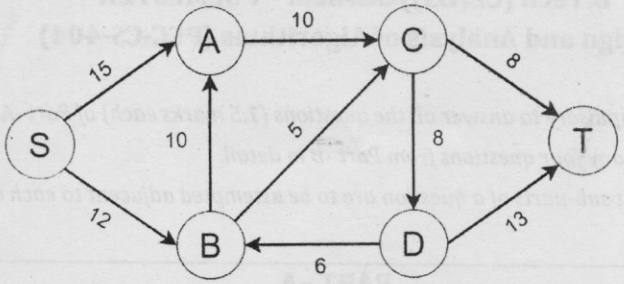
	(b)	Solve the following Knapsack problem by using Branch and Bound method: N=4, P=(10, 10, 12, 18), W=(2, 4, 6, 9) and m=15	(7)
Q6	(a)	What do you mean by Network Flow? Find out the maximum network flow from the given graph using Edmond-Karp algorithm: 	(10)
	(b)	What do you mean by Randomized Algorithms? Explain Monte-Carlo and Las-Vegas Algorithms with suitable examples.	(5)
Q7	(a)	What is Approximation algorithm and where these algorithms are used? Write Approximation algorithm for Vertex-cover problem.	(8)
	(b)	Discuss P, NP, NP-Complete and NP-Hard Problems with suitable examples.	(7)

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