Hall Ticket No: | | | | | | | | | | | Question Paper Code: A8516

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

II B. Tech II Semester Regular Examinations, July – 2024

(Regulations: VCE-R22)

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to Computer Science and Engineering, Computer Science and Engineering (AIML), Information Technology & Artificial Intelligence and Machine Learning)

Date: 16 July, 2024 FN | **Time: 3 hours** | **Max Marks: 60**

Answer All Questions

PART – A

1.	a)	Distinguish the best-case, average-case, and worst-case efficiency of an algorithm.	CO1	L2	*1M*
	b)	Write down the control abstraction for the divide and conquer strategy.	CO1	L2	*1M*
	c)	Mention the Properties of Greedy method.	CO2	L1	*1M*
	d)	Time Complexity of job sequencing with deadlines.	CO2	L1	*1M*
	e)	List the difference between an optimal solution and a feasible solution.	CO3	L1	*1M*
	f)	What is the knapsack problem?	CO3	L1	*1M*
	g)	Define State Space Tree.	CO4	L1	*1M*
	h)	Define E node and live node.	CO4	L1	*1M*
	i)	When can a path be terminated in a branch and bound algorithm?	CO5	L2	*1M*
	j)	Define P and NP problems.	CO5	L1	*1M*

PART – B

2.	a)	Illustrate briefly on Big oh Notation, Omega Notation and Theta Notations. Depict the same graphically and explain.	CO1	L3	*5M*
	b)	Write the algorithm for merge sort and Trace 76, 23, 45, 13, 98, 52, 84 and 18.	CO1	L2	*5M*
		(OR)			
	c)	Apply Strassen's algorithm for matrix multiplication to multiply the matrices with an example and justify how the Strassen's algorithm is better.	CO1	L3	*5M*
	d)	Apply quick sort technique and arrange the records with the following index values in the ascending order. 2, 3, 8, 5, 4, 7, 6, 9, 1. Explain with algorithm and analyze time complexity.	CO1	L3	*5M*
3.	a)	Write the Dijkstra's Algorithm.	CO2	L3	*5M*
	b)	Apply prims algorithm to find Minimum spanning Tree.	CO2	L3	*5M*

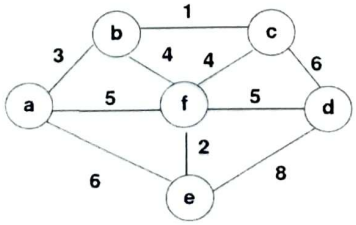

Fig.1

(OR)

	c)	Solve the following instance of Knapsack problem by Greedy Method. W=15, n=6. (p1, p2 ,p3, p4, p5, p6) = (40, 35, 18, 4, 10, 2) (w1, w2, w3, w4, w5, w6) = (5, 7, 2, 4, 5, 1)	CO2	L3	*5M*
	d)	Write the Kruskal's algorithm for finding minimum Spanning tree.	CO2	L3	*5M*

Cont...2

4.	a)	Solve the All Pair shortest Path problem for the following graph.	CO3	L3	***5M***

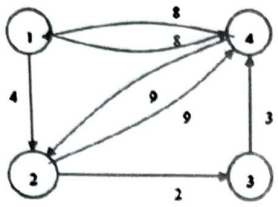

Fig.2

	b)	Plan the following instance of the 0/1 knapsack problem given the knapsack capacity in W=5 using dynamic programming and explain it.	CO3	L4	***5M***

Item	Weight	Profit
1	1	5
2	2	4
3	4	8
4	5	6

(OR)

	c)	Describe the Travelling salesman problem and discuss how to solve it using dynamic Programming.	CO3	L3	***5M***
	d)	Use function OBST to compute w(i, j), r(i, j), and c(i, j), 0<=i<j<=4, for the identifier set (a1,a2,a3,a4) = (cout, float, if, while) with p(1) = 1/20, p(2) = 1/5, p(3) = 1/10, p(4) = 1/20, q(0) = 1/5, q(1)= 1/10, q(2) = 1/5, q(3) = 1/20, and q(4) 1/20. Using the r(i, j)"s, construct the optimal binary search tree.	CO3	L3	***5M***
5.	a)	Construct the State space tree for 4 Queens Problem (Show at least one solution).	CO4	L2	***5M***
	b)	Find the solution for subset sum problem and represent the solution via state space tree Where n = 4, w = {3, 4, 5, 6}, d = 9.	CO4	L3	***5M***

(OR)

	c)	Write generic template backtracking algorithm.	CO4	L3	***5M***
	d)	Discuss Graph coloring problem. Draw the state space tree for 'm' coloring when n=3 and m=3.	CO4	L3	***5M***
6.	a)	Apply the Least Cost Branch and Bound (LCBB) algorithm to solve the travelling salesman problem for the graph below.	CO5	L3	***10M***

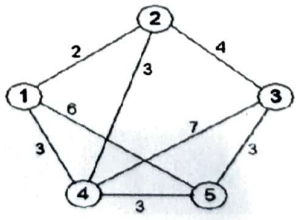

Fig.3

(OR)

	c)	Write the non-deterministic sorting algorithm and also analyze its complexity?	CO5	L2	***5M***
	d)	Define the following with an example: i. Class P ii. Class NP iii. NP-Complete iv. NP-Hard	CO5	L2	***5M***