R22 Regulation *Subject code:4E4FE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech IV Semester Supplementary Examinations, December 2025

DESIGN AND ANALYSIS OF ALGORITHMS

(IT)

Maximum Marks: 60 Date:18.12.2025 Duration: 3 hours

Note:
1. **This question paper contains two parts A and B.**
2. **Part A is compulsory which carries 10 marks. Answer all questions in Part A.**
3. **Part B consists of 5 Units. Answer any one full question from each unit.**
4. **Each question carries 10 marks and may have a, b, c, d as sub questions.**

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	Define Time complexity.	1M	CO1	BL1
b)	How the operations performed in Strassen's Matrix multiplication	1M	CO1	BL2
c)	List out the Advantages in Quick Sort	1M	CO2	BL1
d)	Define an AND/OR graph with an example.	1M	CO2	BL1
e)	Why Backtracking always produces an optimal solution? Justify.	1M	CO3	BL2
f)	What is Knapsack problem?	1M	CO3	BL1
g)	Define overlapping subproblems with an example.	1M	CO4	BL1
h)	What is the basic recurrence relation used in solving TSP using dynamic programming?	1M	CO4	BL2
i)	What is a non-deterministic algorithm?	1M	CO5	BL1
j)	Give an example each of NP-Hard and NP-Complete problems.	1M	CO5	BL2

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	What do you mean by performance analysis? Derive the run time complexity of a non-recursive Fibonacci series algorithm using tabular method.	10M	CO1	BL5
	OR			
3	a) Illustrate the tracing of quick sort algorithm for the following set of numbers: 25, 10, 72, 18, 40, 11, 64, 58, 32, 9. b) Derive the Complexity of Binary Search.	7M 3M	CO1	BL3
4	What is backtracking? Give the explicit and implicit constraints in 8 queen's problem.	10M	CO2	BL3
	OR			
5	a) Explain the Graph–Coloring problem and draw the state space tree for m= 3 colors and n=4 vertices graph. b) Discuss the time and space complexity.	7M 3M	CO2	BL4

6	Solve the following instance of knapsack problem using greedy method. n=7(objects), m=15, profits are (P1,P2,P3,P4,P5,P6,P7)=(10,5,15,7,6,18,3) and its corresponding weights are (W1,W2,W3,W4,W5,W6,W7) = (2,3,5,7,1,4,1).	10M	CO3	BL2
	OR			
7	Use the greedy algorithm for sequencing unit time jobs with deadlines and profits to generate the solution when n=7, (p1, p2,...p7)=(3, 5, 20, 18, 1, 6, 30), and (d1, d2,..., d7)=(1, 3, 4, 3, 2, 1, 2).	10M	CO3	BL4
8	a) Write an algorithm to compute the all-pairs shortest path using dynamic programming and prove that it is optimal. b) Solve the following instance of 0/1 KNAPSACK problem using Dynamic programming n = 3, (W1, W2, W3) = (2, 3, 4), (P1, P2, P3) = (1, 2, 5), and m = 6.	4M 6M	CO4	BL4
	OR			
9	Outline the Dynamic Programming approach to solve the Optimal Binary Search Tree problem and analyze it time complexity.	10M	CO4	BL3
10	a) What is LC–Search? b) Describe the Travelling sales person problem and discuss how to solve it using branch and bound?	3M 7M	CO5	BL3
	OR			
11	a) Describe NP-hard. b) Identify an example for the best-case input for the branch and bound algorithm.	3M 7M	CO5	BL3