

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

MCA DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

First Semester

Master of Computer Applications

PMCT2401/MC4101 – Advanced Data Structures and Algorithms

Regulations – 2021 & 2024

Duration : 3 Hrs

Maximum : 100 Marks

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

Q.No	Questions	BLT	CO	Marks
1.	Recall the criteria that must satisfied by all the algorithms.	RE	1	2
2.	State the importance of efficient algorithms.	UN	1	2
3.	List out the properties of Red-Black trees.	RE	2	2
4.	Outline the features of Fibonacci heap.	UN	2	2
5.	Name the ways to represent the graphs.	RE	3	2
6.	Identify the algorithms used to find the shortest paths between all pairs of nodes in a graph.	UN	3	2
7.	Relate Greedy algorithm with dynamic programming.	UN	4	2
8.	Write the steps to build the Huffman tree.	UN	4	2
9.	Interpret the concept of NP-completeness.	UN	5	2
10.	Show any four concepts related to NP-completeness proofs.	RE	5	2

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

Q.No	Questions	BLT	CO	Marks
11.	a i Enumerate the role of time complexity and space complexity for solving a problem with more optimal.	UN	1	7
	ii Elucidate the most commonly used asymptotic notations in complexity analysis to describe the performance of an algorithm.	UN	1	6
	Or			
	b Demonstrate how to solve time complexity recurrence relations using recursion tree method.	UN	1	13
12.	a Construct the binary search tree with following set of numbers and carry out the insertion and deletion operations with an algorithm. 50, 40, 60, 35, 45, 55, 65, 25, 70.	AP	2	13
	Or			
	b Perform the insertion, deletion and searching operations by using B-Trees with an algorithm and example.	AP	2	13

13.	a	i	Inspect the steps involved in topological sort and show with an example.	AN	3	7
		ii	Analyze how to find the minimum spanning tree with Kruskal algorithm. Give an example.	AN	3	6
			Or			
	b	i	Survey the Bellman-Ford Single-Source shortest path algorithm with illustration.	AN	3	7
		ii	Review the Floyd-Warshall All-Pairs shortest path algorithm with example.	AN	3	6
14.	a		Apply the dynamic programming principles to perform the matrix-chain multiplication for the given dimension of a sequence of matrices.	AP	4	13
			Or			
	b		Utilize the Greedy algorithm technique for finding the global optimum solution and illustrate the characteristics, importance, working strategy and algorithm with a suitable example.	AP	4	13
15.	a		Examine the process of Polynomial-Time verification and reduction with an example problem.	AN	5	13
			Or			
	b		Explore the various NP-Complete problems used for the optimization and appraise the process of traveling salesman problem.	AN	5	13

*PART – C (Marks 1*15 = 15)*

<i>Q.No</i>		<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
16.	a	Evaluate the process of graph traversal techniques breadth first search and depth first search with an illustration and representation in detail.	EV	3	15
		Or			
	b	Assess the Dijkstra's algorithm for finding the shortest path between two nodes with necessary steps, representation and an example.	EV	3	15