4

~~$U = \{$~~ $V = \{1, 4, 2\}$

$S = \{1, 3, 2\}$

1. KnapSack:-

$U = \{1, 2, 3, 4, 5, 6\}$

count $U = 6$ $\quad B = 6$

matrix $X = (B+1) \times (U+1)$

$= 7 \times 7$.

$U \downarrow$ / $B \rightarrow$	0	1	2	3	4	5	6
0	0	0	0	0	0	0	0
1	0	0	0	0	5	5	5
2	0	0	4	4	5	5	9
3	0	0	4	4	5	↑8	↑9
4	0	0	4	4	5	↑8	↑9
5	0	0	4	4	5	↑8	↑9
6	0	3	4	7	7	8	11

$S = \{4, 2, 3, 5, 2, 1\}$

$V = \{5, 4, 4, 4, 1, 3\}$

items in KnapSack are:- $\{2, 3, 6\}$

Best Value we Can achieve = 11

if (j < S(i))

  V(i,j) = V(i-1, j)

else

  V(i,j) = max (V(i-1, j), V(i-1, j-S(i)) + V(i))

- optimal Path = O Representation

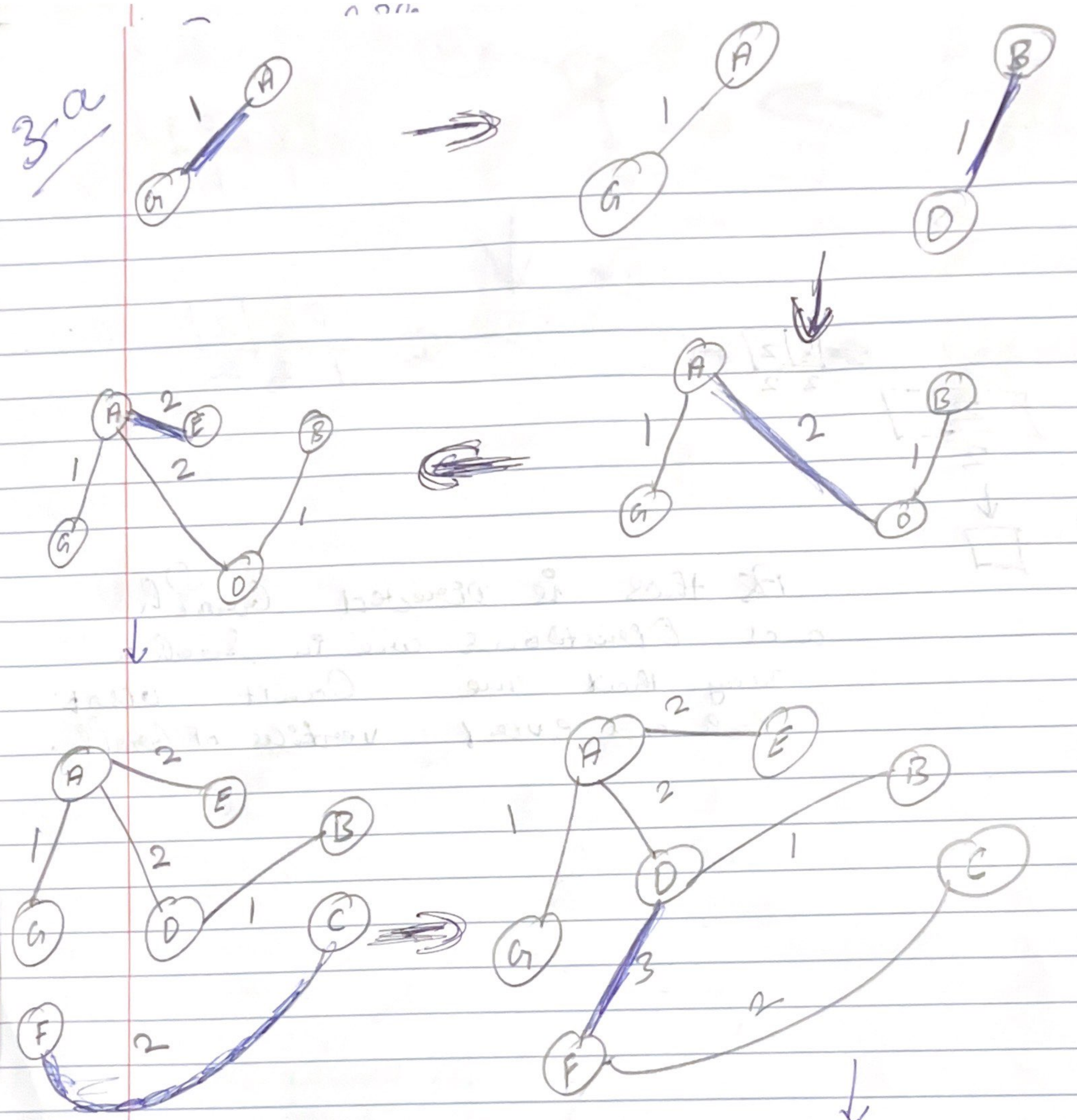
$4+2=6$

$3+1+2=6$

$4+3+4$

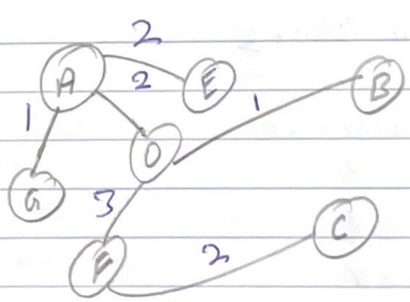
$7+4=8$

3-a



Reject $B \xrightarrow{3} E$
$B \xrightarrow{3} C$
$G \xrightarrow{3} F$
– –
– –

Because ~~all~~ they Belong to Same tree that are already Connected, So no Point of Adding them.



Final

Reject
~~$B \xrightarrow{3} E$~~
$B \xrightarrow{3} C$
3

Because they Belong to Same tree.

Also Reject
$G \xrightarrow{3} F$

We 6 edges in total means ~~Eg~~ Edges = (n-1)   n=vertices

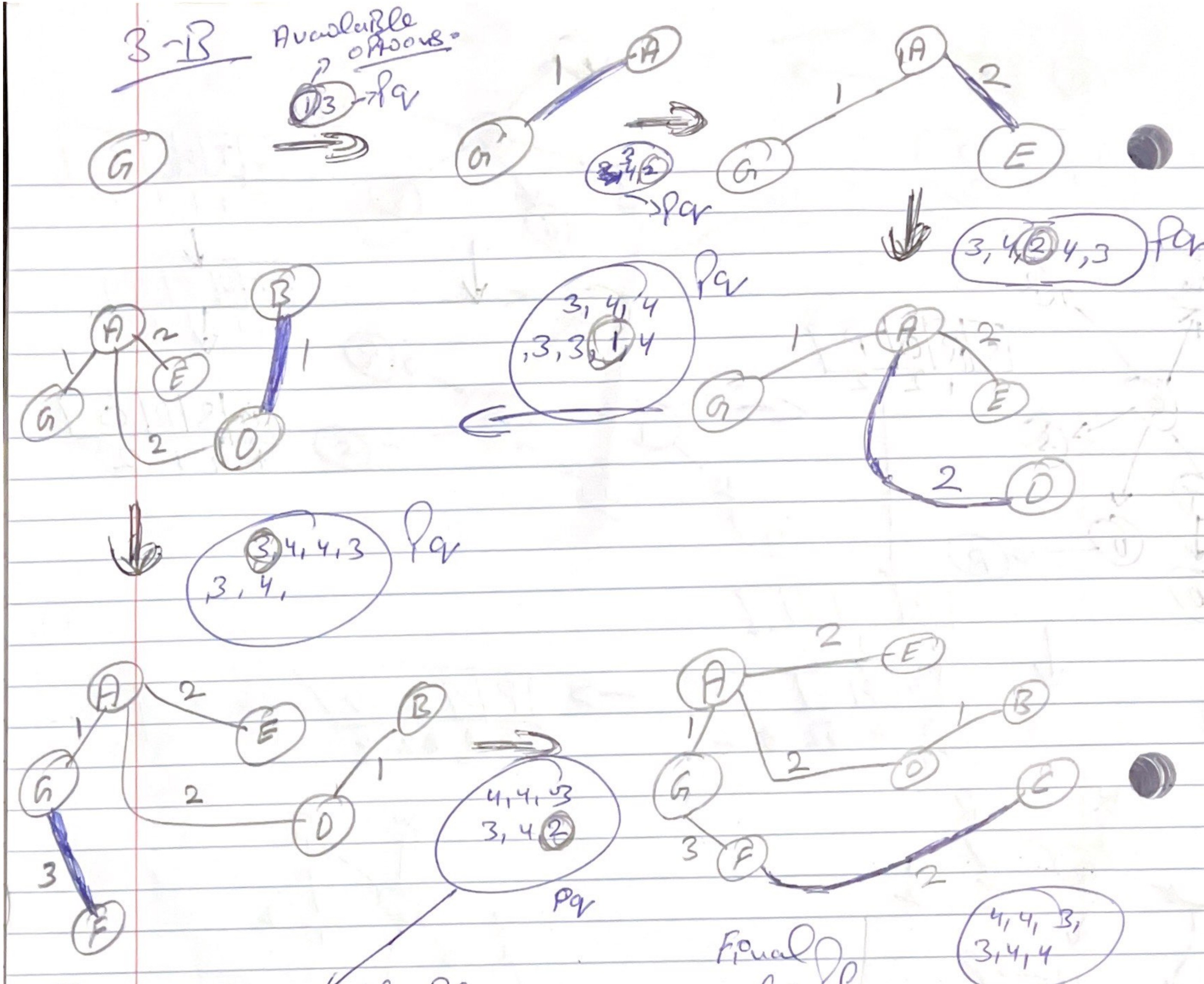
3-Ce

- Here what I did → I have added edges in ascending order → Creating ~~dosf~~ Disjoint set for each vertex

Checking if vertex it connects belong to different disjoint sets → If so Add them to minimum spanning tree if no discard them.

I haven't done explanation at each step as the way I have drawn graph is very clear.

3-B



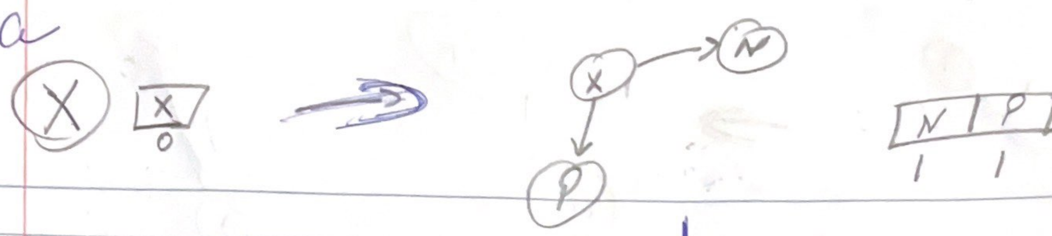
These are the available options to select edge and we select smallest edge

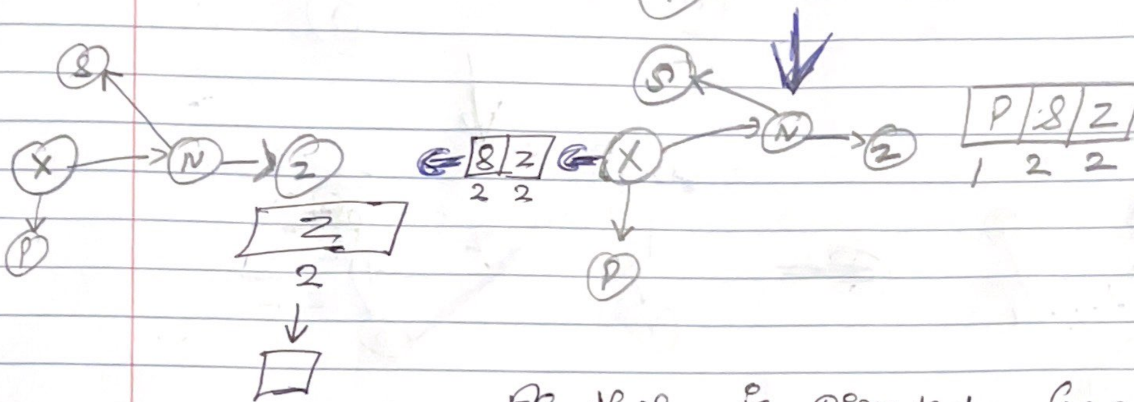
- Here I have a (visited vertex set) starting from G
- Pq → priority queue (storing ~~each~~ edges connected to vertices, that will be present in visited vertex set)

Pq → will give edge with minimum length →

Add → vertex in visited vertex set that is connected with that edge → But make sure that vertex is not already in visited vertex set.

4-a

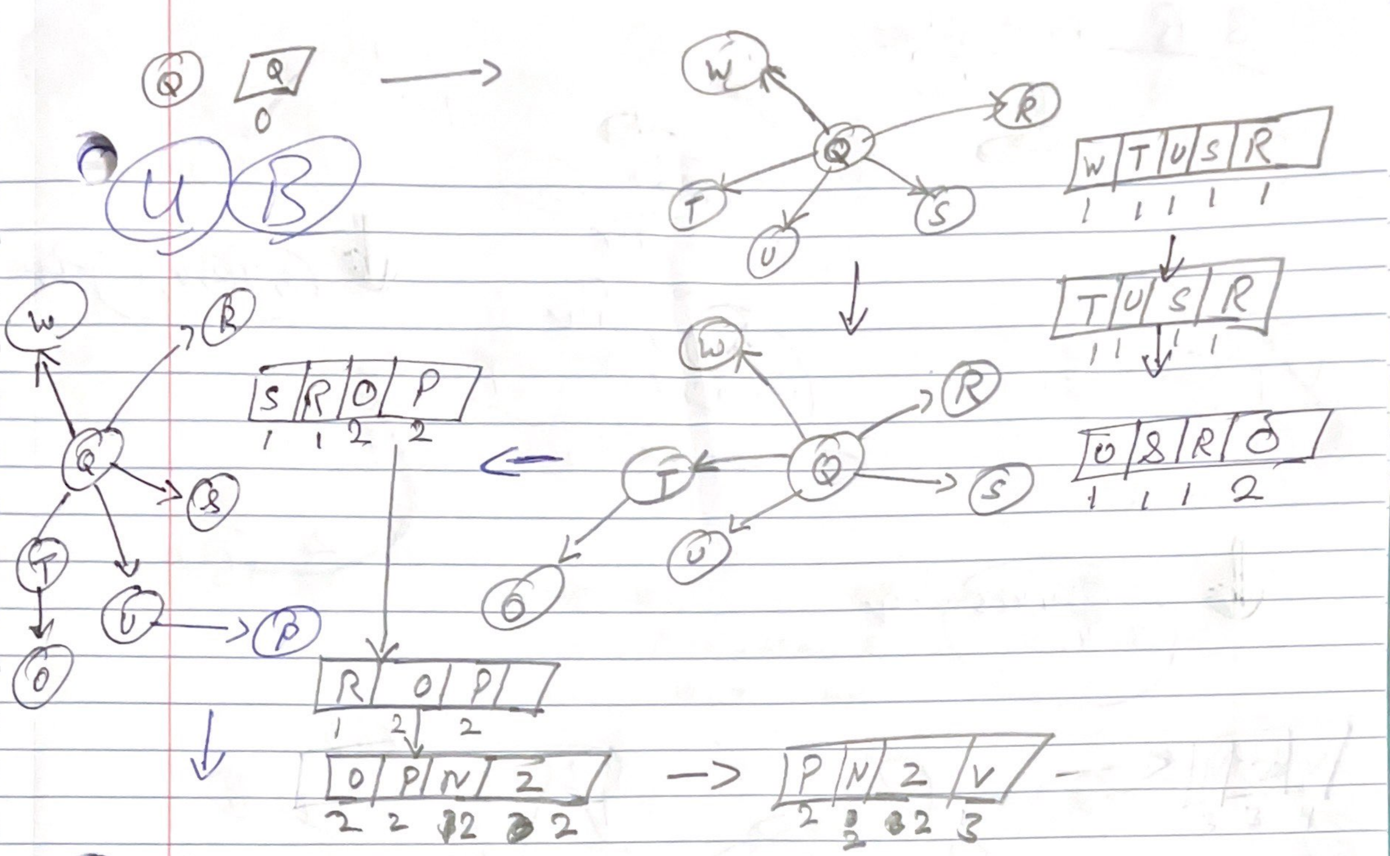


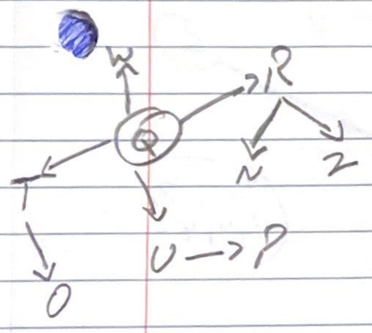


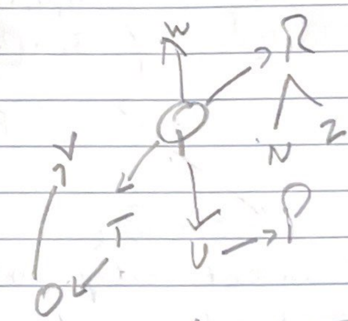
As this is Directed Graph and Directions are in such a way that we can't visit each and every vertices of Graph.

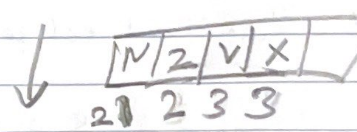
d and π values

X: $d=0$, $\pi=$ None
N: $d=1$, $\pi=X$
P: $d=1$, $\pi=X$
S: $d=2$, $\pi=N$
Z: $d=2$, $\pi=N$

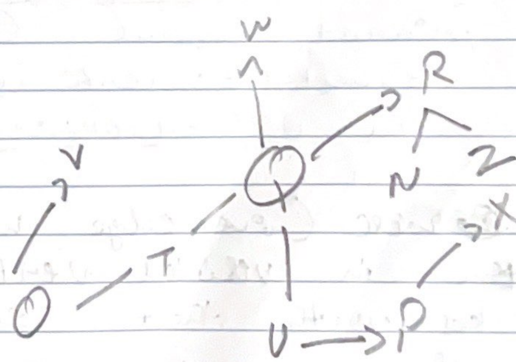


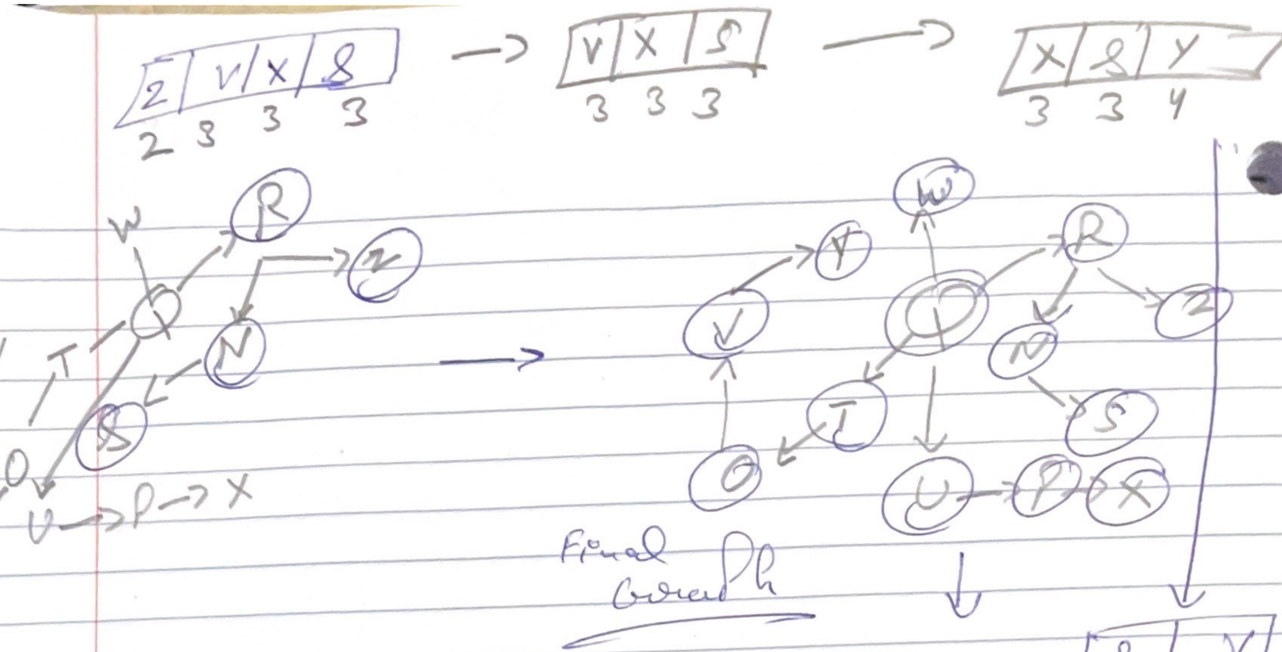


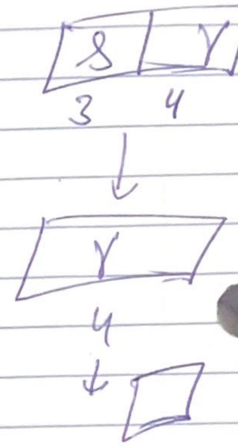




Q: $d=0$, $\pi=$ None
W: $d=1$, $\pi=Q$
T: $d=1$, $\pi=Q$
U: $d=1$, $\pi=Q$
S: $d=1$, $\pi=Q$
R: $d=1$, $\pi=Q$
O: $d=2$, $\pi=T$
P: $d=2$, $\pi=U$
N: $d=2$, $\pi=R$
Z: $d=2$, $\pi=R$
V: $d=3$, $\pi=O$







4-B

X: $d = 3$; $\pi = P$
S: $d = 3$, $\pi = N$
Y, $d = 4$, $\pi = V$