



**R22 Regulation** **Subject code: 4E4EB**  
**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**  
(Autonomous, Accredited by NAAC with 'A+' Grade)  
**B.Tech IV Semester Regular Examinations, July 2024**

**DESIGN AND ANALYSIS OF ALGORITHMS**  
(Common to CSE, CSE(AI&ML) & CSE(DS))

**Maximum Marks: 60**

**Date: 20.07.2024 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		CO	Bloom Tx
All the following questions carry equal marks (10x1M=10 Marks)			
1.a)	What is the definition of an algorithm?	1	L1
b)	How is time complexity defined?	1	L1
c)	What is a Hamiltonian cycle in a graph?	2	L1
d)	What is a spanning tree of a graph?	2	L1
e)	Write the control abstraction of greedy method?	3	L1
f)	What is a minimum cost spanning tree in a graph?	3	L1
g)	What is the focus of reliability design in algorithm applications?	4	L1
h)	What is the objective of the travelling salesperson problem?	4	L1
i)	What defines a problem as NP-Complete?	5	L1
j)	What is a non-deterministic algorithm?	5	L1
Part-B			Bloom Tx level
Answer All the following questions. (5X10M=50Marks)			
2	A) Analyze the role of algorithms in computer science and provide examples to illustrate their importance in solving complex computational problems. [5] B) Explain about space complexity? [5]	1	L4
OR			
3	A) Compare the time complexities of merge sort, quicksort and discuss scenarios where each algorithm is most appropriately applied. [5] B) Explain divide and conquer method of binary search in detail. [5]	1	L4
4	Explain the procedure of solving 8-Queens problem. [10]	2	L2
OR			
5	A) Explain the concept of AND/OR graphs and their significance in problem-solving. Provide an example of an AND/OR graph and describe its use in a practical application. [5] B) Explain graph coloring problem using backtracking method with a suitable example. [5]	2	L2

6	A) Explain the concept of a minimum cost spanning tree (MST) and describe Kruskal's algorithm for finding an MST. [5] B) Provide a detailed example with a weighted graph. [5]	3	L2
OR			
7	A) Describe the general method of dynamic programming. [5] B) How does it differ from divide-and-conquer approaches? [5]	3	L2
8	Analyze how the Floyd-Warshall algorithm solves the All Pairs Shortest Path problem. Given the following weighted graph, use the Floyd-Warshall algorithm to find the shortest path between all pairs of vertices. [10]  <ul style="list-style-type: none"> <li>• Vertices: {A, B, C, D}</li> <li>• Edges and weights: <ul style="list-style-type: none"> <li>○ A-B: 3</li> <li>○ A-D: 7</li> <li>○ B-C: 1</li> <li>○ C-D: 2</li> <li>○ D-B: 1</li> </ul> </li> </ul>	4	L3
OR			
9	A) Describe how dynamic programming can be used to optimize the reliability of a system composed of multiple components. [5] B) Illustrate with an example where the reliability of each component and the overall system reliability is calculated. [5]	4	L2
10	A) Give the detailed steps of how LC Branch and Bound is applied. [5] B) Explain the detail procedure of FIFO branch and bound solutions. [5]	5	L2
OR			
11	A) State the Cook's theorem. [5] B) Discuss its importance in the context of NP-Complete problems. [5]	5	L2