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Tutorial-6

Q1 **Minimum Spanning Tree**

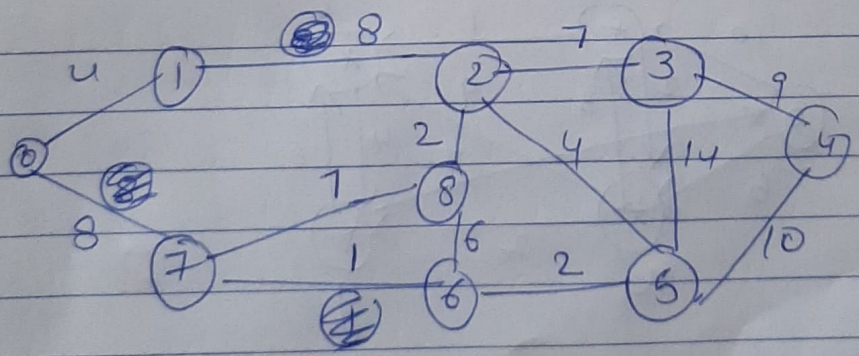
It is spanning tree which has minimum total cost. If we have a linked ~~list~~ undirected graph with weight combine with each edge then cost of spanning tree would be the sum of cost of its edge

Application - In design of networks including computer networks, transportation networks

Q2

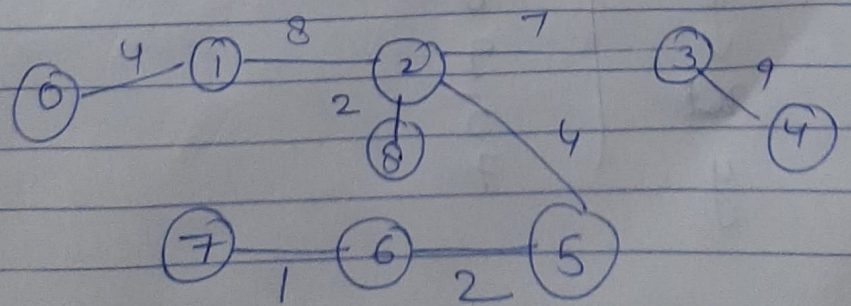
	Prim	Dijkstra	Bellman Ford
Time complexity	$O(V+E)\log V$	$O(E \log V)$	$O(NE)$
Space	$O(V+E)$	$O(N^2)$	$O(N)$

Q3



i) Kruskals

1, 2, 2, 4, 4, 6, 7, 7, 8, 8, 9, 10, 11, 14



Min wt = 37

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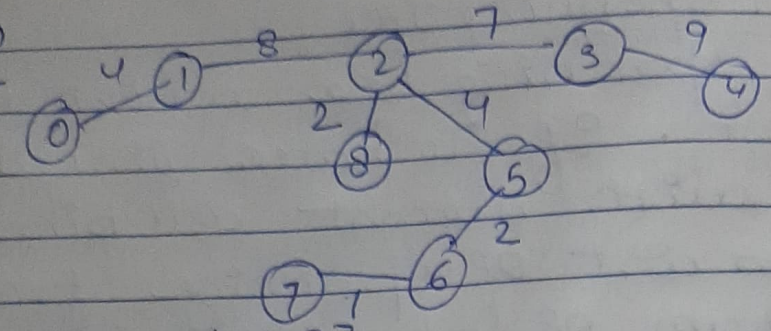
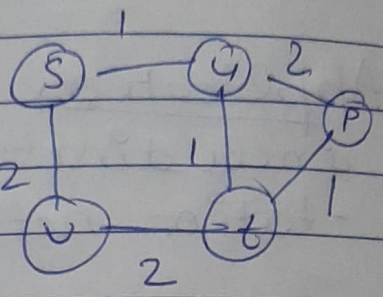
i) Prim



min wt = 37

Q4 Let we have



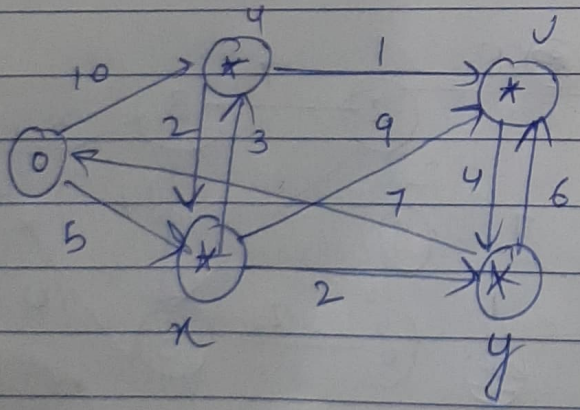
initial shortest path

$s \to u \to t$

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



Dijkstra

Node	Dist from s
u	8
v	9
x	5
y	7

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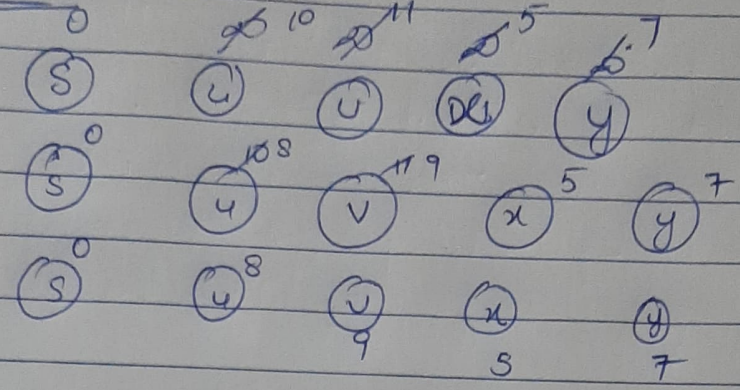
Bellman



Q6 $A_0 = \begin{bmatrix} 0 & \infty & 6 & 3 & \infty \\ 3 & 0 & \infty & \infty & \infty \\ \infty & \infty & 0 & 2 & \infty \\ \infty & 1 & 1 & 0 & \infty \\ \infty & 4 & \infty & 2 & 0 \end{bmatrix}$

$A_1 = \begin{bmatrix} 0 & \infty & 6 & 3 & \infty \\ 3 & 0 & 9 & 6 & \infty \\ \infty & \infty & 0 & 2 & \infty \\ \infty & 1 & 1 & 0 & \infty \\ \infty & 4 & \infty & 2 & 0 \end{bmatrix}$ $A_2 = \begin{bmatrix} 0 & \infty & 6 & 3 & \infty \\ 3 & 0 & 9 & 6 & \infty \\ \infty & \infty & 0 & 2 & \infty \\ \infty & 1 & 1 & 0 & \infty \\ \infty & 4 & 13 & 2 & 0 \end{bmatrix}$

$A_3 = \begin{bmatrix} 0 & \infty & 6 & 3 & \infty \\ 3 & 0 & 9 & 6 & \infty \\ \infty & \infty & 0 & 2 & \infty \\ \infty & 1 & 1 & 0 & \infty \\ \infty & 4 & 13 & 2 & 0 \end{bmatrix}$ $A_4 = \begin{bmatrix} 0 & 4 & 4 & 3 & \infty \\ 3 & 0 & 7 & 6 & \infty \\ \infty & 3 & 0 & 2 & \infty \\ \infty & 1 & 1 & 0 & \infty \\ \infty & 3 & 3 & 2 & 0 \end{bmatrix}$

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