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CLASS: BS(SE) 4th

SECTION: (B)

CLASS TIMING: WEDNESDAY

①

Q no I:-

a) - Calculate the CPM Network.

b) :- Determine the Critical Path and project completion time.

We know that:-

$$E_{s_j} = \max(\sum s_i + D_{ij})$$

Fa) 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 = $5 + 4 = 9$

2)

C:-

total float = TF

TF = LF - EF "finish float"

TF = LS - ES "start float"

TF

ES	Activity	EF
LF	Activity	FL

TF = 1

4	8	7
5	3	8

22	F	21
22	3	21

TF = 0

0	A	4
0	4	4

8	0	12
8	5	12

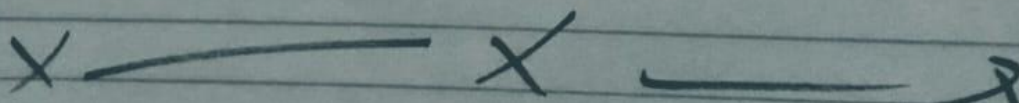
13	E	15
13	1	15

5	C	8
5	2	8

19	G	17
19	4	17

25	H	23
25	4	23

3	I	26
3	6	26

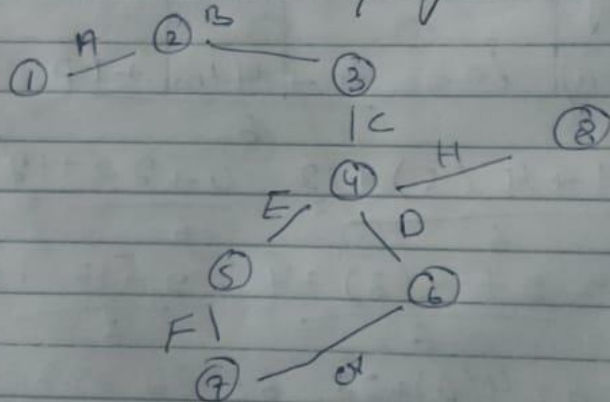


Q No 2:- (3)

Activity	Predecessor	optimistic (time @)	most likely (time @)	P-f/s
A	—	4	5	12
B	A	2	5	4
C	B	6	3	22
D	C	7	8	13
E	C	3	6	5
F	E	2	4	6
G	D, F	2	4	4
H	C	5	3	15

a) :- solution (A)

Construct the project network



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

b):-

(4)

durah

Activity	predecessor	o m p	excepted	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
		5 7 15		
h	C		8	2.76

by Formula

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

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

$$t_{e2} = \frac{2 + 4(3) + 4}{6} = \frac{2 + 12 + 4}{6} = 3$$

$$t_{e3} = \frac{6 + 4(6) + 22}{6} = \frac{6 + 32 + 22}{6} = 10$$

$$t_{e4} = \frac{4 + 4(6) + 8}{6} = \frac{4 + 24 + 8}{6} = 6$$

$$t_{e5} = \frac{3 + 4(4) + 5}{6} = \frac{3 + 16 + 5}{6} = 4$$

$$t_{e6} = \frac{2 + 4(4) + 6}{6} = \frac{2 + 16 + 6}{6} = 4$$

(5)

$$t_7 = \frac{2 + 4(3) + 4}{6} = \frac{2 + 12 + 4}{6} = 3$$

$$t_8 = \frac{5 + 4(7) + 15}{6} = \frac{5 + 28 + 15}{6} = 8$$

variance (6)
by Formula

$$b^2 = \left(\frac{t_p - t_o}{6} \right)^2$$

$$b_1^2 = \left(\frac{12 - 4}{6} \right)^2 = \left(\frac{8}{6} \right)^2 = (1.33)^2$$

$$b_2^2 = \left(\frac{4 - 2}{6} \right)^2 = \left(\frac{2}{6} \right)^2 = 0.11$$

$$b_3^2 = \left(\frac{22 - 6}{6} \right)^2 = \left(\frac{16}{6} \right)^2 = 7.09$$

$$b_4^2 = \left(\frac{8 - 4}{6} \right)^2 = \left(\frac{4}{6} \right)^2 = 0.44$$

$$b_5^2 = \left(\frac{5 - 3}{6} \right)^2 = \left(\frac{2}{6} \right)^2 = 0.11$$

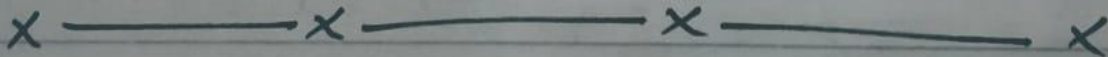
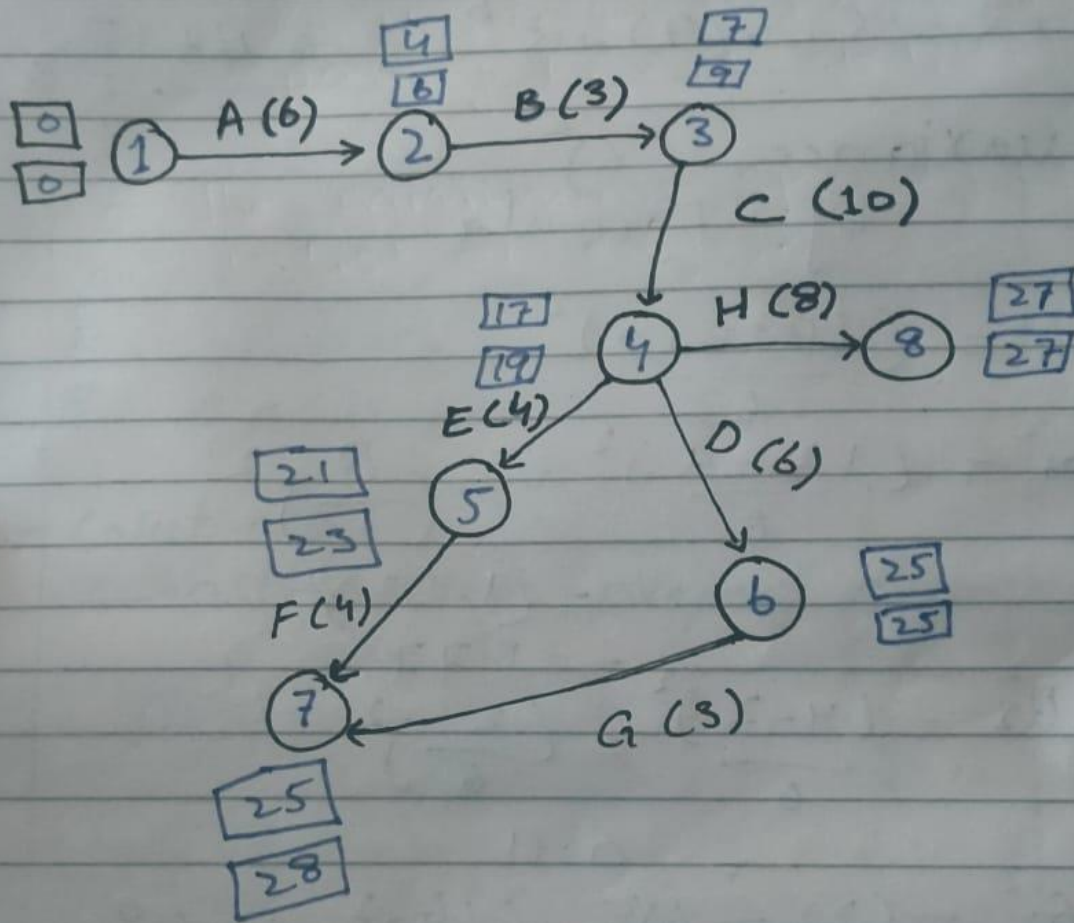
$$b_6^2 = \left(\frac{6 - 2}{6} \right)^2 = \left(\frac{4}{6} \right)^2 = 0.44$$

$$b_7^2 = \left(\frac{4 - 2}{6} \right)^2 = \left(\frac{2}{6} \right)^2 = 0.11$$

$$b_8^2 = \left(\frac{15 - 5}{6} \right)^2 = \left(\frac{10}{6} \right)^2 = 2.76$$

(b) (2)

C):- Critical path.



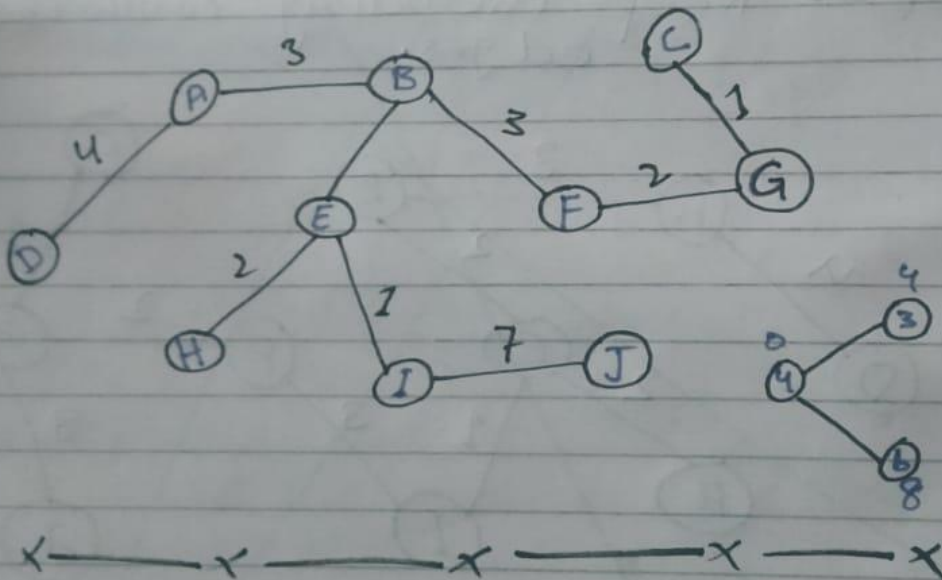
(7)

Q No 3:-

→ Now we have connected all the vertices our minimum spanning tree look like this.

The minimum spanning tree is list of edges.

(CG, GF, FB, BE, EI, IJ, EH, BA, AD)



(8)

Q no 4:-

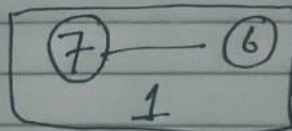
A4:- The graph ~~contains~~ contains 9 vertices and 14 edges so the minimum spanning tree formed will be having $(9-1) = 8$ edges

After sorting:

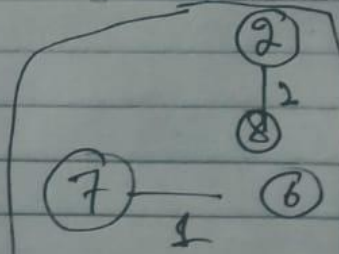
weight	src	Dest
1	7	6
2	8	2
2	6	5
4	0	1
4	2	5
6	8	6
7	2	3
7	7	8
8	0	7
8	1	2

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

① pick edges 8-2 No cycle is formed include it.

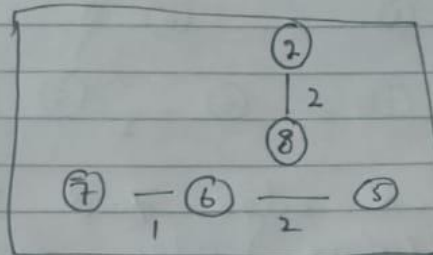


② pick edges 8-2 No cycle is formed include it.

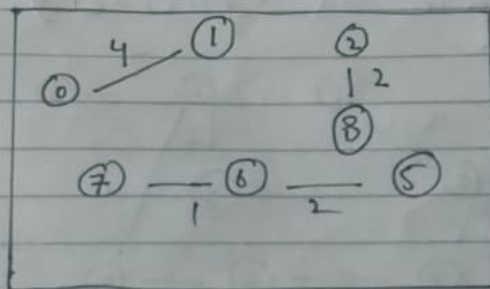


(9)

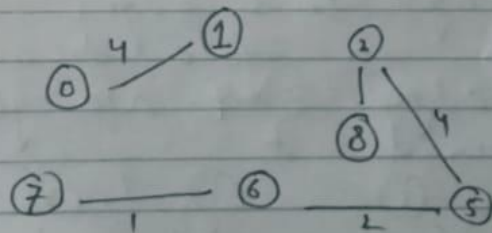
(3) pick edges 6-5 no cycle is formed include it



(4) pick edges 0-1 no cycle is formed include it



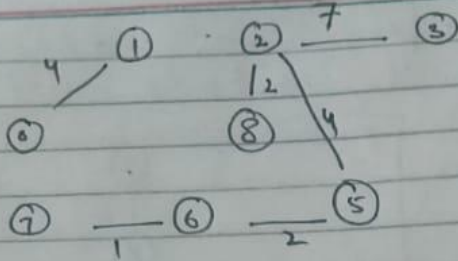
(5) pick edges 2-5 no cycle is formed include it



(6) pick edge 8-6 since including this edges results in cycle, discard it

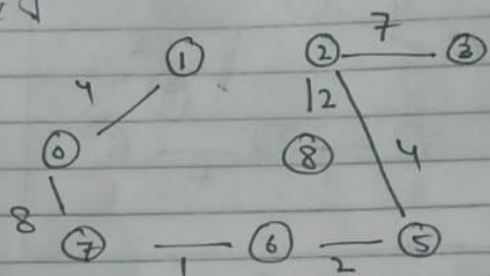
(7) pick edge 2-3 no cycle is formed it

(10)



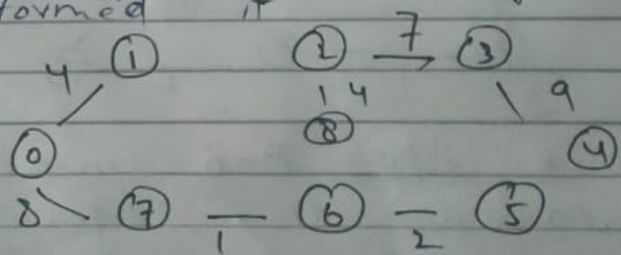
(8) pick edge 7-8 since including edge results in cycle discard it.

(9) pick edge 0-7 no cycle is formed include it.



(10) pick edges 1-2 since including this edges results in cycle discard it.

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



Since the number of edges including equals $(V-1)$ the algorithm stops here.



(11)

Q NO. 5:-

Operation Research:-

It will help me a lot in professional life because companies try to get most value out of their data analytics platforms investment, and need the right individual to take it from raw data to an intelligent asset for business.

And would be to determine the various alternatives that are available and then carry out an analysis that would enable me to assess objectively and recommend the most suitable one.

It will also help me in these types of duties and Skill:-

- * Analyzing data and information.
- * Spending lots of time on the computer with sophisticated math software.
- * Making decisions and solving problems.
- * Gathering data needed to solve those problems.
- * Making full use of creative thinking abilities.
- * Interpreting the meaning

- * of information for others.
communicating result and recommendation not only to colleagues but also to supervisors and executives.

10 Reasons to consider a career in operation Research.

1. I have the opportunity to solve real-world problems:-
These problems matter to organizations and have an impact. In areas such as healthcare, public policy, resource management, and disaster relief, you can truly change people's lives for the better.
- 2) I can use your analytical skills and your Creativity:-
Whether your background is math, software engineering, computer science, or an industry such as healthcare, manufacturing, finance, government, or military, there is a job in O.R for you.
- (3) I have mobility across industries and careers:-
I can apply your Core

O.R skills to almost any industry - pharmaceuticals, Law enforcement, even entertainment so you're far more recession-proof than if focused on one cyclical industry. And with O.R training you can move into management consulting, operations marketing finance, or a number of other fields.

(4) I don't have to subscribe to a dominant worldview:-
O.R has no single mode of professional practice, so you never have to get boxed or pigeonholed into a specific technique or problem-solving approach that never changes!

(5) I become a better strategist:-
The O.R discipline - looking at problems, creating models and setting up analysis that points to better options and professional decisions: as the national bestseller smart choices by John S. Hammond demonstrates.

(6) I become an essential

Link between technology departments and organizational management :-

As an O.R professional I often act as interpreter b/w technical staff - operations management, computer programmes, software engineers, and electrical engineers and management helping to abstract real-world needs into software or models.

(6) I become an essential link between technology department and organizational management.

(7) I can make a great living.

(8) I not part of a fed.

(9) I can have fun at work.

(10) I extremely relevant today.

