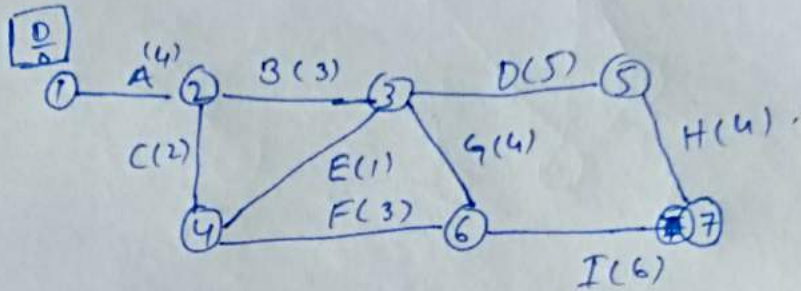


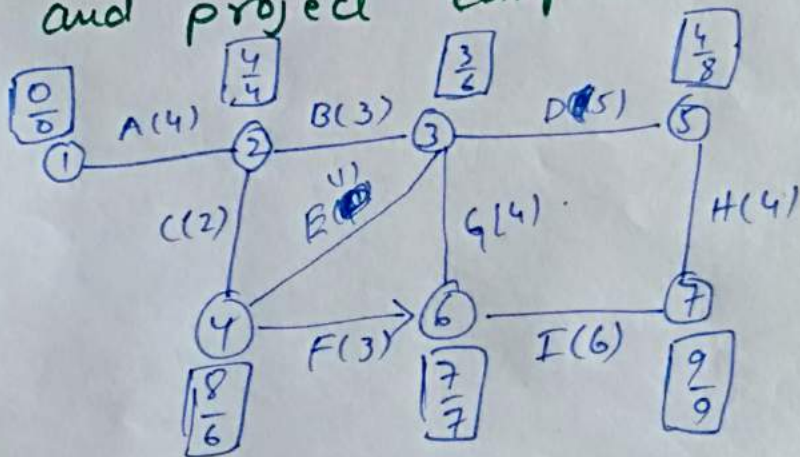
Name	Kamran
ID	15121
Subject	operation Research
Semester	4 th (Spring 2020)
Section	BSSE ("B")
instructor:	Saifullah Jan...
Date :	23-06-20

Q No 1: The Given table Shows the detail of a project?

(a) Calculate the CPM Network?



(b) Determine the critical path and project completion time?



So,
 \Rightarrow we know that

$$E_{sj} = \max(E_{si} + D_{ij})$$

For node 1 = $E_{s1} = 0$

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 = $5 + 4 = 9$

(c) Compute total floats and Free Floats for non-critical Activities?

⇒ For total Floats we know that

$$TF_i = L_{c_j} - E_{s_i} - D_{ij}$$

Activity	Duration	total	Floats
A 1-2	4	1	1
B 1-3	3	4	5
C 1-4	2	3	3
D 3-4	5	2	2
E 2-5	1	1	1
F 2-6	3	2	1
G 3-6	4	3	1
H 4-5	4	2	2
I 1-5	6	3	8

$$\text{total Floats} = L_{c_i} - E_{s_i} - D_{ij}$$

$$\text{For A} = 1-2 = 4 - 0 = 4$$

$$B = 2-3 = 3 - 1 = 2$$

~~$$C = 1-4 = 2 - 2 = 0$$~~

$$C = 5 - 4 = 1$$

$$D = 5 - 1 = 4$$

$$E = 4 - 1 = 3$$

$$F = 3 - 1 = 2$$

$$G = 3 - 2 = 1$$

$$H = 6 - 4 = 2$$

$$I = 3 - 6 = -3$$

⇒ For free float,

$$A = 1 - 2 = 1 - 2 = -1$$

$$B = 2 - 3 = -1 - 4 = -5$$

$$C = 3 - 4 = 2 - 5 = -3$$

$$D = 4 - 5 = 4 - 2 = 2$$

$$E = 5 - 6 = 3 - 2 = 1$$

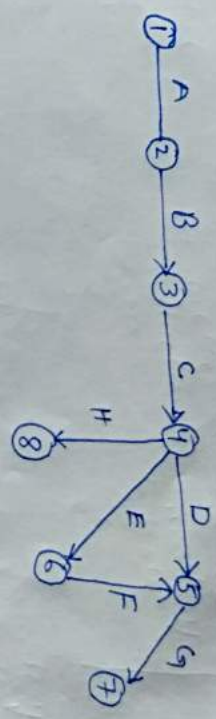
$$G = 7 - 8 = 2 - 4 = -2$$

$$H = 8 - 9 = 10 - 2 = 8$$

Ans.

Q No 2: The Given table shows the details of a project:

(a) Construct the project Network?



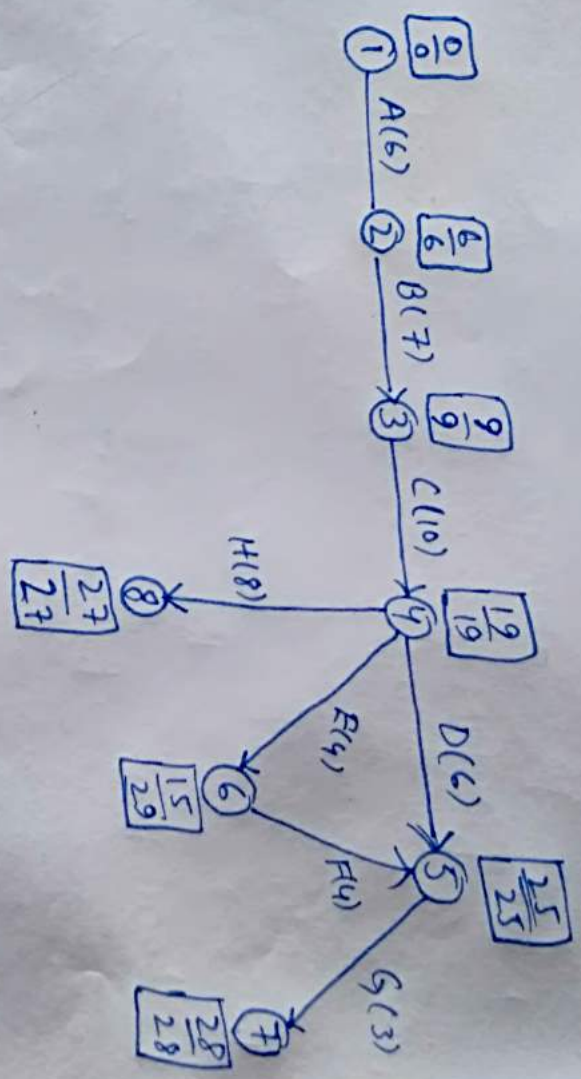
(b) Find the expected duration and variance for each Activity?

Activity	O	M	P	Mean	Variance
A	0	5	12	6	1.77
B	2	3	4	3	0.11
C	6	8	22	10	7.11
D	4	6	8	6	0.44
E	3	4	5	4	0.11
F	2	4	6	4	0.44
G	2	3	4	3	0.11
H	5	7	15	8	2.77

(mean) to

$$t_e = \frac{t_o + 4t_m + t_p}{6}$$

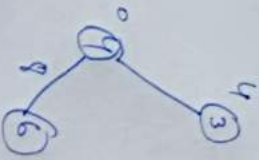
(c) Find the critical path and expected project completion time?



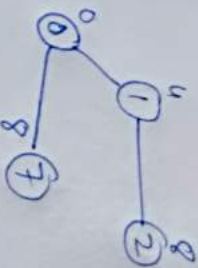
Q No 3 ::

Answer ::

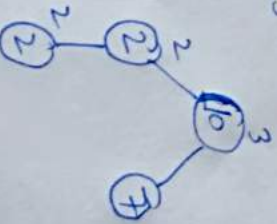
Prims Algorithm to find minimum cost spanning tree treats the node as a single tree and keep on adding new nodes to the spanning tree.



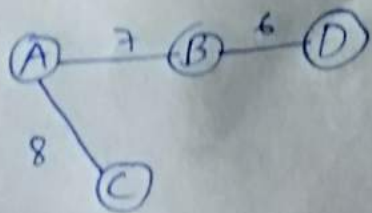
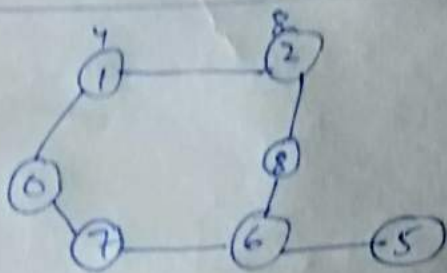
Pick the vertex with minimum key value and not already included vertex.



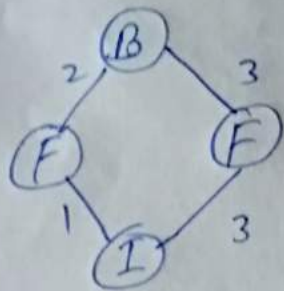
Pick the vertex the minimum value and not already in MST.



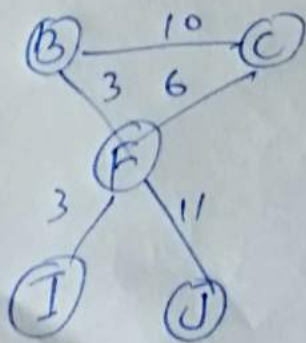
vertex six (6) is picked so MST the key value.



Remove All Loops vertex Edges
From the Given Graph.



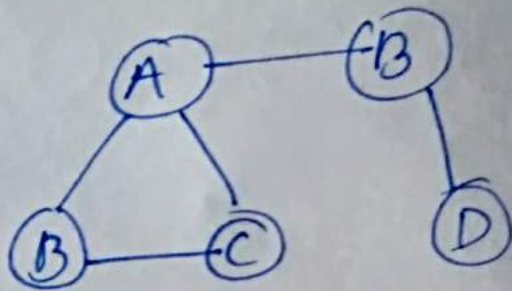
↳ in this case we chose
B node as the root of
Prime's Spanning tree.



↳ Now we select tree S-7
is treated as one node
and we check for All edges
going out from it we select

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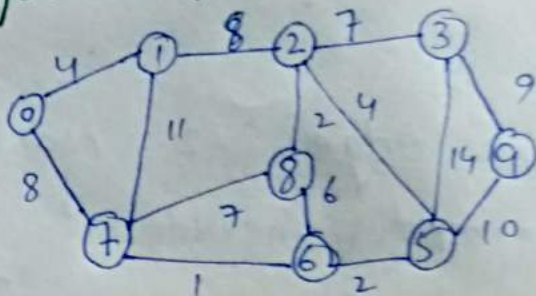
The one which has the lowest cost and include it in the tree.



we choose the edges.

Q No 4: For the following graph, Find the minimum Spanning tree using Kruskal's Algorithm?

Ans: -



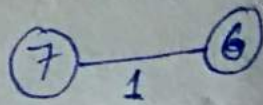
→ The graph contains 9 vertices and 14 edges, so the minimum Spanning tree formed will be having $(9-1) = 8$ edges.

After sorting:

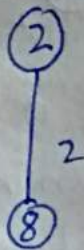
Weight	Src	Dest
1	7	6
2	8	5
3	6	1
4	0	5
5	2	6
6	8	3
7	2	8
8	7	7
9	0	2
10	1	4
11	3	4
	5	4
	5	7

→ Now pick All edges one by one from sorted list of edges.

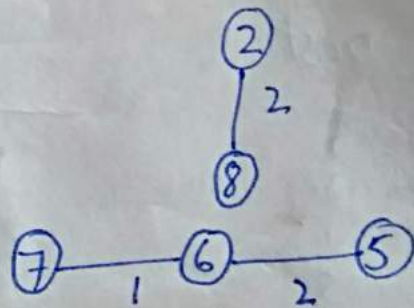
① - pick edge 7-6: No cycle is formed, include it.



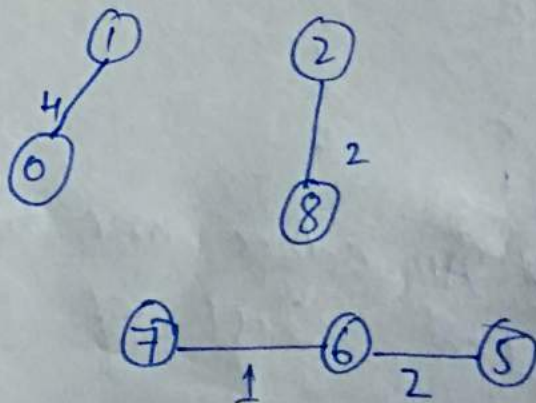
② - pick edge 8-2: No cycle is formed, include it.



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

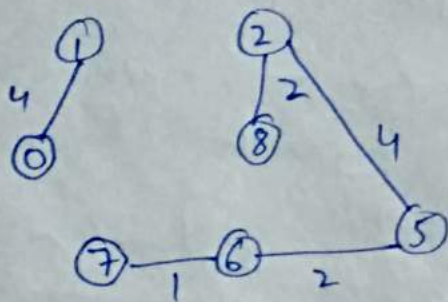


④ - pick edge 0-1: No cycle is formed, include it.



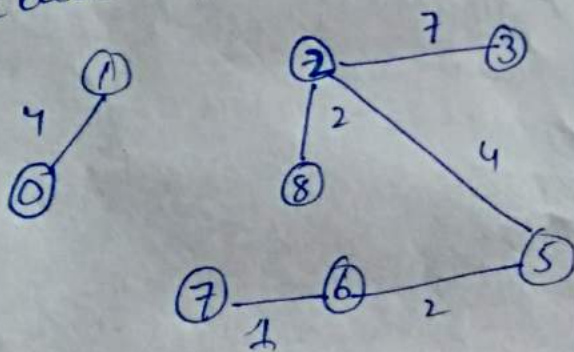
(11)

(5) pick edge 2-5: No cycle is formed, include it.



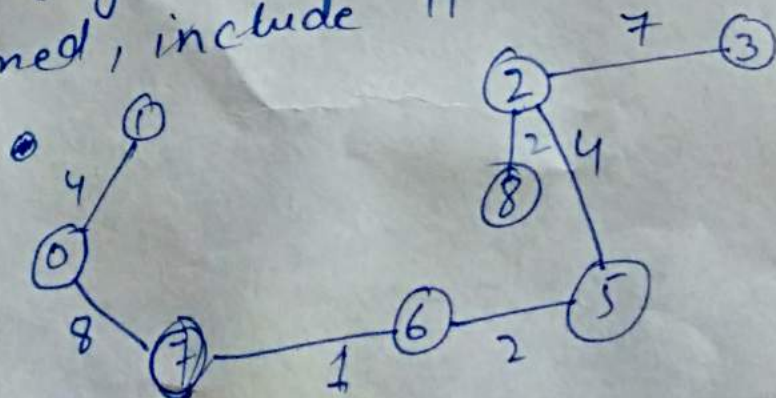
(6) pick edge 8-6: Since including this edge result in cycle, discard it.

(7) pick edge 2-3: No cycle is formed, include it.



(8) pick edge 7-8: Since including this edge result in cycle, Discard it.

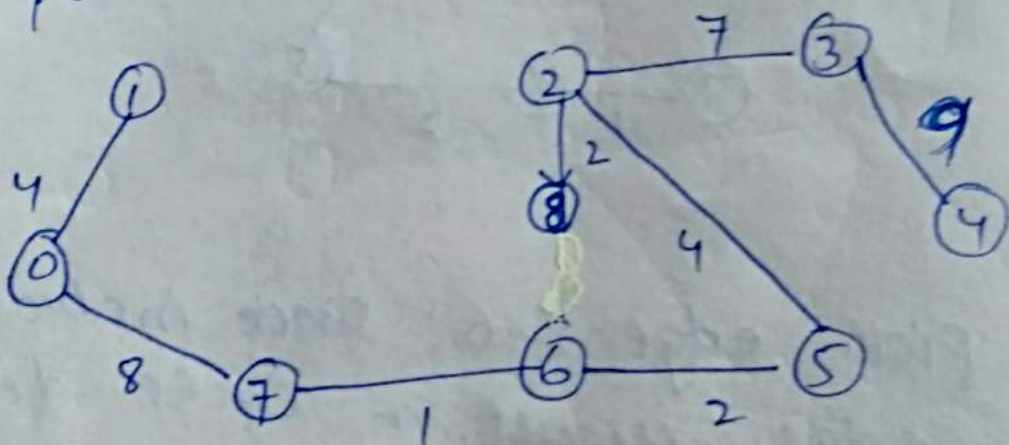
(9) pick edge 0-7: No cycle is formed, include it.



(12)

(10). pick edge 1-2 :- since including this edge Result in cycle, discard it.

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



Since the number of edges include equals $(V-1)$,
The Algorithm stop here -

ANS >

Q No 5: write a detail note on how this course (operation Research) will help you in your professional life?

Ans: operation Research is an analytical method of problem solving and decision making that is useful in the management of organizations. In operations Research, problems are broken down into basic components and then solved in defined steps by Mathematical Analysis.

⇒ in professional life operation Research Analysis use a wide range of methods, such as Forecasting, data mining, and Statistical Analysis, to examine and interpret data. They must determine the appropriate software packages and understand computer programming languages to design and develop new Techniques and Models.
