Name - Prabhdeep Singh
Class Roll no - 04
Section - G

Tutorial 6

Soln 1 A minimum Spanning tree or minimum weight Spanning Tree is a subset of edges of a connected edge - weighted undirected graph that connects all the vertices together, without any cycle and with minimum possible total edge weight.

Application

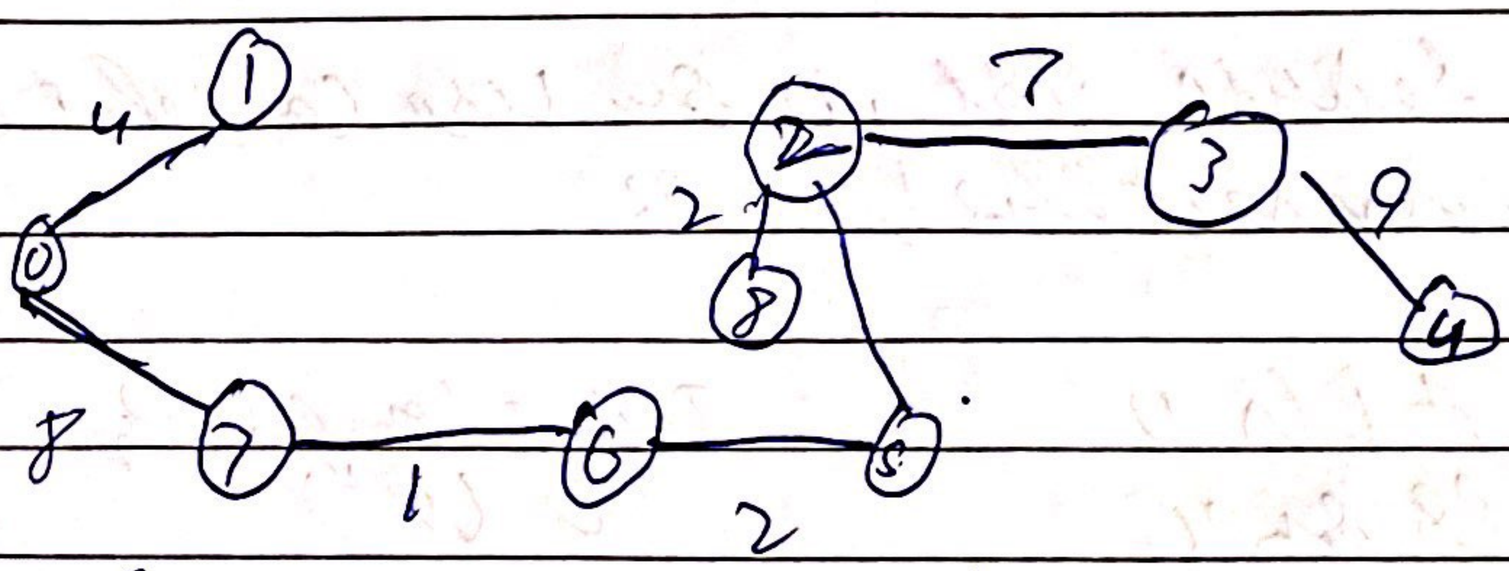
- Designing local area network
- Laying pipelines connecting offshore drilling sites, refineries and consumer markets
- Suppose you want to construct highways or railroads spanning several cities then we use concept of MST
- To reduce cost, eg. we use concept of MST To connect the houses

Soln 2

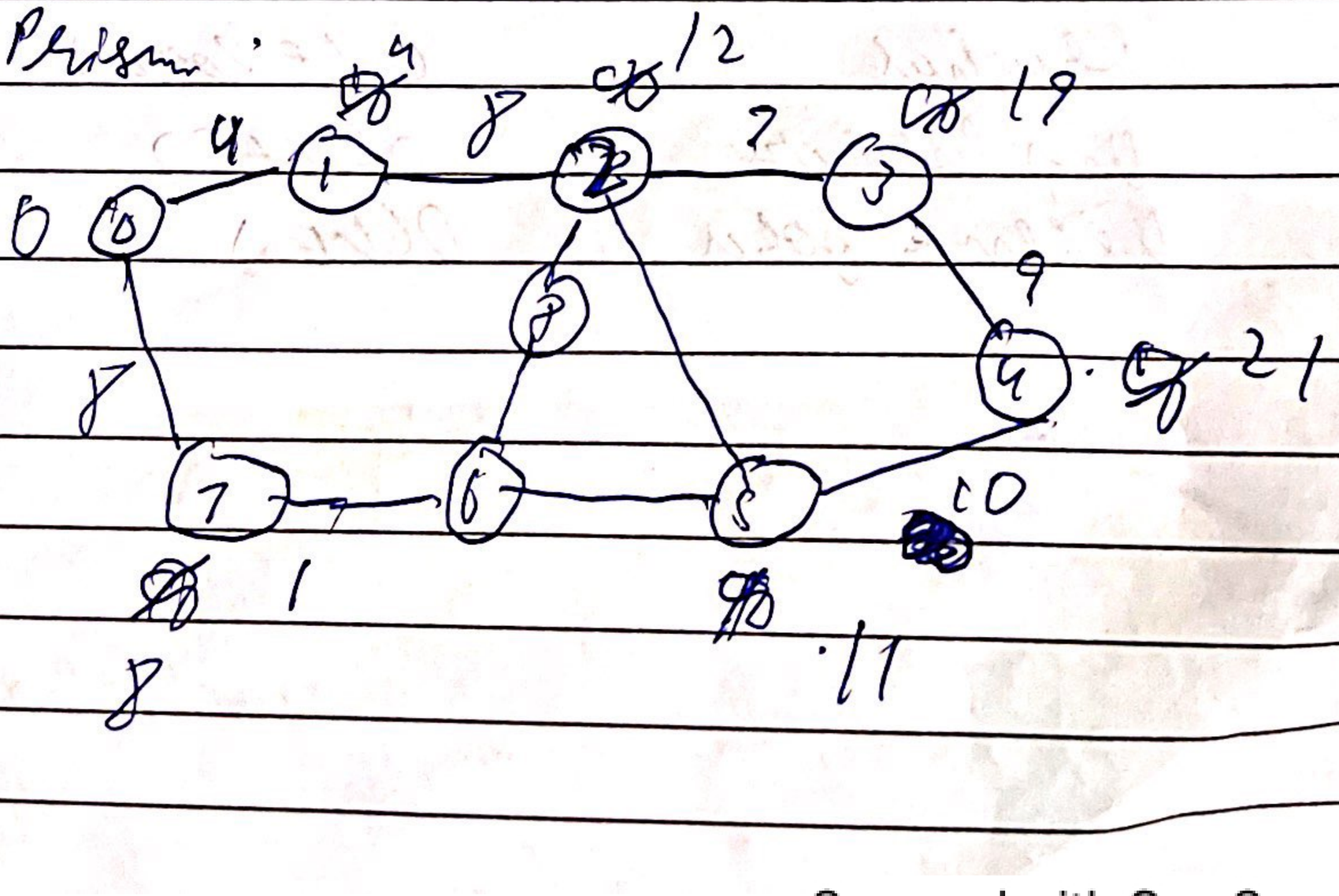
ALGO	Time complexity	Space complexity
Prim's	$O(V^2)$	$O(V+E)$
Kruskal	$O(E \log V)$	$O(\log E)$
Dijkstra's	$O(V+E)$	$O(V+E)$
Bellman ford	$O(VE)$	$O(E)$

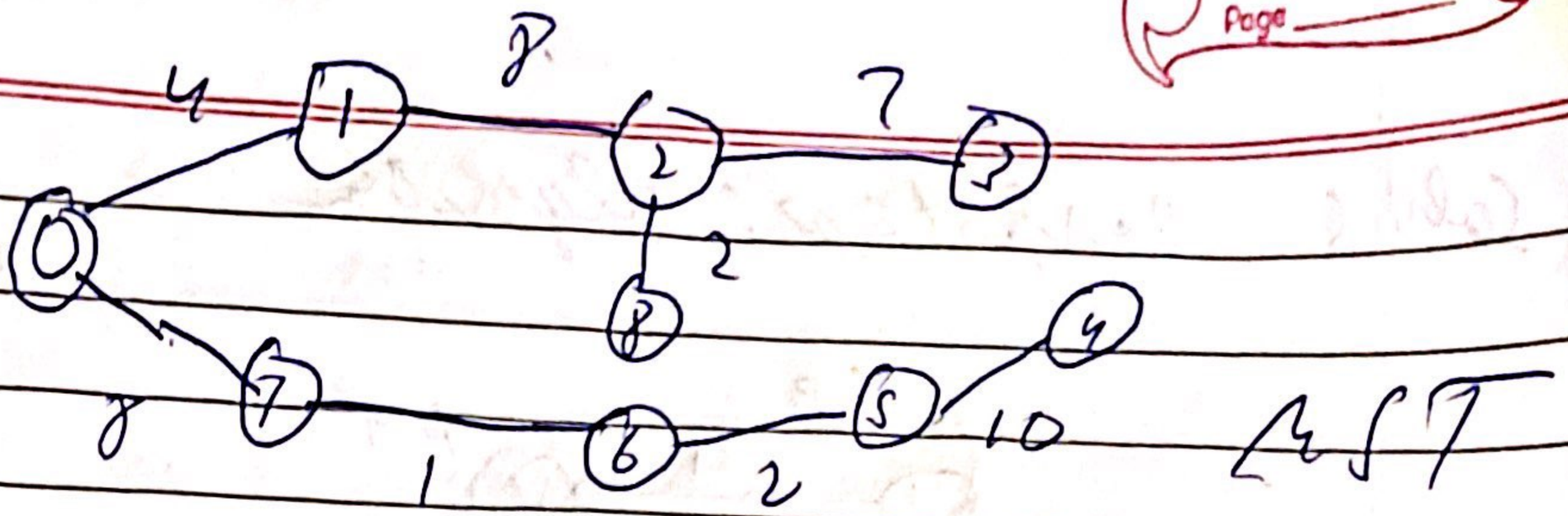
Sol:3 Kruskal

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



Prism:





Soln (i)

(1) The shortest path may change if the reason is that there may be different edges in different paths from 'S' to 't' for example let shortest path of weight 15 and has 5 edges. let there be another path with 2 edges and total weight is 25

The weight of shortest is increased by 5*10 becomes 15+50.

weight of other path is increased by 2+10 it becomes 28+20.

So the shortest path changes to other path which weight is 45

(2) If we multiply all edges weighted by 10, the shortest path doesn't change the reason it simple weight of all paths from S to t get multiplied by same amount - the no of edge on path doesn't matter

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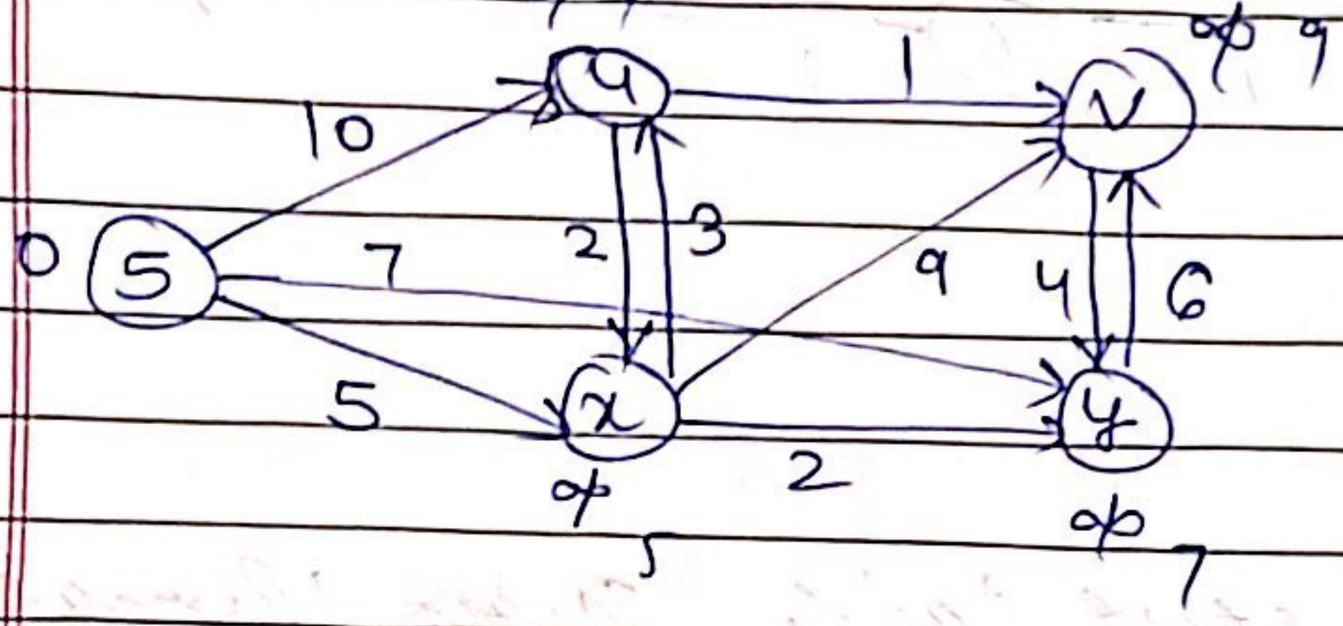
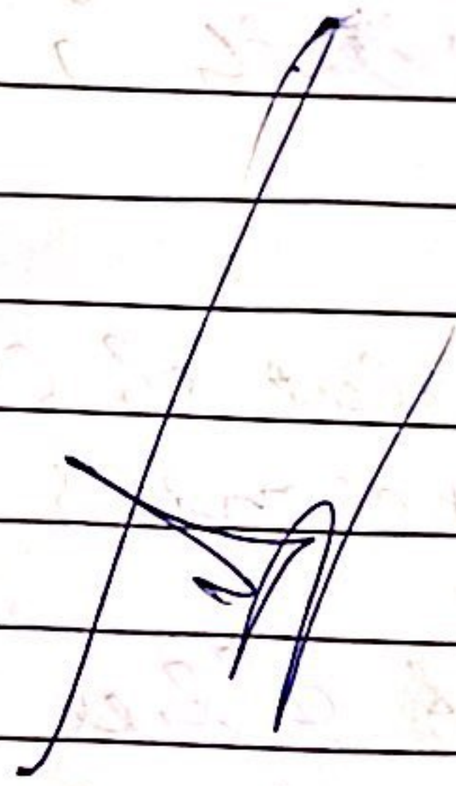
Solve Dijkstra's algorithm



Node Shortest distance from source node

u 8
x 5
v 7
y 9



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