SHAGUN GUPTA
Sec - C
RollNo. - 11

Date. ______
Page No. ______

Tutorial - 6

Sol-1 Minimum spanning tree - A minimum spanning tree (MST) or minimum weight spanning tree is a subset of the edges of a connected edge-weighted undirected graph that connects all the vertices together, without any cycles and with the minimum possible total edge weight

→ Applications.

(i) consider n station that are to be linked using a communication network and lying of communication link between any two station involves a cost. The ideal solution would be to exact a subgraph termed as minimum cost spanning tree

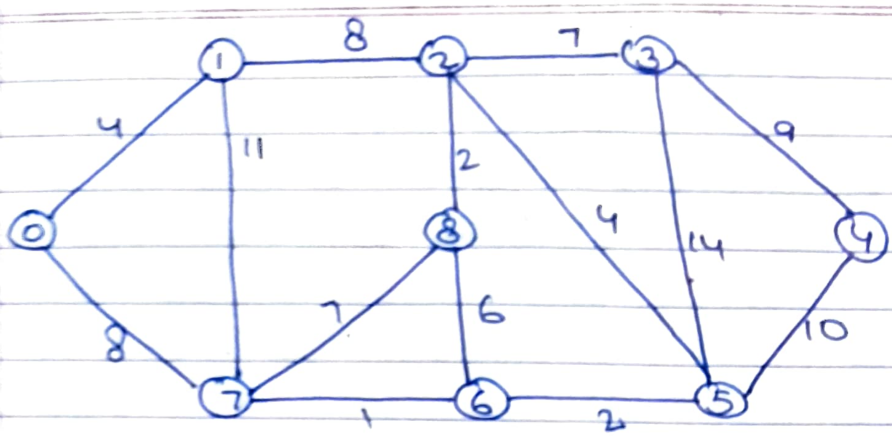
(ii) Suppose you meant to construct highways or railroads spanning several cities then we can use the concept of minimum spanning tree.

(iii) Design LAN

(iv) Laying pipelines connecting offshore drilling sites, refineries and consume markets

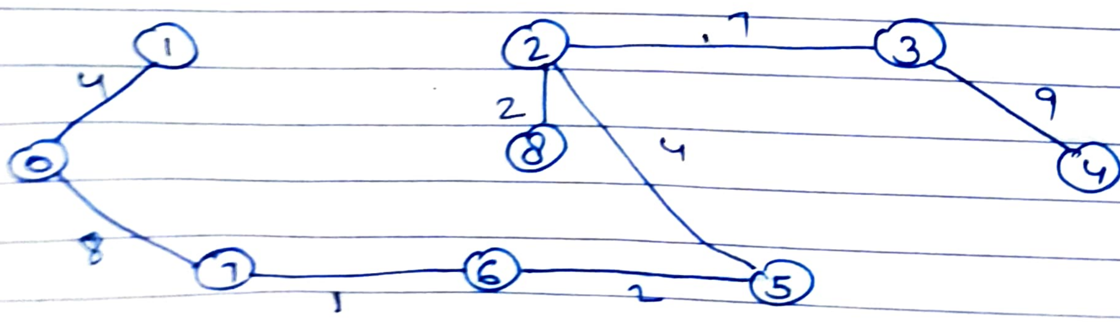
Sol-2 Time complexity of Prim's algorithm :- $O((V+E)\log)$
Space complexity of Prim's algorithm :- $O(1)$
Time complexity of Krushkal's Algorithm :- $O(E(\log V))$
Space complexity of Krushkal's Algorithm :- $O(1M)$
Time complexity of Dijkstra Algorithm :- $O(V^2)$
Space complexity of Dijkstra Algorithm :- $O(V^2)$
Time complexity of Bellmanford :- $O(VE)$
Space complexity of Bellman ford :- $O(E)$

Set - 3



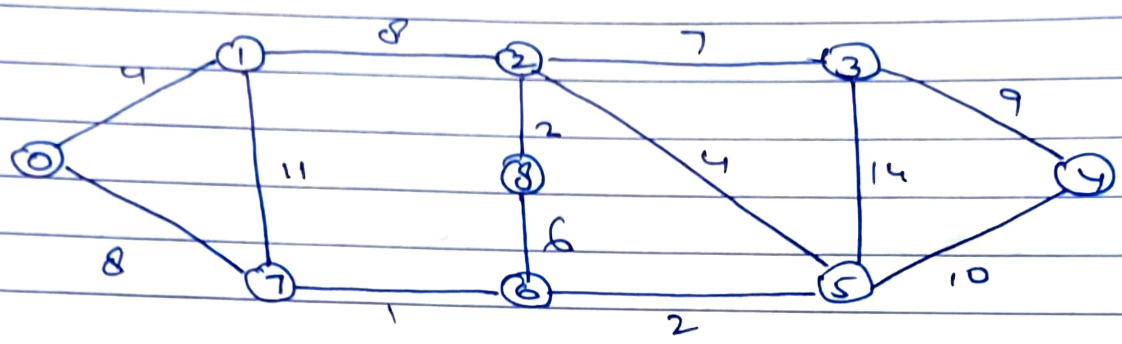
Krushkal algorithm

O	V	W	
6	7	1	✓
5	6	2	✓
2	8	2	✓
0	1	4	✓
2	5	4	✓
6	8	6	×
2	3	7	✓
7	8	7	×
0	7	8	✓
1	2	8	×
4	3	9	✓
4	5	10	×
1	7	11	×
3	5	14	×



weight = (1 + 2 + 2 + 2 + 4 + 4 + 7 + 8 + 9) = 39

Prim's Algorithm

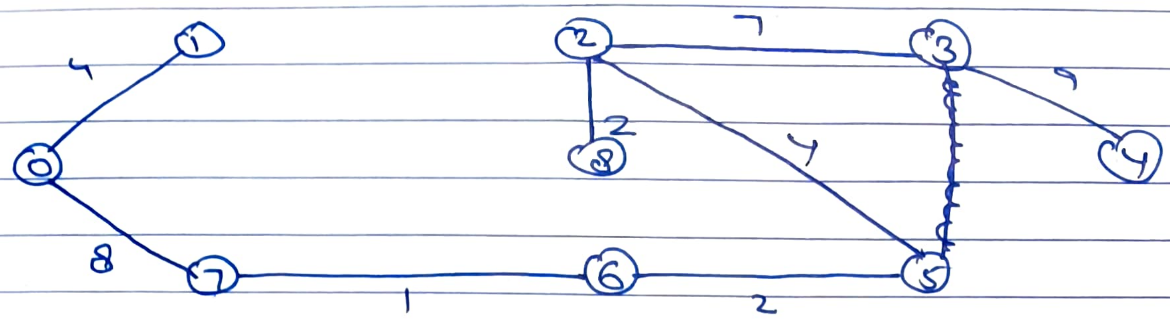


Weight

0	1	2	3	4	5	6	7	8
0 ~~∞~~	∞	∞	∞	∞	∞	∞	∞	∞
	4						$\boxed{8}$	
		8				$\boxed{\ }$		7
	11		7		4	1		$\boxed{2}$
			7		2			6
		14	1	10				
		$\boxed{7}$						
				$\boxed{9}$				

Parent

0	1	2	3	4	5	6	7	8
-1	~~-1~~	~~-1~~	-1	-1	-1	~~-1~~	~~-1~~	-1
	0	1				1	1	



weight :- $4+8+1+2+4+7+2+9 = 37$

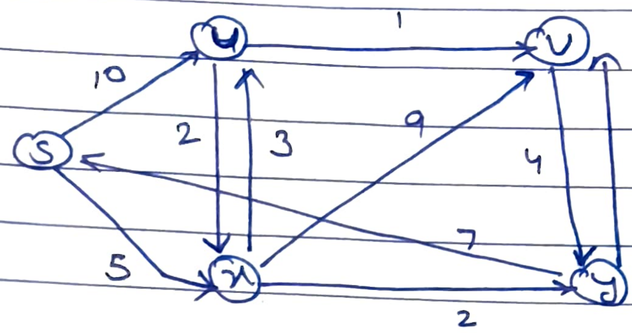
Sol - 4

(i) The shortest path may changes. The reason is there may be different number of edges in different paths from 's' to 't'. for example :- Let shortest path be of weight 15 and has edges 5. Let there be another path with 2 edge and total weight 25. The weight of the shortest path is increased by 5×10 and becomes $15+50$ weight of other path is increased by 2×10 & becomes $25+20$ so the shortest path changes to the other path with weight as 45

(ii) If we multiply all edges weight by 10, the shortest path don't change, The reason is simple, weight of all path from 's' to 't'. The no. of edges on a path don't matter. It is like changing limits of weights

Date. ____________
Page No. ____________

Sol-5.



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

Bellman ford algorithm

	s	u	v	x	y
1st →	0	10	∞	5	∞
2nd →	0	10	11	5	∞
3rd →	0	8	9	5	7
4th →	0	8	9	5	7