CSE-2415 : Algorithm
Batch: 42A
Session: Spring 2024
Assignment (Consider as Class Test 03)

1. You are managing a logistics company that needs to optimize delivery routes for its fleet of trucks. Each truck must deliver packages to various locations within a city, and you want to minimize the travel time. Now, you must find the shortest path from the warehouse to each delivery location. Following table indicates the distance between the locations.
   Here, W is the Warehouse and other nodes are delivery locations.

	W	A	B	C	D	E	F
W	0	10	15	0	0	0	0
A	10	0	0	12	15	0	0
B	15	0	0	0	10	5	0
C	0	12	0	0	0	2	5
D	0	15	10	0	0	0	10
E	0	0	5	2	0	0	3
F	0	0	0	5	10	3	0

2. Imagine a logistics company that needs to transport goods from multiple warehouses to various retail stores. Each warehouse has a limited supply of goods, and each store has a specific demand. The goal is to maximize the flow of goods from the warehouses to the stores while adhering to the capacity constraints of the transportation routes. Determine the maximum amount of goods that can be transported from the warehouses to the stores, meeting the stores' demands without exceeding the capacity of the routes.

   Source (representing the start of the flow)
   Warehouses (W1, W2, W3)
   Stores (S1, S2, S3)
   Sink (representing the end of the flow)
   Edges: An edge exists from a warehouse to a store if there is a transportation route available, with capacities representing the maximum quantity of goods that can be transported through that route.

	source	W1	W2	W3	S1	S2	S3	sink
source	0	20	30	25	0	0	0	0
W1	0	0	0	0	10	5	0	0
W2	0	0	0	0	0	15	10	0
W3	0	0	0	0	15	0	12	0
S1	0	0	0	0	0	0	0	10
S2	0	0	0	0	0	0	0	13
S3	0	0	0	0	0	0	0	12

3. Find the minimum multiplications for following matrix chain multiplication and show the tree representations of the matrix multiplications.

   A (2X3), B (3X7), C (7X4), D (4X6)

4. Imagine you're a treasure hunter exploring a cave filled with valuable items. You have a backpack that can carry a maximum weight of 50 kg. Inside the cave, you find various treasures, each with a specific weight and value which you can take a whole or fractions of each treasure. Your goal is to maximize the total value of the items you carry back.

   You have the following treasures:

Treasure	Weight (kg)	Value ($)
Gold Bar	10	60
Silver Coin	20	100
Diamond	30	120
Ruby	5	30

5. Distinguish between :
   a. Quick sort and merge sort
   b. Prim’s and Kruskal’s algorithm
   c. Dijkstra and Bell-man Ford algorithm
   d. Greedy method and Backtracking method
   e. Greedy method and Dynamic Programming method