



R17 Regulation

Subject code: 1P5EC

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Year I Semester Supplementary Examinations, January 2023

DESIGN AND ANALYSIS OF ALGORITHMS

(CSE)

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 In what way a time complexity differs from space complexity
- 2 Give the general plan of divide and conquer algorithms.
- 3 Write an algorithm for collapsing find
- 4 Define Backtracking?
- 5 What is the importance of knapsack algorithm in our daily life?
- 6 Write Control Abstraction of Greedy method.
- 7 What you mean by dynamic programming
- 8 Define optimal binary search tree.
- 9 State the difference between FIFO and LC Branch and Bound algorithms
- 10 Write the Control Abstraction of Least -Cost Branch and Bound

Part-B

Answer All the following questions.

(10M X 5=50Marks)

- 11 A) What are the different mathematical notations used for algorithm analysis.
B) Write Divide – And – Conquer recursive Quick sort algorithm and analyze the algorithm for average time complexity. [5+5]
- 12 A) Explain recursive binary search algorithm for the given data: 2, 4, 8, 9, 11, 13, 15, 16, 24, 30, 33, 42, 48 and key=16 with time complexity analysis.
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? Write an algorithm for it and explain with an example. [10]
- 14 Write an algorithm to implement 8-Queens Problem. Analyze the algorithm for its space & time complexity. [10]
- 15 State the Job – Sequencing with deadlines problem. Find an optimal sequence to the $n = 5$ Jobs where profits $(P_1, P_2, P_3, P_4, P_5) = (20, 15, 10, 5, 1)$ and deadlines $(d_1, d_2, d_3, d_4, d_5) = (2, 2, 1, 3, 3)$. [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 Draw an Optimal Binary Search Tree for $n=4$ identifiers $(a_1, a_2, a_3, a_4) = (\text{do}, \text{if}, \text{read}, \text{while})$ $P(1:4)=(3,3,1,1)$ and $Q(0:4)=(2,3,1,1,1)$. [5+5]
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 if each device type is 0.9, 0.8 and 0.5 respectively. [2+8]
- 19 Explain the LC BB 0/1 Knapsack problem procedure with the knapsack instance for $n=4$, $m=15$, $(p_1, p_2, p_3, p_4)=(10, 10, 12, 18)$, $(w_1, w_2, w_3, w_4)=(2, 4, 6, 9)$. Draw the portion of the state space tree and find optimal solution. [10]
OR
- 20 A) Explain Cook's Theorem
B) Explain the classes of NP- H & NP-C [5+5]