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DAA - Tutorial - 6

Q1

Ans Minimum spanning tree : A (MST) 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 are to be linked using a communication network and eying of communication link b/w any two station involve a cost.

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.

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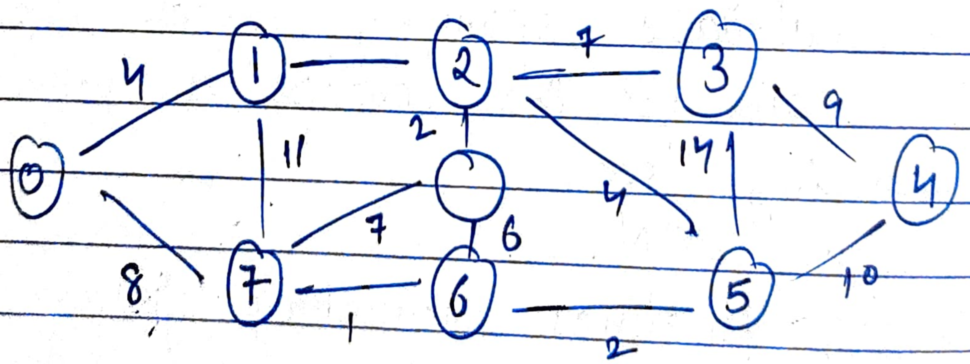
Q2
Solⁿ Time complexity of Prim's algorithms
$O((V+E)\log V)$
Space complexity = $O(V)$.

Kruskal's Algo
T.C => $O(E(\log V))$
S.C => $O(|V|)$.

Dijkstra Algo
T.C => $O(V^2)$
S.C => $O(V^2)$

Bellmanford Algo
T.C => $O(VE)$
S.C => $O(E)$.

Q3
Solⁿ



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Kruskali algo

0	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

0	v	w	
1	7	11	X
3	5	14	X

Q4

Solⁿ i) The shortest path may changes. The reason is there may be different numbers of edges in different paths from 's' to 't'. For eg. let shortest path be of weight 15 and has edge 5. Let there be another path with 2 edge and total

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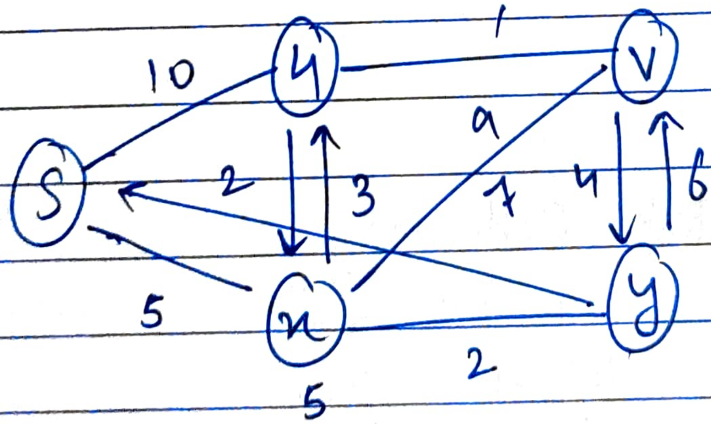
weight 25. The weight of the shortest path is increased by 5×10 and become $15+50$.

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' get multiplied by same amount. The no. of edges on a path don't matter. It is like changing limits of weight.

Q5
Sol^n

Dijkstra Algorithms.



node Shortest dist. from source node

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u	8
x	5
v	9
y	7

Bellmanford Algo.

	s	u	v	x	y
1st →	0	10	∞	5	∞
2nd →	0	10	11.1	5	∞
3rd →	0	8	9	5	7
4th →	0	8	9	5	7