Date: .....

Name : Hijrat ullah

Id : 14994

Section : 'B'

Program : BS SE

Class time : Wed 8:00 - 11:00

Instructor : Saifullah Jan

Final Assignment : Operation Research

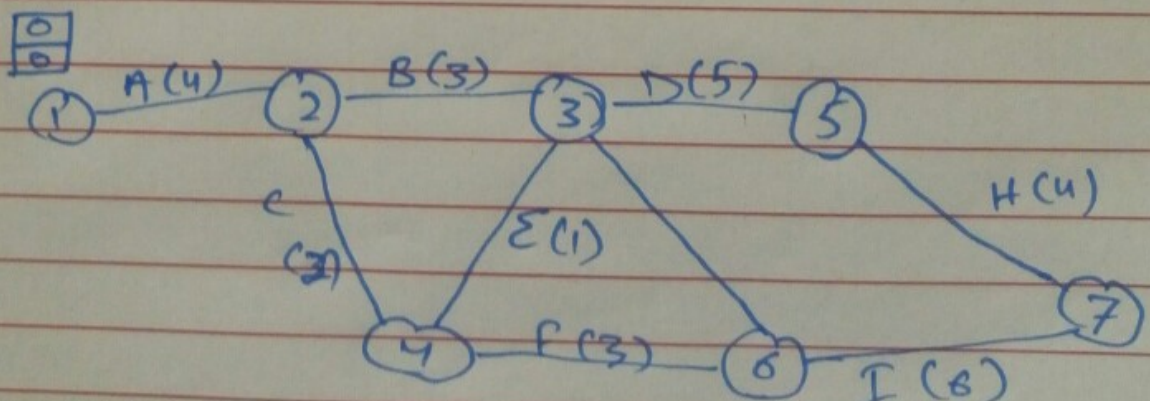
Question NO 1

Answer:

The given table show the details of project:

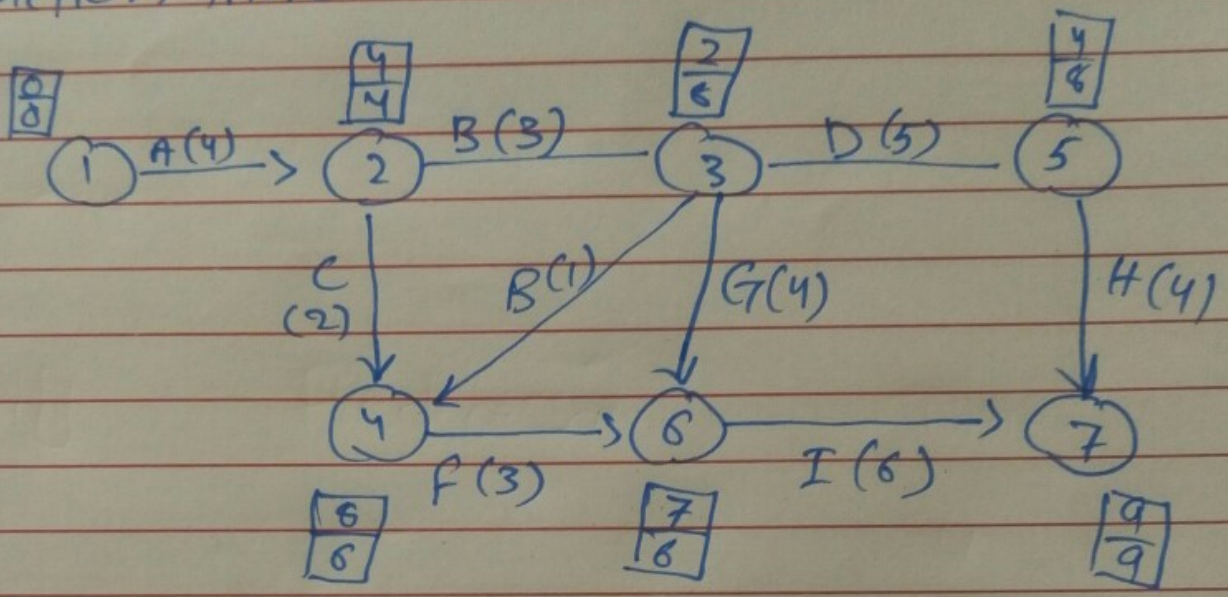
Activity	Predecessor	Time.
A	-	4
B	A	3
C	A	2
D	B	5
E	B, C	1
F	C	3
G	E, F	4
H	D, E	4
I	H, G	6

(a) calculte the ~~cpm~~ cpm network.



Date:

(b) Determine the Critical Path and project Completion time:



As we know that.

$$E_{sj} = \text{Max}\,(\{s_i + D_{ij})$$

For Node 1 = $E_{s_1} = 0$

Node 2 = 0+4 = 4

node 3 = 4+3 = 7

node 4 = 3+1 = 4

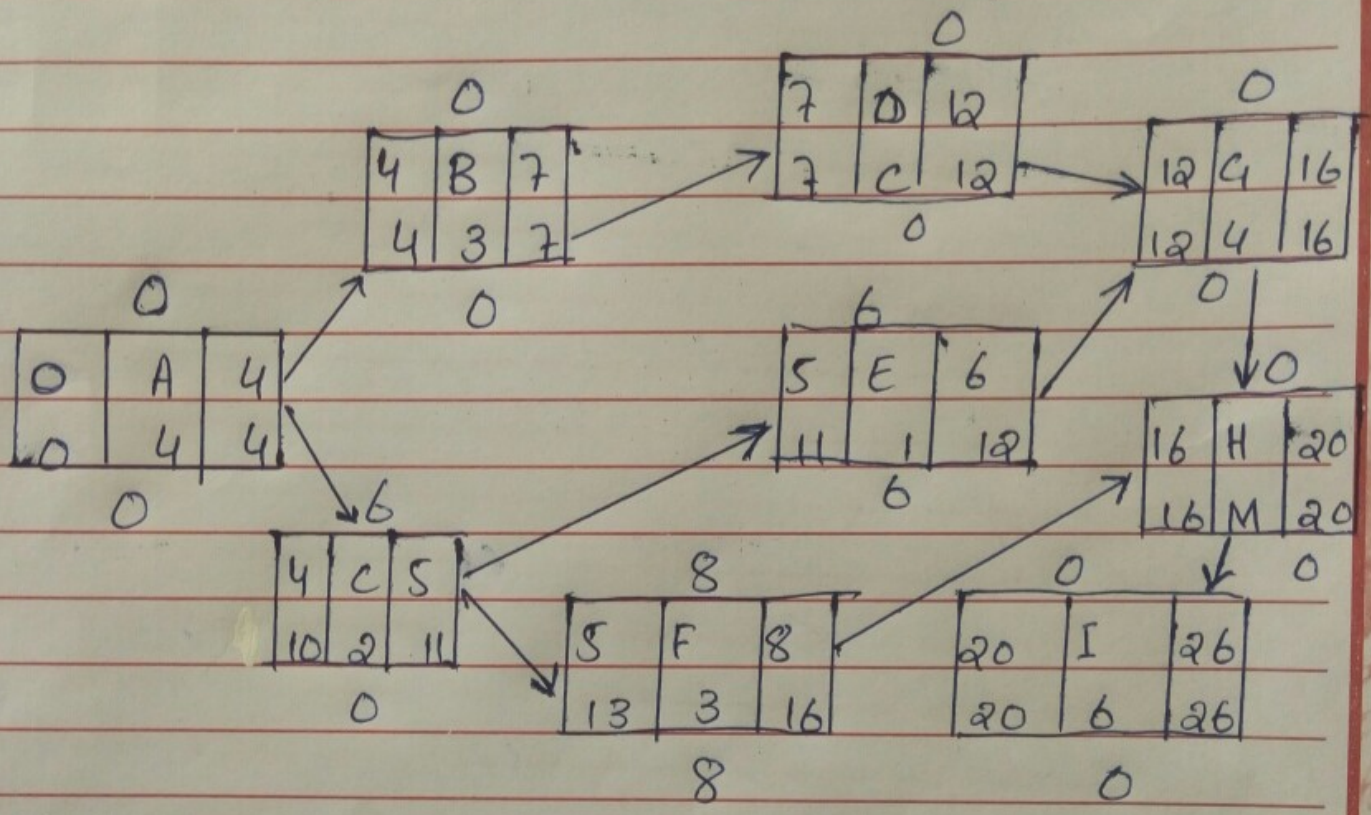
node 5 = 3+5 = 8

node 6 = 3 + 4 = 7

Node 7 = 5+4 = 9.

Date: .....

P # 3


0
0 A 4
0 4 4
0
4 B 7
4 3 7
0
7 D 12
7 C 12
0
12 G 16
12 4 16
0
6
5 E 6
11 1 12
6
16 H 20
16 M 20
0
0
4 C 5
10 2 11
0
8
5 F 8
13 3 16
8
0
20 I 26
20 6 26
0

Date:

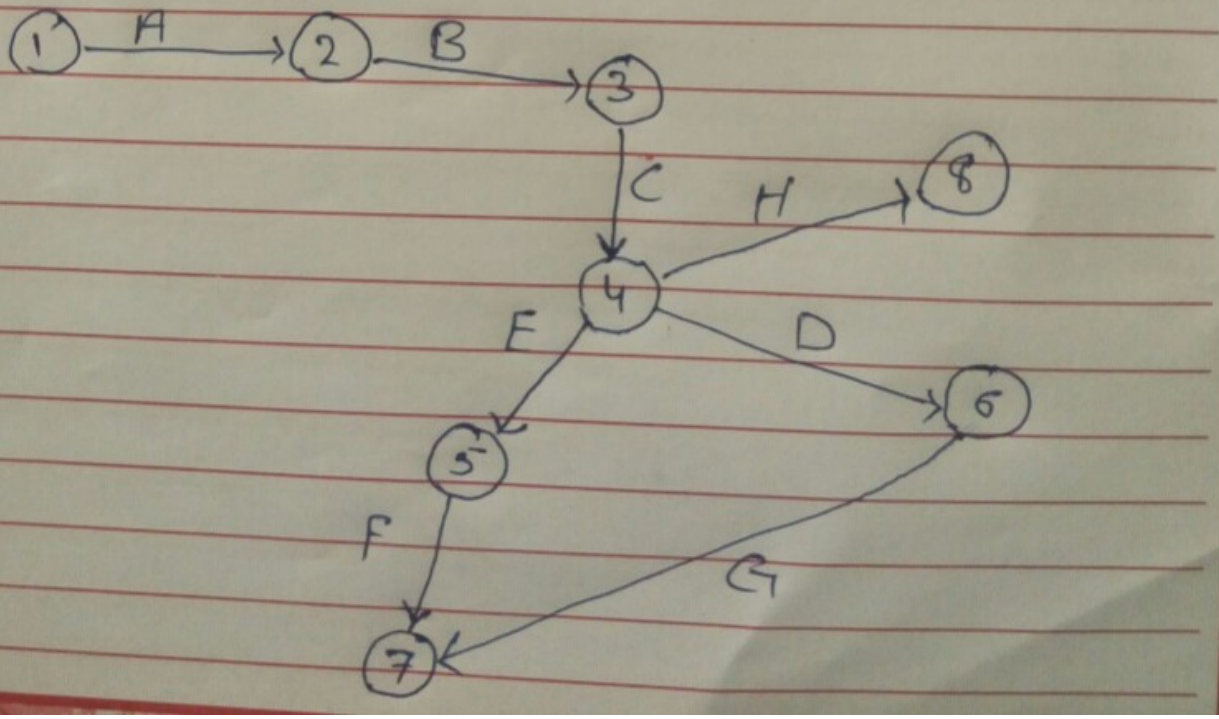
Question No 2

Answer:

Activity	Predecessor	Optimistic Time (O)	Most likely Time (M)	Possimistic Time (P)
A	-	4	5	12
B	A	2	3	4
C	B	6	8	22
D	C	4	6	8
E	C	3	4	5
F	E	2	4	6
G	D, F	2	3	4
H	C	5	7	15

Solo=>

(a) Construct the Project Network.



Date:

(b)

Activity	Predecessor	O	M	P	mean expected duration	Variance
A	–	4	5	12	6	1.77
B	A	2	3	4	3	0.11
C	B	6	8	22	10	7.09
d	C	4	6	8	6	0.44
e	C	3	4	5	4	0.11
f	E	2	4	6	4	0.44
g	D,F	2	3	4	3	0.11
h	C	5	7	15	8	2.76

by Formula.

$$(\text{mean})\ te_1 = \frac{to + 4tm + tp}{6}$$

$$= \frac{4 + 4(5) + 12}{6} \quad = \frac{4 + 20 + 12}{6} = 6$$

$$te_2 = \frac{2 + 4(3) + 4}{6} = \frac{2 + 12 + 4}{6} = 3$$

$$te_3 = \frac{6 + 4(8) + 22}{6} = \frac{6 + 32 + 22}{6} = 10$$

$te_4 = \frac{4+4(6)+8}{6} = \frac{4+24+8}{6} = 6$

$te_5 = \frac{3+4(4)+5}{6} = \frac{3+16+5}{6} = 4$

$te_6 = \frac{2+4(4)+6}{6} = \frac{2+16+6}{6} = 4$

$te_7 = \frac{2+4(3)+4}{6} = \frac{2+12+4}{6} = 3$

$te_8 = \frac{5+4(7)+15}{6} = \frac{5+28+15}{6} = 8.$

Variaince (6^2)
by formula.

$6^2 = \frac{(tP-to)}{6}$

$6_1^2 = \left(\frac{12-4}{6}\right)^2 = \left(\frac{8}{6}\right)^2 = 1.77$

$6_2^2 = \left(\frac{4-2}{6}\right) = \left(\frac{2}{6}\right)^2 = 0.11$

Date:

P # 7

$$\delta_3^2 = \left(\frac{22-6}{6}\right)^2 = \left(\frac{16}{6}\right)^2 = 7.09$$

$$\delta_4^2 = \left(\frac{8-4}{6}\right)^2 = \left(\frac{4}{6}\right)^2 = 0.44$$

$$\delta_5^2 = \left(\frac{5-3}{6}\right)^2 = \left(\frac{2}{6}\right)^2 = 0.11$$

$$\delta_6^2 = \left(\frac{6-2}{6}\right) = \left(\frac{4}{6}\right)^2 = 0.44$$

$$\delta_7^2 = \left(\frac{4-2}{6}\right)^2 = \left(\frac{2}{6}\right)^2 = 0.11$$

$$\delta_8^2 = \left(\frac{15-5}{6}\right)^2 = \left(\frac{10}{6}\right)^2 = 2.76$$

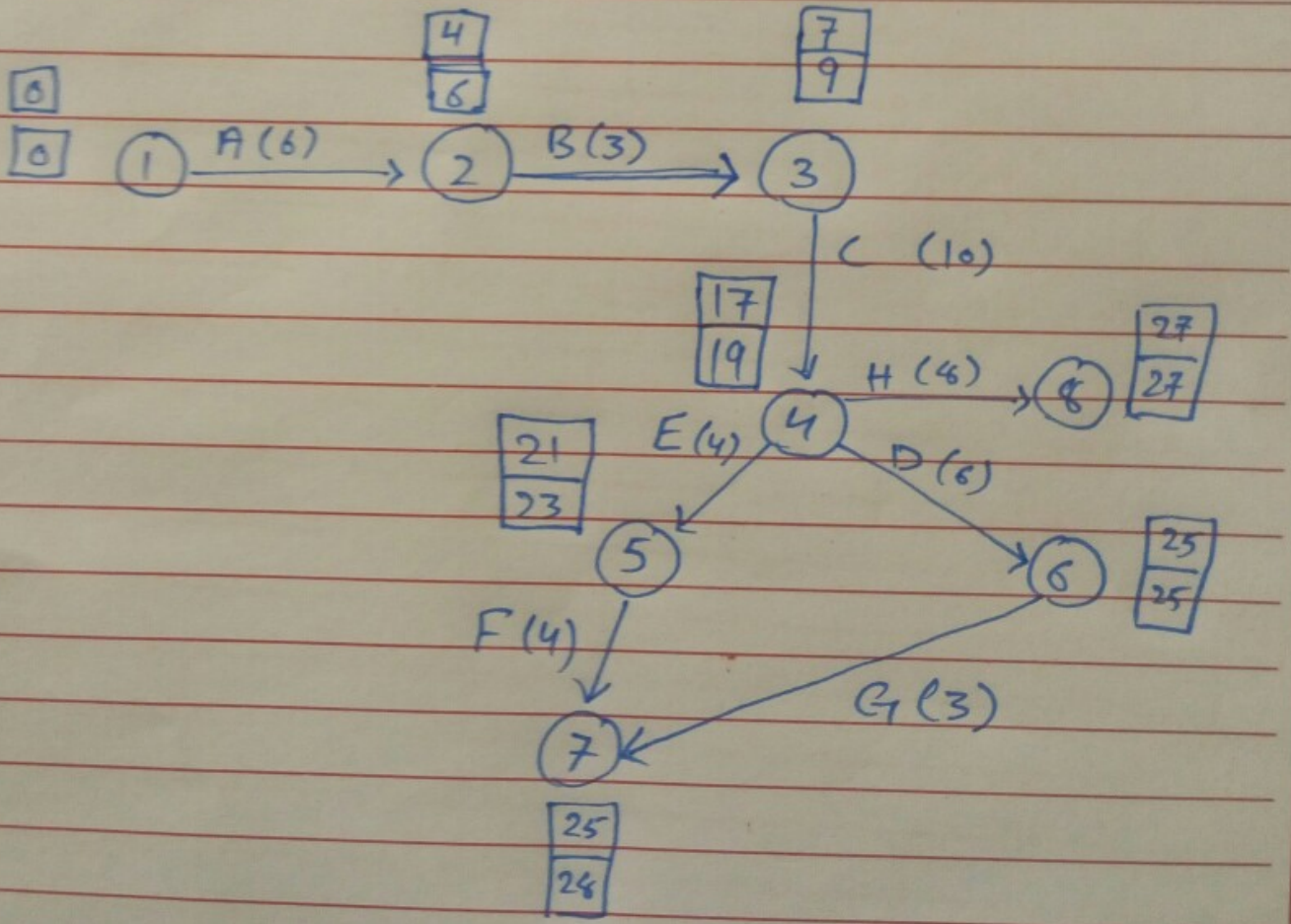
Date:

P # 8

$$\sigma_8^2 = \frac{(15-5)^2}{6} = \left(\frac{10}{6}\right)^2 = 2.76$$

(C) Find the Critical path and expected project Completion time.

Critical path



Date:

P# 09

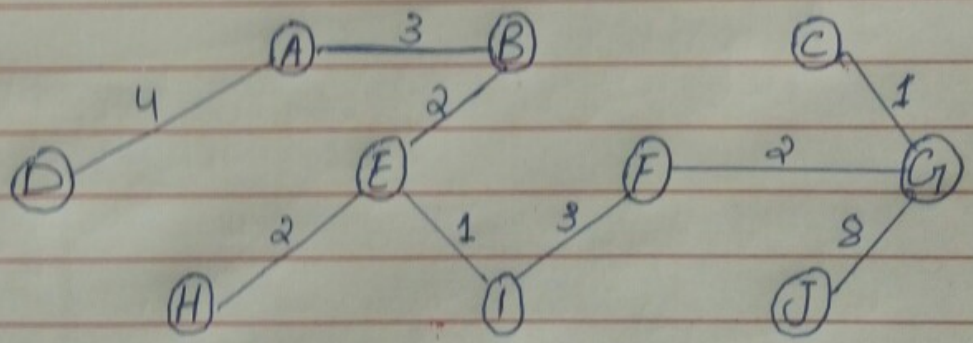
Question No 3:

Answer:

In prims Algorithm the idea is simple to create a spanning tree with all sides connected by minimum weight. Also there should be no cycles.

Step 1) choose an arbitary start vertex

2) Keep including connected edges

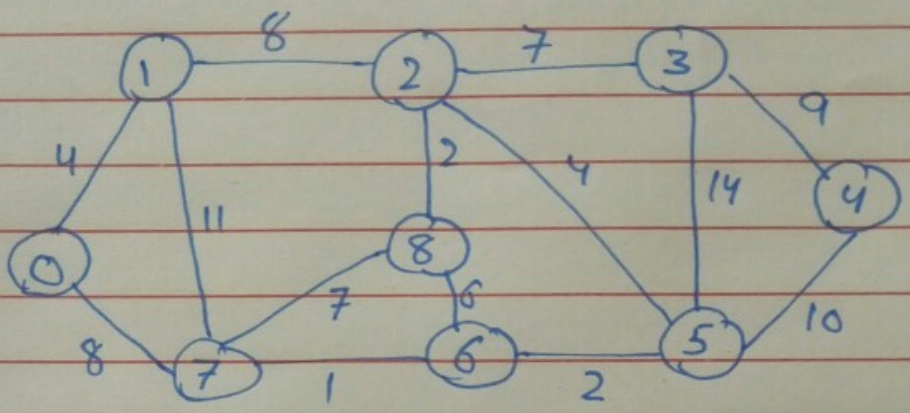


Date:

P # 10

Question No 4

Answer:



The graph contains 9 vertices and 14 edges. So, the minimum spanning tree formed will be having (9-1) = 8 edges.

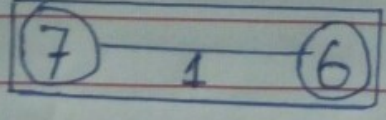
Date: _____ P # 11

After Sorting

Weight	Src	Dest
1	7	6
2	8	2
2	6	5
4	0	1
4	2	5
6	8	6
7	2	3
7	7	8
8	0	7
8	1	2
9	3	4
10	5	4
11	1	7
14	3	5

Now pick all edges one by one from sorted list of edges

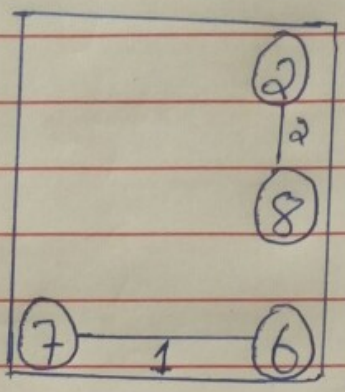
1) Pick edge 7-6: No Cycle is formed, include it.



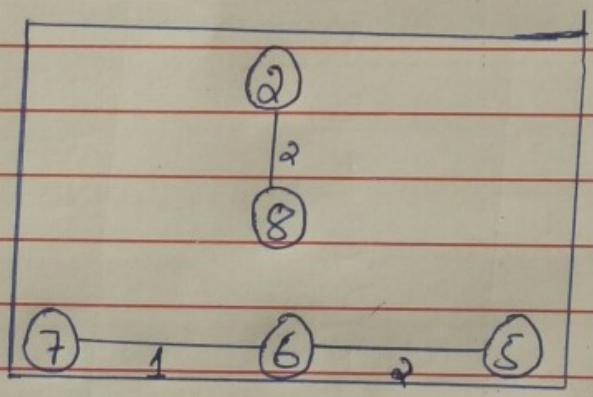
Date:

P # 12

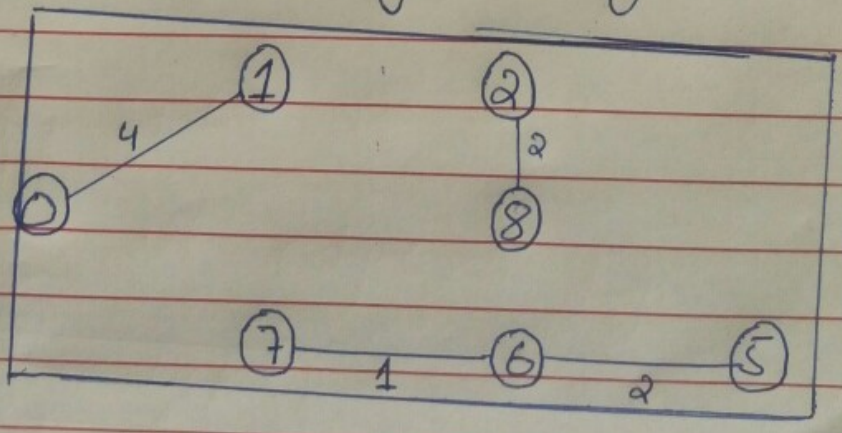
2) Pick edge 8-2: No cycle is formed, include it.



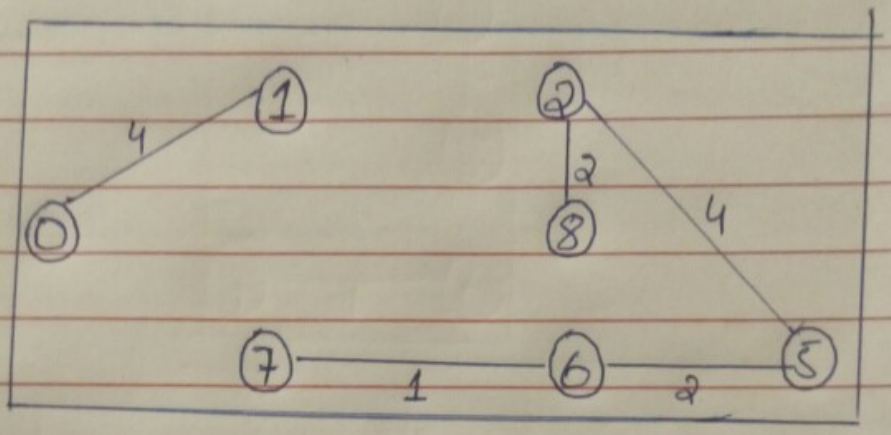
3) Pick edge 6-5: No cycle is formed, include it.



4) Pick edge 0-1: No cycle is formed, include it.

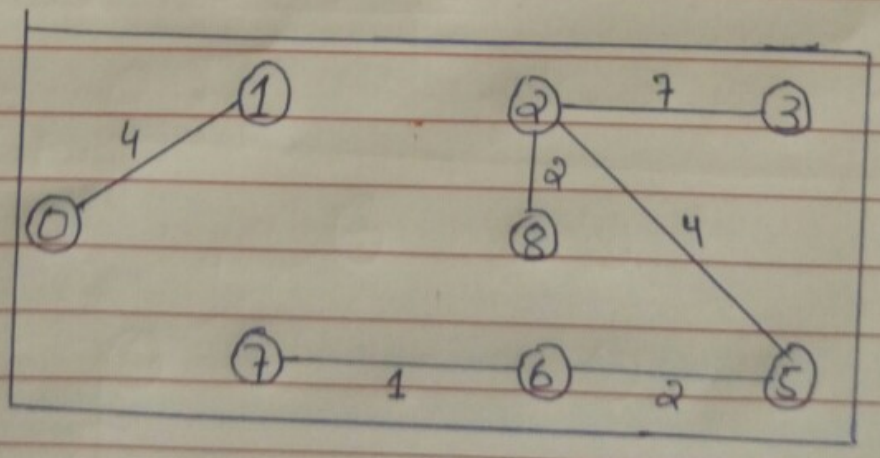


5) Pick edge 2-5: No Cycle is formed, include it.



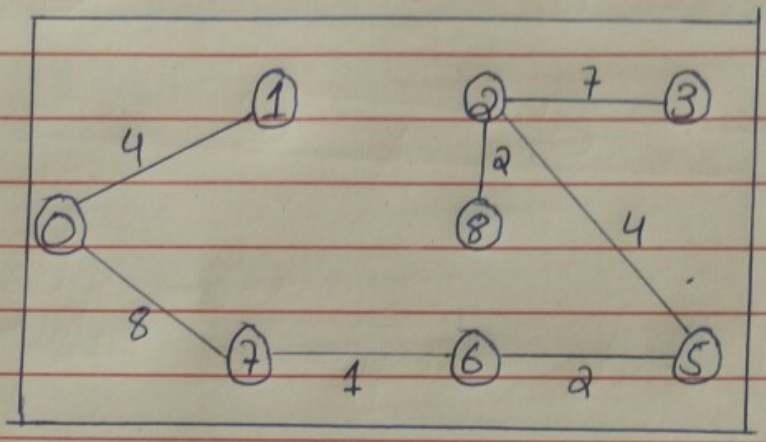
6) Pick edge 8-6: Since including this edge results in cycle, discard it.

7) Pick edge 2-3: No cycle is formed, including it.



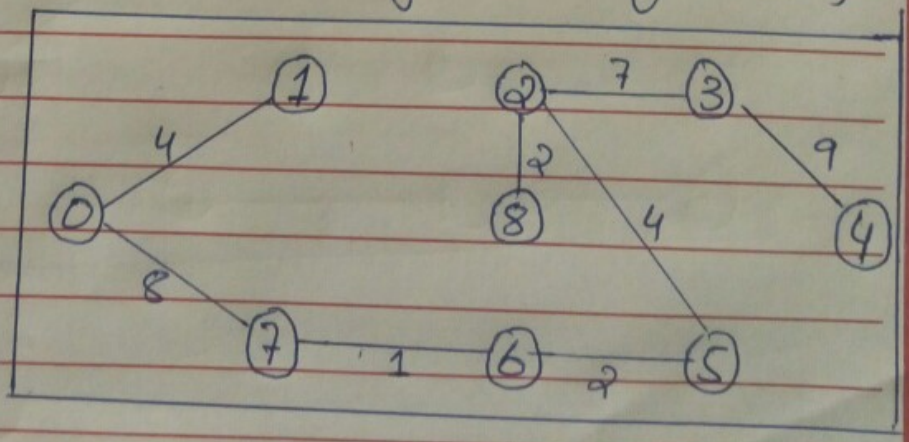
8) Pick edge 7-8: Since including this edge results in cycle, discard it.

9) Pick edge 0-7: No cycle is formed, include it.



10) Pick edge 1-2: Since including this edge results in cycle, discard it.

11) Pick edge 3-4: No cycle is formed, include it.



Since the number of edges included equals (V-1), algorithm stops here.

Question No 5

Answer:

There is not much market value in writing simple if then else programs. You will be valued higher for your ability to model and simplifying complex problems. Solving any problems involves trade-offs and making choice among competing alternatives. This is what operation research is.

(1) You have mobility across industries and careers :-

You can apply your core operation research skills to almost any industry pharmaceuticals, law-enforcement, even entertainment So you are far more recession-proof than if focused on one cyclical industry. And with operation research training you can move into management consulting, operations, marketing, finance or a number of other fields.

(2) You don't have to subscribe to a dominant worldview :-

Operation research has no single mode of professional practice, so you never have to get bored or pigeonhold into a specific technique or problem-solving approach that never changes.

(3) You become a better Strategist :-

The operation research decipline looking at problems, creating models, and sitting up analysis that points to better options and results - helps you make better personal and professional decisions, as the national best seller smart choices by Jhon S. Hammond demonstrates.

(4) You're extremely relevant today :-

Many organizations find themselves awash in data, with little understanding of how to leverage that data for better results. With operation research you bring "the science of Better" - tools and approaches

from harvesting insight from data to make dramatic improvements throughout the organization.