



R17 Regulation

Subject code: 1P5FA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY  
(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech III Year I Semester Supplementary Examinations, June 2022

DESIGN AND ANALYSIS OF ALGORITHMS

(Information Technology)

Maximum Marks: 70

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.
  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 Define Space and Time Complexities?
- 2 Mention the criteria to be satisfied by an algorithm.
- 3 What is an articulation point in a graph? Give two examples.
- 4 What is a bi-connected component?
- 5 State knapsack problem. What is the essential difference between KNAPSACK and 0/1 KANPSACK Problem.
- 6 Define minimum spanning tree
- 7 Define principle of optimality
- 8 What is traveling salesman problem
- 9 Define tractable and intractable problems.
- 10 Explain NP-Complete Problem.

Part-B

Answer All the following questions.

(10M X 5=50Marks)

11

If matrices

A =

9	4	6	7
7	8	1	4
4	3	2	6
5	3	0	2

B =

7	6	2	1
3	9	0	3
4	3	2	6
5	3	0	2

Implement Strassen's matrix multiplication on A and B.

[ 10 ]

OR

- 12 A) Explain various asymptotic notations used in algorithm design in detail.  
B) Discuss the working strategy of merge sort and illustrate the process of merge sort algorithm for the given data: 43, 32, 22, 78, 63, 57, 91 and 13 [ 5+5 ]
- 13 What is graph coloring? Explain with an example. [10 ]

OR

14 Write an algorithm to implement 8-Queens Problem. Analyze the algorithm for its space & time complexity. [10]

15 Explain the concept of job sequencing with deadlines by Greedy technique. With Example. [ 10 ]

OR

16 A) Find the feasible and optimal solutions for the following knapsack problem.  
Let  $n = 3$ ,  $m = 20$ ,  $(p_1, p_2, p_3) = (25, 24, 15)$  and  $(w_1, w_2, w_3) = (18, 15, 10)$ .

B) Write and explain the steps for finding the minimum spanning tree by using prim's algorithm. [ 5 + 5 ]

17 Explain Travelling salesman problem. Give an algorithm and explain the algorithm with suitable example. [ 10 ]

OR

18 A) Define Reliability Design Problem

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 of each device type is 0.9, 0.8 and 0.5 respectively. [2+8]

19 Explain 0/1 Knapsack Problem using branch and bound technique. [ 10 ]

OR

20 A) Explain Cook's Theorem

B) Explain P and NP Classes [ 5+5 ]