R22 Regulation *Subject code: 4E4EB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular/Supplementary Examinations, June2026

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CSE, CSE(AI&ML) & CSE(DS))

Maximum Marks: 60 Date:10.06.2026 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)	Write the characteristics of an algorithm.	1M	1	2
b)	State the best-case, average-case, and worst-case time complexities of binary search.	1M	1	2
c)	What are AND/OR graphs?	1M	2	1
d)	What is a Hamiltonian cycle?	1M	2	1
e)	Define the greedy method and its characteristics.	1M	3	1
f)	Define spanning tree.	1M	3	1
g)	What is the principle of optimality in dynamic programming?	1M	4	2
h)	Define reliability design problem.	1M	4	1
i)	What is the role of bounding functions in Branch and Bound?	1M	5	1
j)	What are non-deterministic algorithms?	1M	5	1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Discuss time complexity and space complexity in detail using asymptotic notations. b) Describe the general method for divide and conquer technique and give suitable examples.	5M 5M	1	2
	OR			
3	Develop algorithm for Quick sort and apply on the following numbers. 65, 70, 75, 80, 85, 60, 55, 50, 45	10M	1	4
4	a) Discuss union and find algorithms in detail and analyze their efficiency. b) Discuss bi-connected components and their applications in graph theory.	5M 5M	2	2
	OR			
5	a) Solve the 4-queen problem using backtracking and explain the algorithm. b) Describe the graph coloring problem and explain how backtracking is used to solve it.	5M 5M	2	4

6	a) Explain the fractional knapsack problem using a greedy approach with an example. b) Explain the job sequencing with deadlines problem with an example using greedy method.	5M 5M	3	3
	OR			
7	a) Describe the construction of minimum cost spanning trees using Prim's algorithm with an example. b) Explain Dijkstra's algorithm for solving the single source shortest path problem with an example.	5M 5M	3	4
8	a) Explain matrix chain multiplication and analyze its complexity with example. b) Explain the 0/1 knapsack problem and develop a dynamic programming solution for it.	5M 5M	4	4
	OR			
9	a) Explain the reliability design problem and discuss its solution using dynamic programming. b) Demonstrate how dynamic programming avoids repeated computations compared to recursive approaches.	5M 5M	4	4
10	a) Explain FIFO Branch and Bound method and illustrate its working with an example. b) Explain the travelling salesperson problem and solve using Branch and Bound.	5M 5M	5	3
	OR			
11	a) Differentiate between P, NP, NP-Hard, and NP-Complete classes with examples. b) Explain Cook's theorem and discuss its significance in computational complexity theory.	5M 5M	5	3