

Q1 solⁿ:- Minimum Spanning tree :-

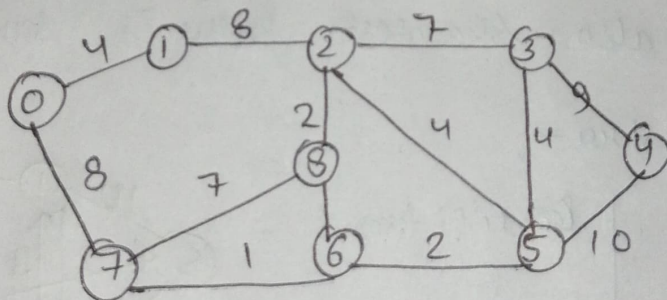
It is spanning tree which has minimum total cost. If we have linked undirected graph with a weight combin with each edge. then the cost of spanning tree would be the sum of the cost of its edge.

Application - In design of network including computer networks, telecommunication network for transportation network.

Q2 solⁿ:-

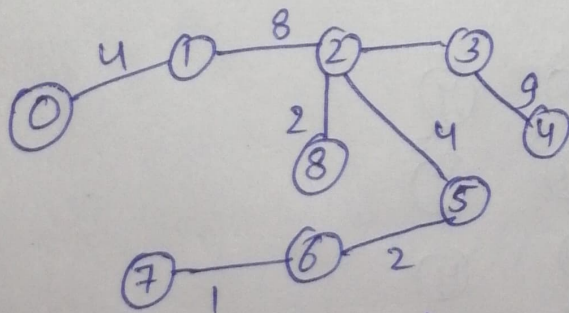
	Prim	Dijkstra	Bellman Ford.
Time complexity	$O((V+E) \log n)$	$O(E \log n)$	$O(VE)$
Space	$O(V+E)$	$O(V^2)$	$O(N)$

Q3 solⁿ:-

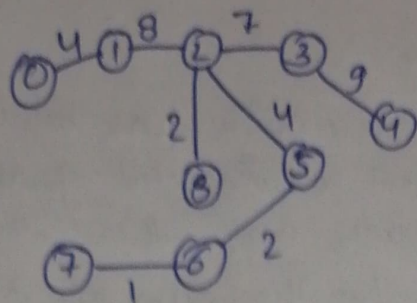


(1) Kruskal's -

[1, 2, 2, 4, 4, 7, 7, 8, 8, 9, 10, 11, 14]



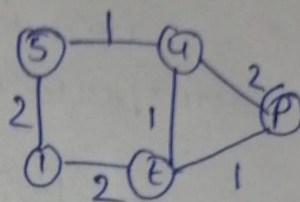
Min wt = 37



min wt = 37.

Q4 Solⁿ:-

Let we have
Initial shortest path
 $S \rightarrow V \rightarrow t$

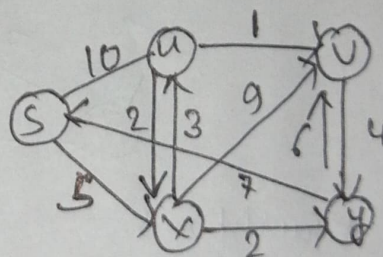


(a) if we increase every edge by 10 units then also shortest path is same.

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

Q5 Solⁿ:- Dijkstra -

node	list of nodes
u	8
v	9
x	5
y	7



Bellemann -

6	10	11	5	7
(S)	(u)	(v)	(x)	(y)
0	8	9	9	7

Q6-soln-

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

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

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

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

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

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