R20 Regulation *Subject code: 3P4ED*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, February 2024

DESIGN AND ANALYSIS OF ALGORITHMS

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

Maximum Marks: 70 Date: 23.02.2024 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
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 Marks)	(10x2M=20	CO	Bloom Tx
1	What is mean by Divide and Conquer	CO1	L1
2	Define Algorithm	CO1	L1
3	Define Backtracking	CO2	L1
4	What is meant by Bi-connected Components	CO2	L1
5	Define Single Source Shortest Path Problem	CO3	L1
6	Write the definition for Knapsack Problem	CO3	L1
7	Define Reliability Design	CO4	L1
8	What is mean by Traveling Salesperson Problem	CO4	L1
9	What do you understood about Branch and Bound	CO5	L1
10	Define NP-Hard and NP-Complete Problems	CO5	L1
	Part-B		
Answer All the following questions.	(5X10M=50Marks)		
11	Explain Strassen's Matrix Multiplication algorithm with example [10M]	CO1	L2
	OR		
12	A. Take one of the applications of divide and conquer, such as merge sort or quick sort, and analyze its time and space complexity. Compare its performance to other sorting algorithms. [5M] B. Describe the divide and conquer problem-solving method. Provide a step-by-step explanation of how this strategy works with suitable examples. [5M]	CO1	L2 L2
13	A. Discuss graph coloring as a backtracking problem. Explain the rules and constraints of graph coloring and how backtracking helps in finding valid vertex colorings. [5M] B. Investigate the sum of subsets problem and its backtracking-based solution. How does backtracking efficiently explore the solution space and generate valid subsets that meet the given criteria? [5M]	CO2	L2 L1
	OR		
14	Explain the 8-queen problem and how it is solved using backtracking with an example. [10M]	CO2	L2

15	A. Define minimum cost spanning trees and their role in network design and optimization. Compare and contrast Prim's algorithm and Kruskal's algorithm for solving this problem. [5M] B. Discuss the concept of priority queues in the context of job sequencing with deadlines. How do they contribute to efficient job scheduling and profit maximization? [5M]	CO3	L2 L2
	OR		
16	A. Discuss the greedy approach and dynamic programming approach for solving the 0/1 knapsack problem. Compare their advantages and disadvantages. [5M] B. Define the job sequencing problem with deadlines and explain its significance in various industries. How can greedy algorithms be applied to solve this problem, and what are their limitations? [5M]	CO3	L2 L2
17	Define the traveling salesperson problem and its relevance in logistics, transportation, and optimization. How does dynamic programming contribute to finding an optimal solution for this NP-hard problem? [10M]	CO4	L1
	OR		
18	A. Define the 0/1 knapsack problem and describe its applications in resource allocation and portfolio optimization. How does dynamic programming provide an optimal solution to this problem? [5M] B. Contrast the brute-force approach with the dynamic programming approach for solving the 0/1 knapsack problem. Highlight the advantages of dynamic programming in terms of time complexity and optimality. [5M]	CO4	L2 L2
19	A. Define the FIFO Branch and Bound solution and its implications for solving optimization problems. How does it address the exploration order and help in finding optimal solutions? [5M] B. Compare the advantages and limitations of the FIFO Branch and Bound approach with the standard Branch and Bound method. Provide examples of problems where FIFO can offer notable benefits. [5M]	CO5	L2 L2
	OR		
20	A. Explain how the Branch and Bound technique can be utilized to solve the traveling salesperson problem. Discuss the branching and bounding steps involved in finding an optimal route. [5M] B. Explore the challenges posed by the exponential growth of sub problems in the traveling salesperson problem. How does Branch and Bound help manage this complexity and contribute to solving large instances of the problem? [5M]	CO5	L5 L2