ASSIGNMENT:-06

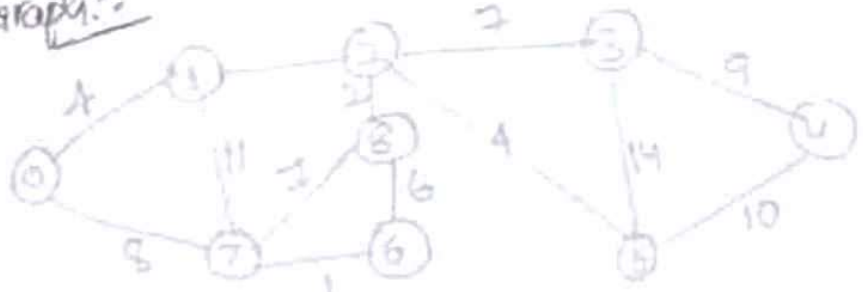
Ans 1) MINIMUM SPANNING TREE:-
It is a subset of the edges of a connected edge-weighted undirected graph that connects all the vertices together, without any cycles and with the minimum possible total edge weight.

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.

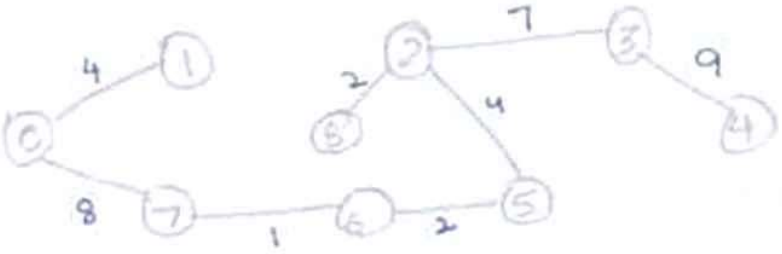
Ans 2)

Algorithm	Time Complexity	Space Complexity
Prim's Algorithm	O(V+E)	O(V)
Djekstra's Algorithm	O(V²)	O(V²)
Kruskal's Algorithm	O(E log V)	O(|V|)
BellMan Ford	O(VE)	O(V)

Ans 3) Graph:-



O	V	H	
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	3	10	×
1	7	11	×
3	5	14	×



wgt. = [37] -Ans

Prim's Algo:-

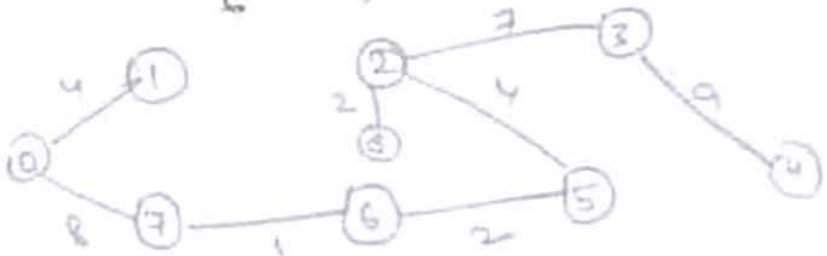
Weight:-

[0]

1	2	3	4	5	6	7	8
∞	∞	∞	∞	∞	∞	∞	∞
4	∞	∞	∞	∞	∞	[5]	∞
4	8	∞	∞	∞	[1]	6	7
11	8	7	∞	1	1	8	[2]
11	8	7	2	2	1	6	6
4	14	1	10	2	1	5	6
4	[7]	1	10	2	1	8	6
4	7	1	[9]	2	1	8	6

Brout:-

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



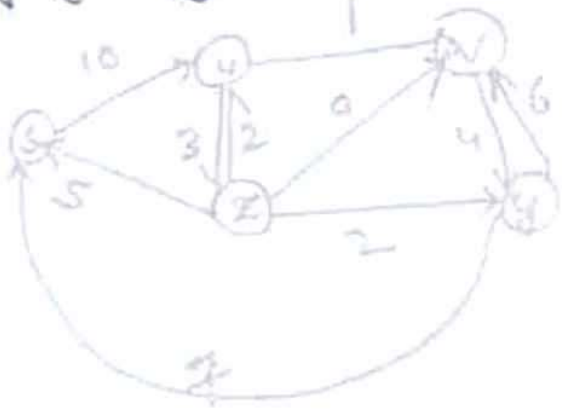
Wgt. = 37.

Ans4)

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 10x otherwise it will follow the same path.

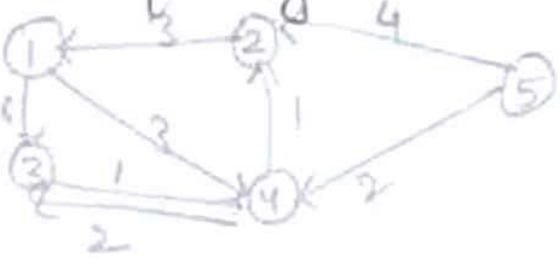
Ans5) Dijkstra's Algo:-



Node	Shortest distance from source node
u	8
x	5
y	9
z	7

Bellman Ford :-

Question 6 Floyd Warshall Algo :-



TC = $O(|V|^3)$.

SC = $O(|V|^2)$