P - (1)

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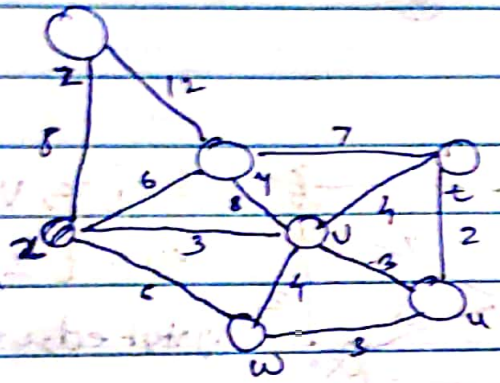
Homework - 6

Q1)

a) Prim's algorithm

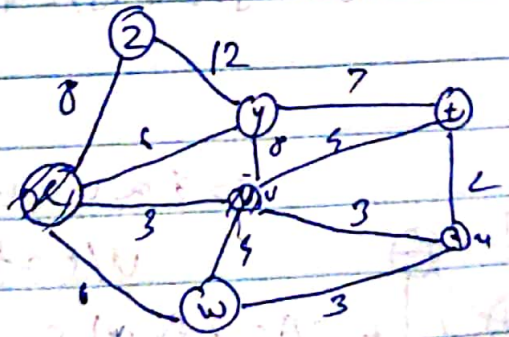


Step 0 :- $S = \{x, y\}$ $V/S = \{z, y, w, v, t, u\}$

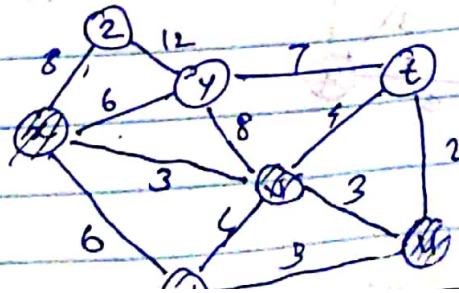
lightest edge = $\{x, v\}$

Step 1 - $S = \{x, y\}$ $V/S = \{z, y, w, t, u\}$

lightest edge = $\{v, u\}$ $A = \{(x, v)\}$



Step 2 :-



$S = \{x, v, u\}$

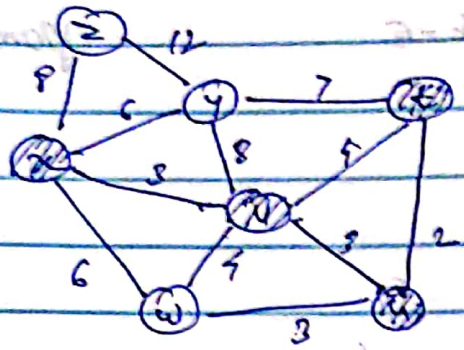
$V/S = \{z, y, w, t\}$

lightest edge = $\{u, t\}$

$A = \{\{x, v\}\{v, u\}\}$

p-(2)

Step3 :-



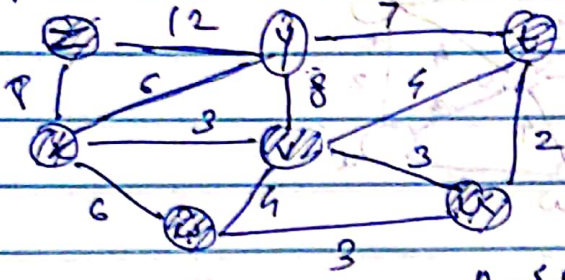
$S = \{x, v, u, t\}$

$V/S = \{z, y, w\}$

lightest edge = $\{u, w\}$

$A = \{\{x,v\}\{v,u\}\{u,t\}\}$

Step 4 :-



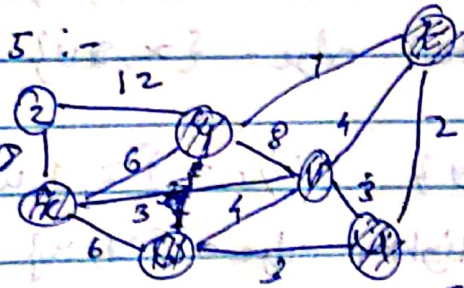
$S = \{x, v, u, t, w\}$

$V/S = \{z, y\}$

lightest edge = $\{x, y\}$

$A = \{\{x,v\}, \{v,u\}, \{u,t\}, \{u,w\}\}$

Step 5 :-



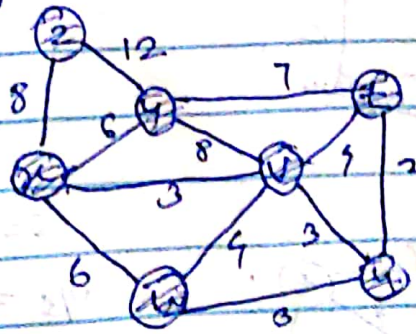
$S = \{x, v, u, t, w, y\}$

$V/S = \{z\}$

lightest edge = $\{x, z\}$

$A = \{\{x,v\}, \{v,u\}, \{u,t\}\{u,w\}, \{x,y\}\}$

Step 6 :-



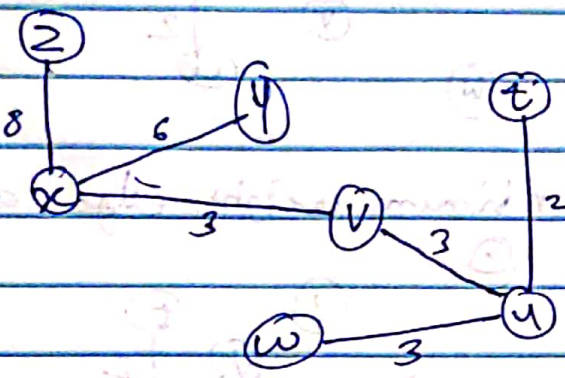
$S = \{x, v, u, t, w, y, z\}$

$V/S = \{\}$

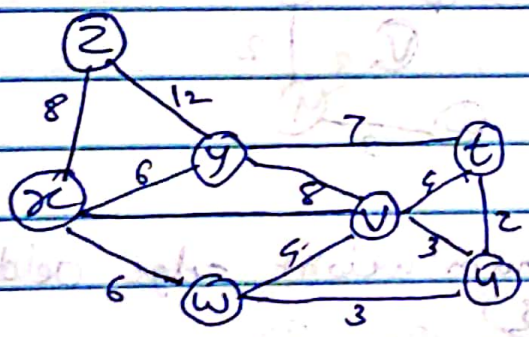
$A = \{\{x,v\}, \{v,u\}, \{u,t\}, \{u,w\}, \{x,y\}, \{x,z\}\}$

P-(3)

Minimum Spanning tree :-



b) Kruskal's algorithm :-

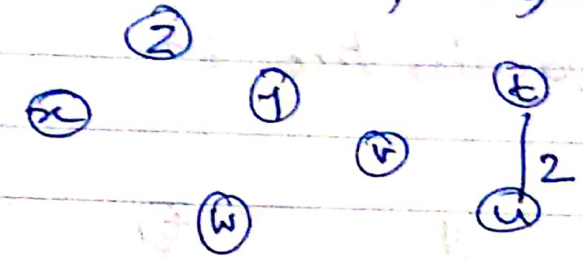


edge	weight
{u,t}	2
{u,v}	3
{u,w}	3
{v,x}	3
{v,w}	4
{v,t}	4
{x,w}	6
{x,y}	6
{y,t}	7
{y,z}	8

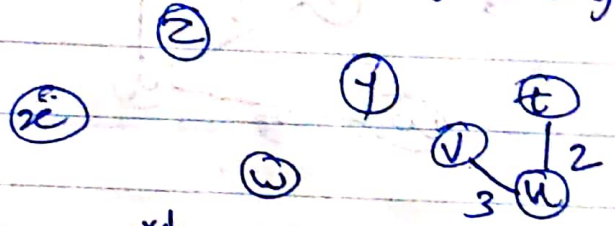
edge	weight
{x,z}	8
{y,z}	12

P-④

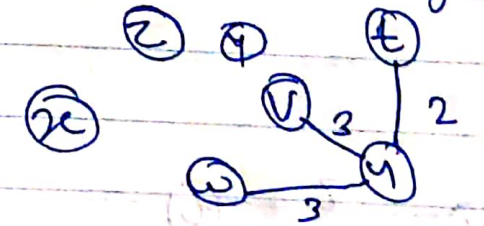
Step ①: minimum weight edge {u, t}



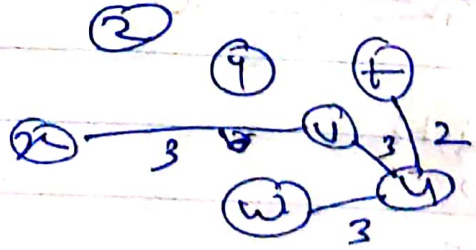
Step ②: 2nd minimum weight edge add {u, v}



Step ③ :- 3rd minimum weight edge add: {u, w}

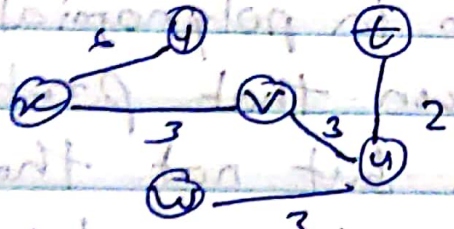


Step ④ :- minimum weight edge add {v, w}



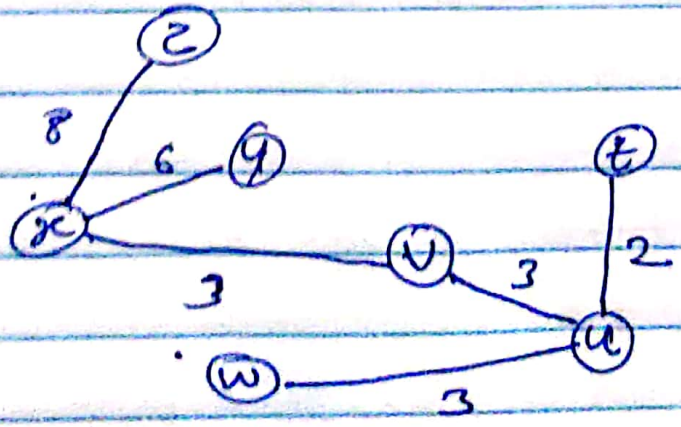
P-(5)

step (5) next minimum weight edge add {x, y}



not created cycle because {v, w}, {v, t}, {x, w} can create cycle

step (6) add {x, z} which is next minimum that will not create cycle) and minimum spanning tree is as below



P-(6)

Q2)

Np complete problem (L') should be reduced to our problem in polynomial time but in here it is given that problem runs in $O(2^n)$ time but not that specific instance of Np complete reduced to our problem hence it is not necessarily be an Np complete problem.