

Course/ Batch: BTech/ SCSET
Course Code: CSET244
Semester: Even
Session: 2024-2025

Course Type: Core
Course Name: Design and Analysis of Algorithms

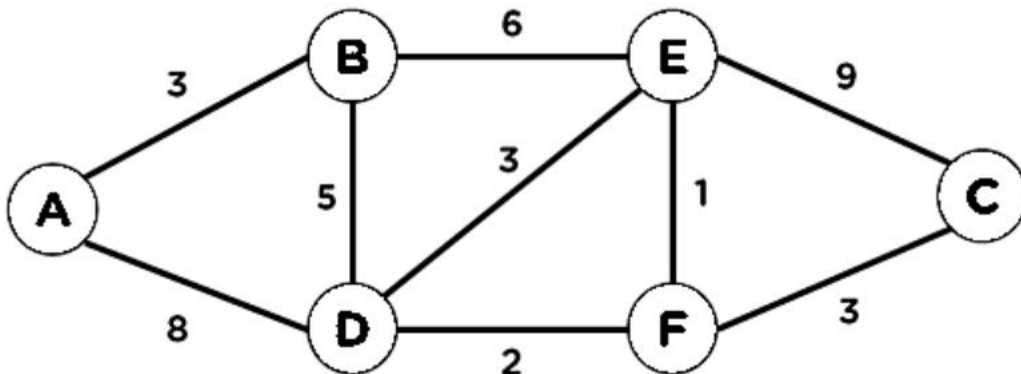
Tutorial Assignment: Week 8

Tutorial title: Dijkstra's Algorithm

CO Mapping

Question no	CO1	CO2	CO3
Q1	✓	✓	✓
Q2	✓	✓	✓
Q3	✓	✓	✓
Q4	✓	✓	
Q5	✓	✓	✓

Q1. Use Dijkstra's algorithm as greedy approach to determine shortest distance from node A to C.



Q2. Consider the following directed graph with zero-weight edges:

- A → B (4)
- A → C (0)
- C → D (0)
- D → E (5)
- B → E (2)

If we apply Dijkstra's algorithm starting from A, what will be the shortest distance to E?

- A) 4
- B) 2
- C) 5

D) 6



Q3. Dijkstra's Algorithm maintains a parent array to reconstruct the shortest path from source to destination. Given the following graph:

A → B (2)
A → C (4)
B → C (1)
B → D (7)
C → D (3)
D → E (1)

If we run Dijkstra's Algorithm from A to E, what is the shortest path and its total cost?

- A) A → B → C → D → E, cost = 7
- B) A → C → D → E, cost = 8
- C) A → B → D → E, cost = 10
- D) A → C → E, cost = 6

Q4. A directed graph contains some edges with zero weight. In order to ensure correctness, a transformation is applied before running Dijkstra's Algorithm. What transformation ensures correct results?

- (A) Replace all zero-weight edges with a very small positive value (e.g., 10^{-6}).
- (B) Treat zero-weight edges as unweighted and apply BFS instead.
- (C) Convert all zero-weight edges to positive weight edges by adding a constant to all edges.
- (D) Use Bellman-Ford Algorithm instead.

Q5. Find the shortest path from A to all other vertices using the adjacency matrix for the graph using Dijkstra's Algorithm

	A	B	C	D	E
A	0	10	3	∞	∞
B	∞	0	1	2	∞
C	∞	4	0	8	2
D	∞	∞	∞	0	7
E	∞	∞	∞	9	0