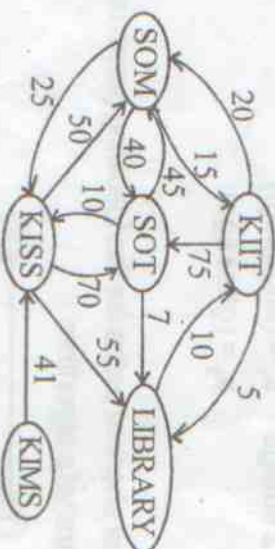


8. a) Find the shortest path cost for all the vertices from vertex KIIT using Dijkstra's Algorithm.

[4]



- b) Define the problem classes P, NP, NP-hard and NP-complete.

[6]

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SIXTH SEMESTER EXAMINATION-2010

DESIGN & ANALYSIS OF ALGORITHMS

[CS 602]

Full Marks: 70

Time: 3 Hours

Answer any SIX questions including Question No.1 which is compulsory.

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

1. a) Arrange the following functions in increasing order of their growth rates

$$2n+3, n^2+20, n \log n+n, 100, 2^n$$

- b) Find the time complexity for the following summation in big 'O' notation.

$$\sum_{i=1}^n \sum_{j=1}^i \sum_{k=1}^j 1$$

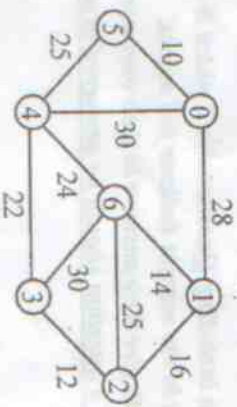
- c) Compare the time complexity of quick sort with merge sort.
- d) Write 4 applications of minimum cost spanning tree.
- e) A Binary heap has n Elements. What would be the time complexity to insert n/2 Elements into this heap?
- f) Differentiate between dynamic programming and greedy approach.

(1)

- g) Find the optimal placement for 10 programs on 4 tapes T_1, T_2, T_3 and T_4 . Where the programs of lengths 120, 60, 50, 400, 200, 100, 700, 400, 250, 110.

- h) Write a sorting algorithm whose best case is order of n .

- i) Find the minimum cost spanning tree for the following graph using Prim's method starting from vertex 2.



- j) Differentiate between backtracking & branch & bound.

2. a) Solve the following recurrence equations

(i) $T(n) = 8T(n/2) + Cn^2$

(ii) $T(n) = T(n/3) + T(2n/3) + Cn$

- b) Write an algorithm for build max heap. [4]

3. a) Write all algorithm for N-queen problem using back tracking and explain how 4-queen use this procedure. [8]

- b) Write an algorithm for weighted union operation. [2]

4. a) Find the code word for each symbol from the following table using Huffman's code. [4]

Symbol	x_1	x_2	x_3	x_4	x_5	x_6	x_7
Frequency	46	30	12	6	3	2	1

- b) Compute the encoded string for the following data [1]

$x_1, x_3, x_4, x_7, x_6, x_1, x_4$

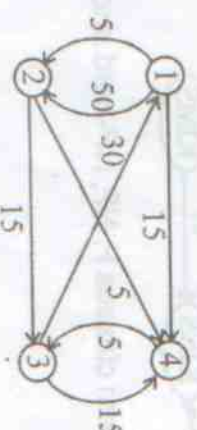
- c) Prove that TSP is NP complete. [5]

5. a) Write the modified Kruskal algorithm to find maximum cost spanning tree. [5]

- b) Find the longest common subsequence between the following 2 strings $s_1 = (\text{attgaacgf})$ [5]

$s_2 = (\text{gttcaagc})$

6. a) Find all pair shortest paths for the following graph using Floyd-Warshall's algorithm. [6]



- b) Write the algorithm for quicksort which considers the middle element as pivot element. [4]

7. a) Explain the search strategies of branch and bound method. [5]

- b) Find the optimal tour of travelling salesperson problem from vertex 1 for following graph using dynamic programming. [5]