

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

MCA DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

First Semester

Master of Computer Applications

MC4101/ PMCT2401 - 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.	Define Asymptotic analysis.	L1	1	2
2.	What is the substitution method in recurrence relation?	L2	1	2
3.	How to Deleting a key from a B-Tree?	L1	2	2
4.	What are the Basic operations on B-Trees?	L2	2	2
5.	Why is it called topological sort?	L3	3	2
6.	What is meant by Acyclic Graphs?	L1	3	2
7.	What are the elements of a dynamic programming approach?	L2	4	2
8.	What is the matrix chain of multiplication?	L4	4	2
9.	Define NP-Completeness.	L2	5	2
10.	What is the reducibility of a problem?	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No	Questions	BLT	CO	Marks
11.	a i Explain about Time and Space complexity of algorithms in data structure.	L3	1	8
	ii Discuss about Asymptotic Notation in data structure.	L2	1	8
	Or			
	b i Write down the Importance of efficient algorithms in data structure.	L2	1	8
	ii Briefly explain about Average and worst-case analysis of algorithm in data structure.	L2	1	8
12.	a i Explain about Binary Search Tree with an algorithm.	L3	2	8
	ii Discuss about the heap operations with suitable example.	L2	2	8
	Or			
	b i How to insert and delete an element into a B- tree?	L3	2	8
	ii What is the maximum degree of node in a Fibonacci heap?	L2	2	8

13.	a i	Explain about Breath-First Search with suitable example.	L3	3	8
	ii	How to calculate Shortest Path using Floyd-Warshall Algorithm?	L3	3	8
Or					
	b i	Analysis the principle of the Bellman-Ford algorithm with an example.	L4	3	8
	ii	Briefly explain about Dijkstra's Algorithm with suitable example.	L3	3	8
14.	a i	Explain about Matrix-Chain Multiplication. Discuss.	L3	4	8
	ii	Write short note on common subsequence with example?	L3	4	8
Or					
	b i	Discuss about Huffman Coding with suitable example.	L3	4	8
	ii	Explain about the activity selection problem with an example.	L3	4	8
15.	a i	Discuss about the significance of polynomial time verification in the class NP?	L3	5	8
	ii	Difference between NP-hard and NP-complete?	L3	5	8
Or					
	b i	How do you prove a language is NP-complete?	L3	5	8
	ii	How many conditions have to be met if an NP-complete problem is polynomially reducible?	L3	5	8