I Minimal Spanning Tree:

It is a special kind of tree that minimises the length or neights of edges of the tree.

of tree is said to be spanning tree

- If it contains all the vertices.

- Spans all the vertices with n=1 edgls

- is acyclic

- A tree is minimum spanning tree if it spans the minimum weight while spanning all the vertices.

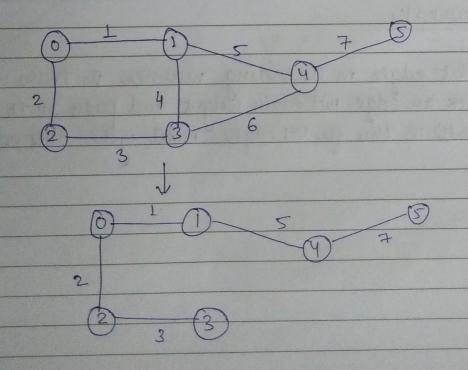
## applications:

1. Telephone

2 TV cable

3. computer Networks

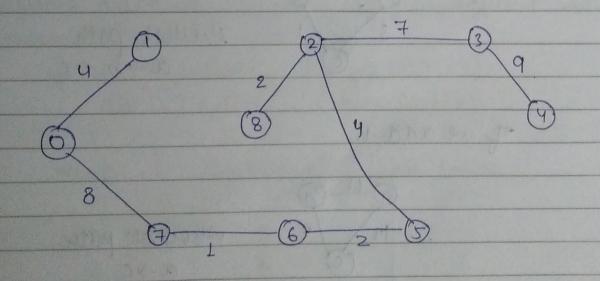
4. Constructing roads while spanning several areas |

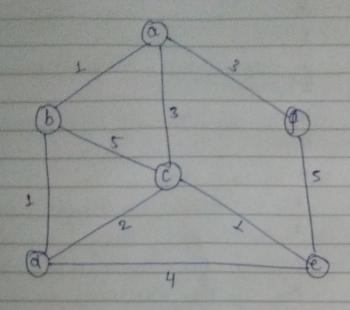


Time complexity Kusukalis algorithm: O(Elogu) Dykstra's algorithm: matrix - O(n2) Heap - O (Flogu) Prime algorithm matrix - O(12) Heap - O(Elogu) Krushkal's o sort edges in according manner in terms of weight of terms of weight of the an edge with min weight and push it to result of continue this for V-sedges until yell does not come

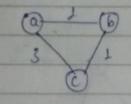
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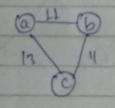


o of we add the neight of the graph by 10, 415 the showest path can change liven consider



showest path a+b+c

of we add 10



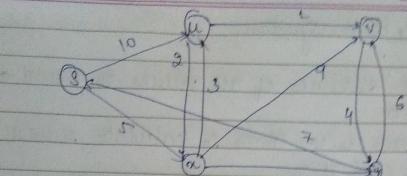
shoulest path a+c

. There is no change in the shortest path if we multiply all the weights at edges by 10 If we milliply lon & 10 m

4 NCM

> 10N < 10M.

.: No change



## Diketa's algorithm:

5.

create spiret which keeps track of vertices

we assign all the vertices with distance infinite. Then we assign distance of source node to 0.

While spiret does not include all the vertices.

i. Pick a vertex which is not appliet and has min distance in Include it in appliet.

in update distance value of all the adjacent votices of obore vector using condition.

if (dist [v] total + graph [u][v])

abit[v] = dist[u] + graph[u][v]

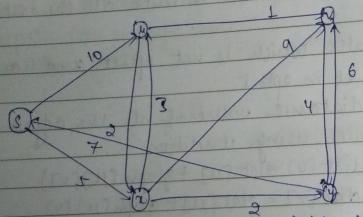
Node	therest dist from son	ule.
3	0	
μ	8	
r	5	
V	9	
y	7	,

Bellman's Foed's Algorithm:

· Initialise distances of all vertices to o and assign · Repeat this fer v-1 times to calculate shortest distance

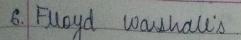
for each edge 11-4. if ( dist turalist [u] + weight [u][v]) distry - dist [4] + weight [4][v])

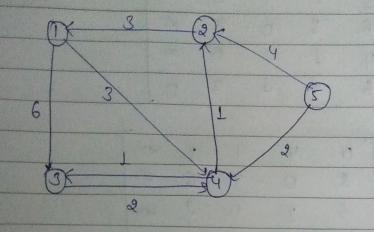
· This will report if there is a negative weight do this for each edge 4-V. if (dist [v] > dist [u] + weight [v][u])



(s, u) (s, z) (u, z) (u, v) (v, y) (y, v) (y, z) (l, m) (n, v) (n, y)

Node	Shortest dist.		
3	0		
u	8		
2	5		
y	7		
V	9		





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

$$\begin{bmatrix}
 0 & \infty & 6 & 3 & \infty \\
 3 & 0 & 9 & 6 & \infty \\
 92 = \infty & \infty & 0 & 2 & \infty \\
 4 & 1 & 1 & 0 & \infty \\
 \hline
 1 & 1 & 0 & \infty & 0
 \end{bmatrix}$$

$$\begin{bmatrix}
 7 & 4 & 13 & 2 & 0 \\
 \hline
 1 & 0 & \infty & 6 & 9 & \infty
 \end{bmatrix}$$

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