

Tutorial-6

Q1. What do you mean by minimum spanning tree? What are the applications of MST? Also known as minimum weight spanning tree for a weighted, connected, undirected graph is a spanning tree with a weight less than or equal to every other spanning tree.

A spanning tree of a graph is a subgraph that is a tree and connects all vertices together. (A single graph can have many spanning trees)

Applications:

→ Network design: telephone, TV cable, Water, Sewage

→ construct highways or railroads spanning several city than we can.

Q2 Analyze the TC and SC of Prim's, Kruskal, Dijkstra's and Bellman Ford Algorithm.

Prim's: $TC = O(|E| \log |V|)$
 $SC = O(|V|)$

Kruskal's Algo = $O(|E| \log |V|)$
 $SC = O(|V|)$

Dijkstra's Algo - $TC = O(V^2)$
 $TC = O(E + v \log v)$ if Priority Queue is used

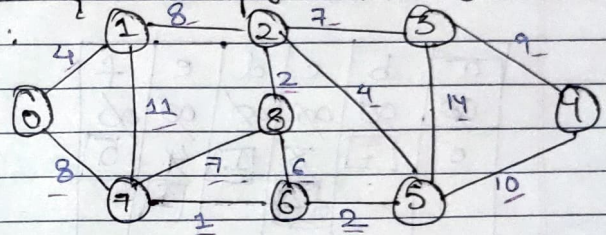
$SC = O(V^2)$

Bellman Ford Algo

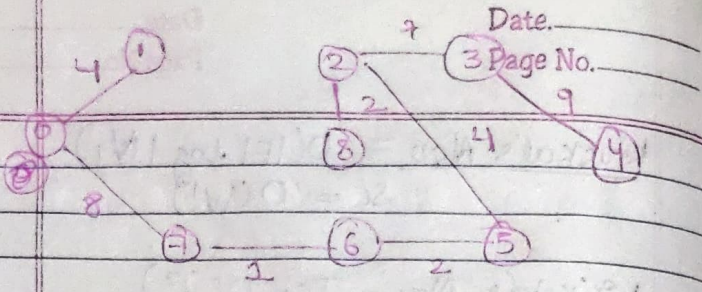
$TC = O(VE)$
 $SC = O(N)$

Q3 Apply Kruskal and Prim's Algo on right side of to compute MST and its weight

Kruskals:

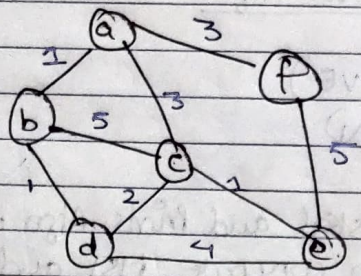


0	1	4	7	6	1	✓
	2	8	2	✓		
	0	1	4	✓		
	2	5	4	✓		
	0	6	0	✓		
	0	4	0	✓		
	0	2	0	✓		
	0	5	0	✓		
	0	1	0	✓		
	0	0	0	✓		



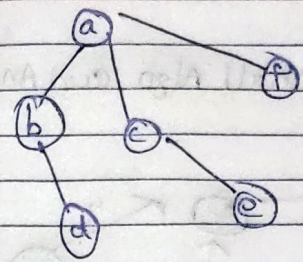
$$4 + 8 + 1 + 2 + 4 + 2 + 9 + 7 = 37$$

Prims Algo



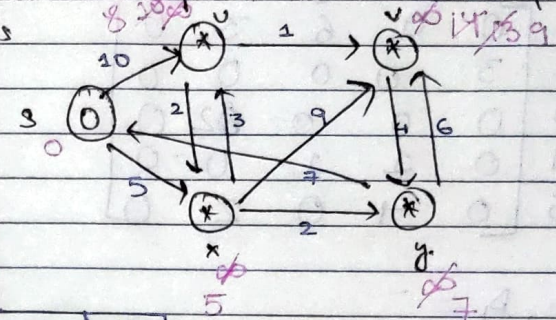
a	b	c	d	e	f
0	0	0	0	0	0
0	1	3	1	4	5
		2		1	

a	b	c	d	e	f
0	1	2	3	4	5
-1	X	X	X	X	X
0	0	3	1	2	0



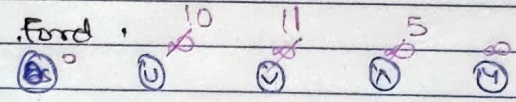
Q5 Apply Dijkstra's and Bellman algorithm on a graph given on RHS to compute shortest path to all nodes from node S.

Dijkstra's

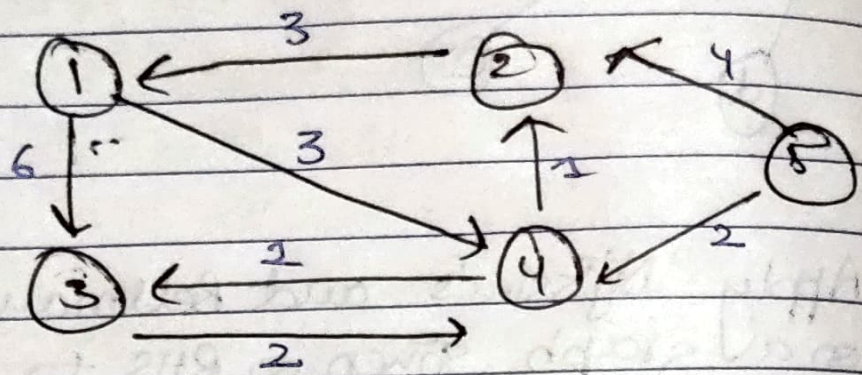


u	8
x	5
v	9
y	7

Bellman Ford



Q6 Apply Floyd Warshall Algo and Analyse TC and SC!



	1	2	3	4	5
1	0	0	6	3	0
2	3	0	0	0	0
3	0	0	0	2	0
4	0	1	1	0	0
5	0	4	0	2	0

$K = 1, A_1 =$