Code No : G- 5259/N/BL/AICTE

FACULTY OF ENGINEERING

B.E. (CSE) VI Semester (AICTE) (Regular & Backlog) (New) Examination, July/August 2025

Subject: Design and Analysis of Algorithms

Time: 3 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

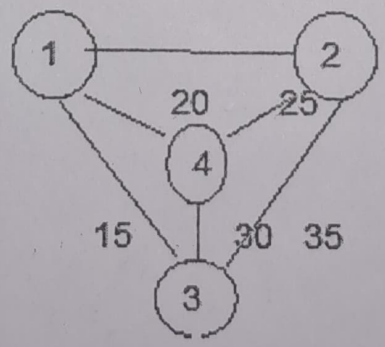
1. a) If f(n)=5n2+6n+4 than prove that f(n) is $O(n^2)$.
   b) Define time complexity
   c) Differentiate knapsack problem.
   d) What do you understand by reliability design?
   e) Define a Hamiltonian cycle
   f) State the 8-Queens Problem
   g) Explain optimal merge pattern with an example?

2. a) Solve the recurrence relation using substitution method
   T(n)=a n=1 a is constant
   =2T(n/2)+c*n n>1 c is constant
   b) Write the weighted union and collapsing find algorithms for disjoint sets

3. a) Sort the records with the following index values in the ascending order using quick sort algorithm 2, 3, 8,5,4, 7,6,9, 1.
   b) (a) Sort the elements using Merge Sort 10 30 15 45 25 30 35 20 30 40 50.
   (b) Write the algorithm for merge sort derive its time complexity.

4. a) Write all pairs shortest path alogorithm using Dynmic programming
   b) Write the greedy algorithm for knapsack problem .Find the optimal solution using it for the given input:M=20,N=3,(p1,p2,p3)=(25,24,15),(w1,w2,w3)=(18,15,10)

5. a) Apply Prim's algorithm to find the minimum cost spanning tree and its minimum cost for the given graph



   b) Write the iterative binary search tree algorithm. State its Best, Average and best case time complexity for both successful and unsuccessful searches.

6. a) Write the N-Queens algorithm using backtracking strategy. Draw the portion of solution state space tree for 4-Queens problem
   b) Explain the Travelling Salesman Problem and solve the problem for the given cost matrix using LC Branch & Bound

$$\begin{bmatrix} \infty & 10 & 15 & 20 \\ 10 & \infty & 35 & 25 \\ 15 & 35 & \infty & 30 \\ 20 & 25 & 30 & \infty \end{bmatrix}$$

7. a) Define NP-complete, NP-Hard. show that clique Decision problem is NP-complete
   b) Explain the different models in parallel computing based on how read and write conflicts are resolved

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