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CLASS ROLL NO:- 20

SECTION:- CE

ASSIGNMENT:- 06

Ans 1)

MINIMUM SPANNING TREE:-

It is a subset of the edges of a connected edge-weighted undirected graph that connects all the vertices together, without any cycle and with the minimum possible total edge weight.

Applications:-

- Consider n stations are to be linked using a communication network and laying of communication link b/w any 2 stations involves a cost; so we use MST for a better output.
- Same goes with roadways & highways & airlines.
- Design LAN
- Laying Pipelines connecting offshore drilling sites, refineries & markets.

Ans 2)

Algorithm

Time Complexity

Space Complexity

Prim's Algorithm

$O(V+E)$

$O(V)$

Dijkstra's Algorithm

$O(V^2)$

$O(V^2)$

Kruskal's Algorithm

$O(E \log V)$

$O(V \log V)$

Bellman Ford

$O(VE)$

$O(V)$

Ans 3)

Graph:-



O
6
5
2
0
2
6
2
7
0
1
4
4
1
3

V
7
6
8
1
5
8
3
8
7
2
2
3
3
7
5

W
1
2
2
4
4
6
7
7
8
8
9
10
11
14
✓
✓
✓
✓
✓
x
✓
x
x
x
x
x
x
x
x



wgt = 37 - Ans

Prim's Algo:-

Weight:-

0

	1	2	3	4	5	6	7	8
1	∞	∞	∞	∞	∞	∞	∞	∞
2	∞	∞	∞	∞	∞	∞	6	∞
3	∞	∞	∞	∞	∞	1	6	7
4	∞	∞	∞	∞	1	1	8	2
5	∞	∞	7	∞	2	1	8	6
6	∞	∞	7	2	2	1	5	6
7	∞	14	1	10	2	1	8	6
8	∞	7	1	10	2	1	8	6
9	∞	7	1	9	2	1	8	6

brant -

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



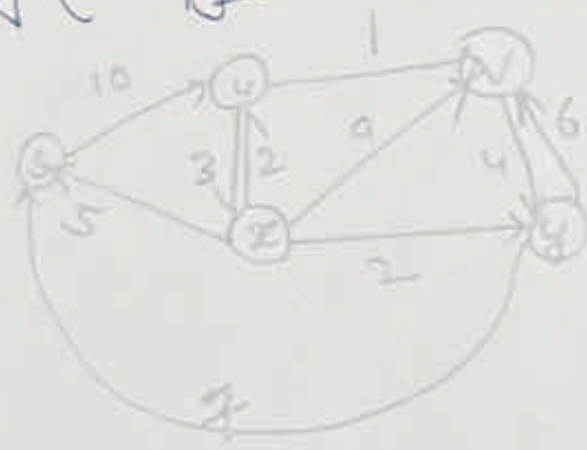
Wgt. = 37

Ans 4)

- i) Shortest path may change. The reason is that there may be different path from 's' to 't'. For example:-
 let shortest path be of weight 15 & edge 5. Let there be another path with 2 edges and total weight 25. Hence, the shortest path increases. More weighted of other paths are also increase.
- ii) If we multiply all edges wgt by 10, shortest path won't change. Only the weight will be increased by 10 or otherwise it will follow the same path.

Ans 5)

Dijkstra's Algo:-



Node
u
v
x
y
z
w

Shortest distance from source node
8
5
9
7

Bellman Ford:-

1st	→	$\begin{pmatrix} 0 \\ 5 \end{pmatrix}$	$\begin{pmatrix} 10 \\ 6 \end{pmatrix}$	$\begin{pmatrix} 20 \\ 7 \end{pmatrix}$	$\begin{pmatrix} 5 \\ 2 \end{pmatrix}$	$\begin{pmatrix} 20 \\ 4 \end{pmatrix}$
2nd	→	$\begin{pmatrix} 0 \\ 5 \end{pmatrix}$	$\begin{pmatrix} 10 \\ 6 \end{pmatrix}$	$\begin{pmatrix} 10 \\ 7 \end{pmatrix}$	$\begin{pmatrix} 5 \\ 2 \end{pmatrix}$	$\begin{pmatrix} 20 \\ 4 \end{pmatrix}$
3rd	→	$\begin{pmatrix} 0 \\ 5 \end{pmatrix}$	$\begin{pmatrix} 0 \\ 6 \end{pmatrix}$	$\begin{pmatrix} 0 \\ 7 \end{pmatrix}$	$\begin{pmatrix} 5 \\ 2 \end{pmatrix}$	$\begin{pmatrix} 7 \\ 4 \end{pmatrix}$
4th	→	$\begin{pmatrix} 0 \\ 5 \end{pmatrix}$	$\begin{pmatrix} 0 \\ 6 \end{pmatrix}$	$\begin{pmatrix} 0 \\ 7 \end{pmatrix}$	$\begin{pmatrix} 5 \\ 2 \end{pmatrix}$	$\begin{pmatrix} 7 \\ 4 \end{pmatrix}$

no
cycle
exists

Question 5

Floyd Warshall Algo:-



TC = $O(V^3)$
 SC = $O(V^2)$