

**BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE
(AUTONOMOUS)**

I – MCA II - Semester Regular/Supplementary Examinations (BR23), June/July - 2025

Design and Analysis of Algorithms (MCA)

Time: 3 hours

Max. Marks: 70

**Answer any Five Questions One Question for One UNIT
ALL the Question Carry Equal Marks**

UNIT-I

	Marks	CO	BL
1.a) Discuss different asymptotic notations with graphical representation.	7M	CO1	L1
b) Write and explain the steps involved in analyzing an algorithm.	7M	CO1	L6

OR

2.a) Analyse the recursive and iterative algorithms for factorial computation.	7M	CO1	L2
b) Explain the concept of space complexity with a suitable example.	7M	CO1	L3

UNIT-II

	Marks	CO	BL
3.a) Describe Merge Sort and derive its time complexity.	7M	CO2	L1
b) Write an algorithm for Quick Sort and trace it for the input: {20, 10, 30, 5, 80}.	7M	CO2	L5

OR

4.a) Discuss Strassen's matrix multiplication and compare it with conventional matrix multiplication.	7M	CO2	L2
b) Write a divide-and-conquer algorithm to find the single source shortest path problem.?	7M	CO2	L6

UNIT-III

	Marks	CO	BL
5.a) Apply Dijkstra's algorithm on a given graph and compute the shortest path.	7M	CO3	L1
b) Differentiate between Prim's and Kruskal's algorithm with examples.	7M	CO3	L5

OR

6.a) Explain the concept of optimal binary search trees (OBST).	7M	CO3	L1
b) Solve the All-Pairs Shortest Path problem using dynamic programming.	7M	CO3	L5

UNIT-IV

	Marks	CO	BL
7.a) Solve the 0/1 Knapsack problem using dynamic programming.	7M	CO4	L1
b) Explain the traveling salesman problem and its dynamic programming solution.	7M	CO4	L2

OR

8.a) Discuss the graph colouring problem using backtracking.	7M	CO4	L1
b) Explain the 8-Queens problem and provide its backtracking solution.	7M	CO4	L1

UNIT-V

	Marks	CO	BL
9.a) Differentiate between P, NP, NP-complete, and NP-hard problems.	7M	CO5	L4
b) Explain Cook's theorem and its significance in NP-completeness.	7M	CO5	L4

OR

10.a) What is a decision problem? Describe how satisfiability can be shown to be NP-complete.	7M	CO5	L5
b) Explain approximation algorithms and their necessity.	7M	CO5	L2
