Tutorial 6

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1.

Minimal spanning tree

A minimal spanning tree or minimum weight weight spanning tree is a subset of the edges of the connected, edge-weighted and undirected graph that connects all the vertices together, without any cycles and with the minimum possible total edge weight.

Application :-

1. Design local area network.
2. In constructig highways or railways spanning
3. Laying pipelines.
4. telecommunication network.

2.

Algo's.	Time Complexity	Space Complexity
Prims	$O(V^2)$	$O(V+E)$
Krushkal	$O(E \log V)$	$O(\log E)$
Dijkstra	$O(V+E)$	$O(V+E)$
Bellman ford	$O(VE)$	$O(V)$

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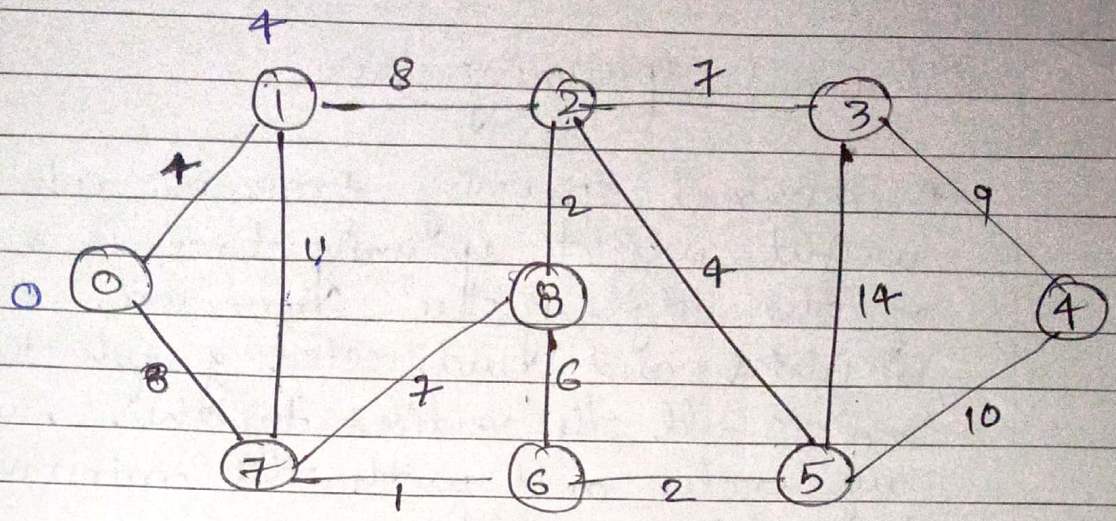
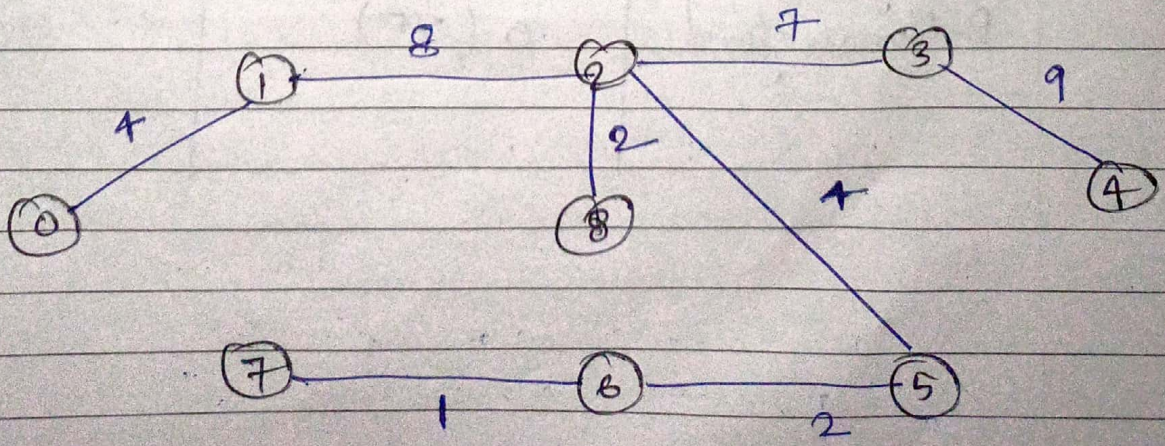
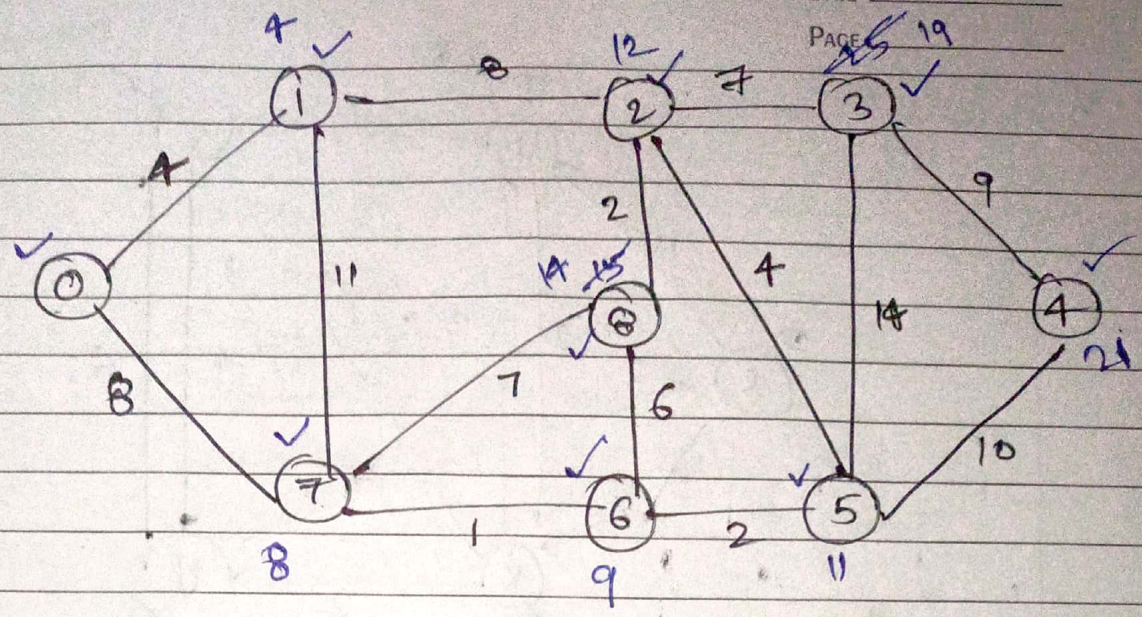
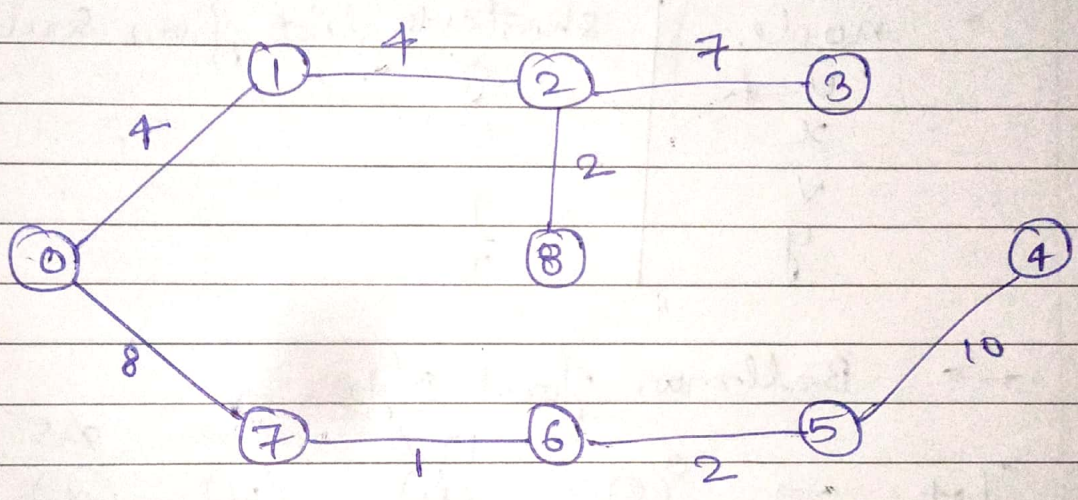


Path	Weight
7 → 6	1
6 → 5	2
2 → 8	2
0 → 1	4
2 → 5	4
8 → 6	6
2 → 3	7
7 → 8	7
1 → 2	8
3 → 4	9.
5 → 4	10
1 → 7	11
3 → 5	14

0 → 7 8







4 (i) The shortest path may change. The reason is there may be different no. of edges in different paths from s to t. for shortest path of weight 15 and 5 edge and another 2 edge and 25 weight. weight of shortest path inc. by 5^10 and become 15+50 and similiarly other path become 25+20. so shortest path weight as 45.

(ii) If we multiply all edges weight by 10, the shortest path does not change. The no. of edge on path does not matter.

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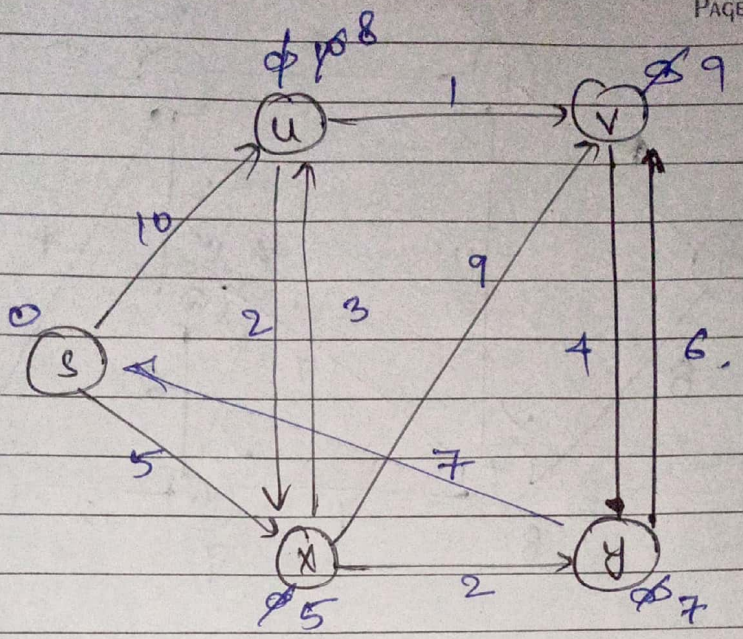
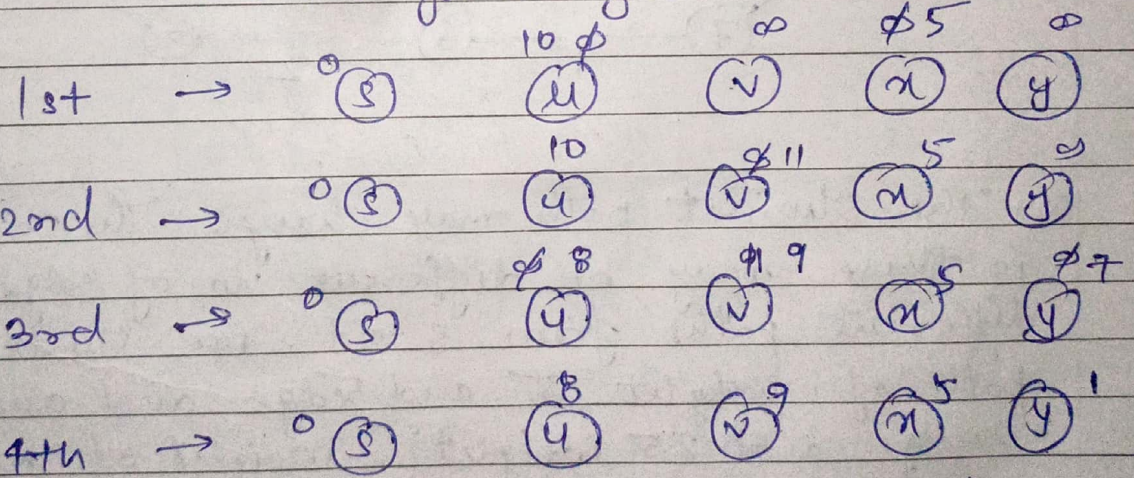


node	shortest dist from source node
u	8
x	5
v	9
y	7

→ Bellman ford algo.



final graph:-