Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Fourth Semester

Computer Science and Engineering

CS3401 – Algorithms

Regulations – 2021

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	Define time complexity and explain its importance in algorithm analysis.	RE	1	2
2.	Describe the basic principle of the Rabin-Karp algorithm.	UN	1	2
3.	Explain Depth-First Search (DFS) and its applications.	UN	2	2
4.	What is the purpose of Dijkstra's algorithm? Briefly explain its approach.	RE	2	2
5.	Describe the divide and conquer approach using merge sort as an example.	UN	3	2
6.	What is dynamic programming? Explain with an example.	RE	3	2
7.	Explain the backtracking approach in solving the n-Queens problem.	UN	4	2
8.	What is branch and bound? Provide an example.	RE	4	2
9.	Define NP-complete problems and give an example.	RE	5	2
10.	Explain the concept of approximation algorithms with a suitable example.	UN	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)*

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a		For a given sorted array arr = [2, 5, 8, 12, 16, 23, 38, 56, 72, 91], explain how binary search would locate the target element 23. Describe each step and analyze the time complexity of binary search for this array.	AP	1	13
			Or			
	b		Apply the Knuth-Morris-Pratt (KMP) algorithm for pattern searching. Provide a detailed example to illustrate how the algorithm functions in finding a substring within a larger text.	AP	1	13
12.	a	i	Explain Depth-First Search (DFS) and its applications.	UN	2	7
		ii	Compare DFS and BFS? Provide examples.	UN	2	6
			Or			
	b	i	Explain Dijkstra's algorithm with an example.	UN	2	7
		ii	Describe the Bellman-Ford algorithm and its applications.	UN	2	6
13.	a		Explain the divide and conquer technique with quicksort.	UN	3	13
			Or			
	b		Explain matrix-chain multiplication with dynamic programming.	UN	3	13

14.	a	Apply the backtracking approach to solve the Hamiltonian Circuit problem. Provide a detailed example to illustrate the algorithm's steps and how it explores possible solutions.	AP	4	13
		Or			
	b	Identify how the branch and bound technique can be applied to solve the 15-puzzle problem. Provide a detailed example to demonstrate the steps of the algorithm as it explores the solution space.	AP	4	13
15.	a	Examine an approximation algorithm for the Traveling Salesman Problem (TSP). Discuss its effectiveness, the methodology it employs, and any potential limitations.	AN	5	13
		Or			
	b	Analyze the concept of randomized algorithms with an example.	AN	5	13

*PART – C (Marks 1*15 = 15)*

Q.No		*Questions*	*BLT*	*CO*	*Marks*
16.	a	Examine the greedy technique in algorithm design. Discuss its application in solving the Huffman Tree problem, including examples.	AN	3	15
		Or			
	b	Analyze the concept of dynamic programming with the matrix-chain multiplication problem. Provide steps and examples to show how dynamic programming solves this problem efficiently.	AN	3	15