R20 Regulation *Subject code: 3P4ED*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular/Supplementary Examinations, September 2023

DESIGN AND ANALYSIS OF ALGORITHMS

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

Maximum Marks: 70 Date:24.09.2023 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 (10x2M=20 Marks)

1 Write any two applications on Divide and conquer?
2 What do you understand about Algorithm Specification?
3 What do you mean by Disjoint Set Operations?
4 What do you understand about Union and Find Algorithms?
5 Define Job Sequencing with Deadlines.
6 What is Minimum Cost Spanning Trees?
7 What do you understand about Dynamic Programming?
8 Define All Pairs Shortest Path Problem.
9 What is 0/1 Knapsack Problem?
10 Define LC Branch and Bound Solution.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 A. Explain the concept of algorithms and their significance in problem-solving. [5]
B. Define and compare space complexity and time complexity. [5]

OR

12 A. Discuss the importance of algorithm specification. [5]
B. Explain Strassen's Matrix Multiplication algorithm. [5]

13 A. What are AND/OR graphs, and how do they represent decision-making scenarios? [5]
B. Discuss the significance of connected components and spanning trees. [5]

OR

14 Define bi-connected components in graphs and explain their importance in terms of graph connectivity. [10]

15 Explain single source shortest path problem using Dijkstra's algorithm. [10]

OR

16 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? [10]

17 A. Explain the traveling sales person problem with suitable example. [7]
B. Analyze its time complexity clearly. [3]

OR

18 A) Define Reliability Design Problem. [3]
B) Design a reliable three state system with three device types D1, D2 and D3. The costs are $30,$15 and $20 respectively. The cost of system is to no more than $105. The reliability if each device type is 0.9, 0.8 and 0.5 respectively. [7]

19 Explain the LC BB 0/1 Knapsack problem procedure with the knapsack instance for n=4, m=15,(p1,p2,p3,p4)=(10,10,12,18) , (w1,w2,w3,w4) =(2, 4, 6, 9). Draw the portion of the state space tree and find optimal solution. [10]

OR

20 A. Define the concepts of NP-Hard and NP-Complete problems. [5]
B. Explain Cook's theorem. [5]