Tutorial-6

Q1) Minimum Spanning Tree

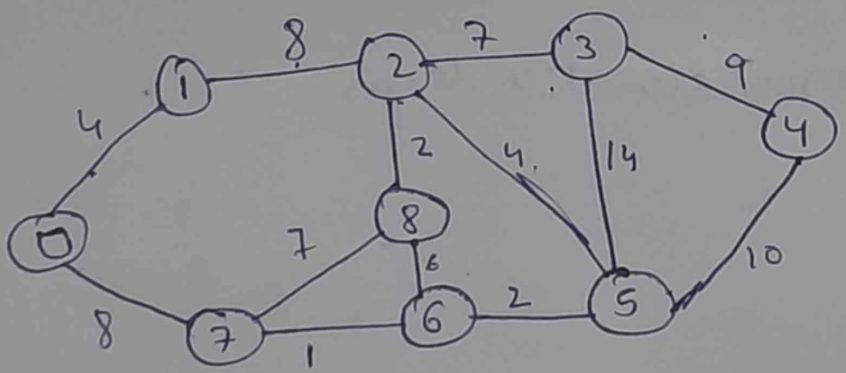
It is spanning tree which has minimum total cost. If we have linked undirected graph with weight combine with each edge then cost of spanning tree would be the sum of cost of its edge.

Application - In design of networks including compute networks, transportation networks.

Q2

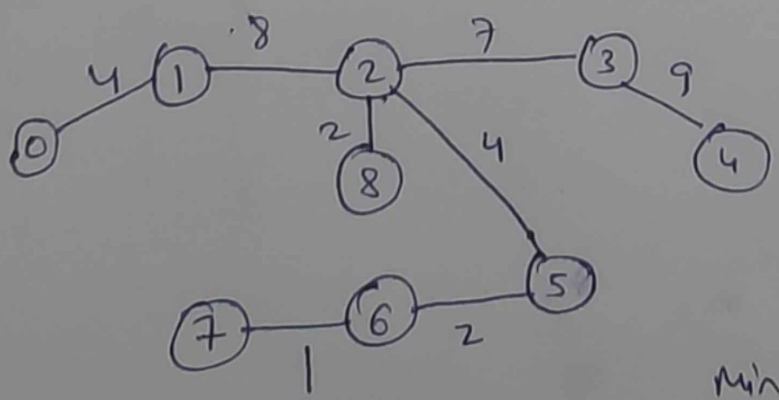
	Prim	Dijkstra	BellmanFord
Time Complexity	$O(V+E)\log V$	$O(E \log V)$	$O(NE)$
Space	$O(V+E)$	$O(V^2)$	$O(N)$

Q3



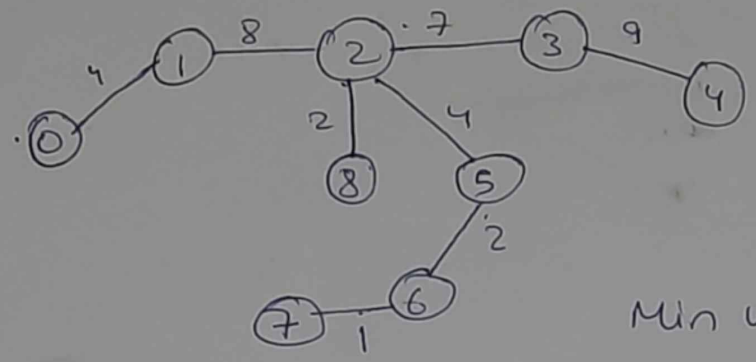
1) Kruskals

1, 2, 2, 4, 4, 6, 7, 7, 8, 8, 9, 10, 11, 14



Min wt = 37

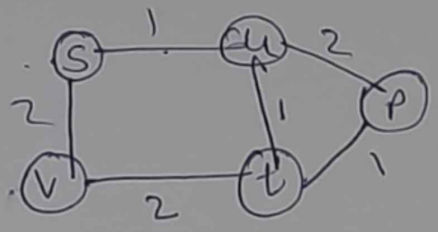
ii) Prim



Min wt = 37

Q4) Let we have initial shortest path.

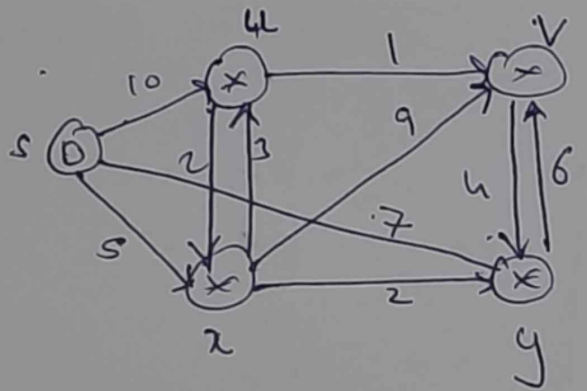
$s \to v \to t$



a) If we increase every edge by 10 units then also shortest path is same

b) If we multiplied every edge by 10 units then also shortest path is same.

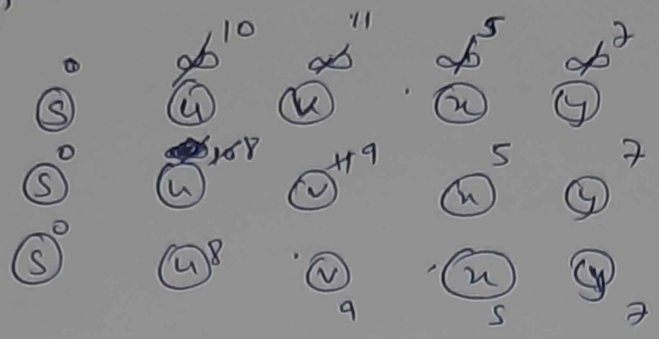
Q5



Dijkstra

Node	Dist. from s
u	8
v	9
x	5
y	7

Bellman



Q6

$$A_0 = \begin{bmatrix} 0 & \infty & 6 & 3 & \infty \\ 3 & 0 & \infty & \infty & \infty \\ \infty & \infty & 0 & 2 & \infty \\ \infty & 1 & 1 & 0 & \infty \\ \infty & 4 & \infty & 2 & 0 \end{bmatrix}$$

$$A_1 = \begin{bmatrix} 0 & \infty & 6 & 3 & \infty \\ 3 & 0 & 9 & 6 & \infty \\ \infty & \infty & 0 & 2 & \infty \\ \infty & 1 & 1 & 0 & \infty \\ \infty & 4 & \infty & 2 & 0 \end{bmatrix}$$

$$A_2 = \begin{bmatrix} 0 & \infty & 6 & 3 & \infty \\ 3 & 0 & 9 & 6 & \infty \\ \infty & \infty & 0 & 2 & \infty \\ \infty & 1 & 1 & 0 & \infty \\ \infty & 4 & 13 & 2 & 0 \end{bmatrix}$$

$$A_3 = \begin{bmatrix} 0 & \infty & 6 & 3 & \infty \\ 3 & 0 & 9 & 6 & \infty \\ \infty & \infty & 0 & 2 & \infty \\ \infty & 1 & 1 & 0 & \infty \\ \infty & 4 & 13 & 2 & 0 \end{bmatrix}$$

$$A_4 = \begin{bmatrix} 0 & 4 & 4 & 3 & \infty \\ 3 & 0 & 7 & 6 & \infty \\ \infty & 3 & 0 & 2 & \infty \\ \infty & 1 & 1 & 0 & \infty \\ \infty & 3 & 3 & 2 & 0 \end{bmatrix}$$

$$A_5 = \begin{bmatrix} 0 & 4 & 4 & 3 & \infty \\ 3 & 0 & 7 & 6 & \infty \\ \infty & 3 & 0 & 2 & \infty \\ \infty & 1 & 1 & 0 & \infty \\ \infty & 3 & 3 & 2 & 0 \end{bmatrix}$$