

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

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

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

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

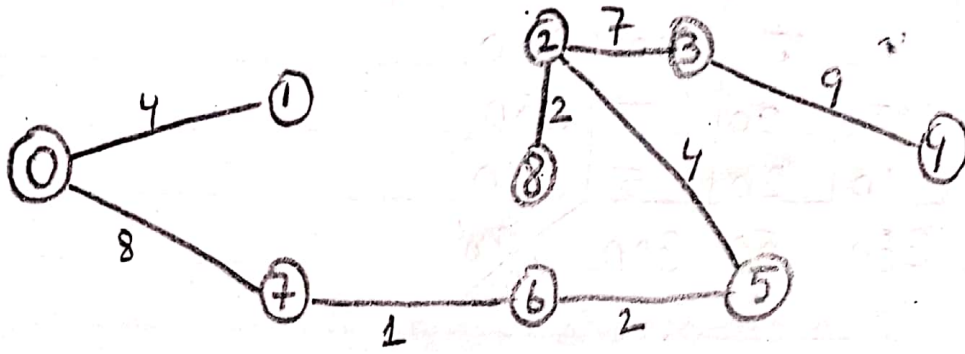
$$t_{e3} = \frac{6 + 4(8) + 22}{6} = \frac{6 + 32 + 22}{6} = 10$$

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

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

④

So at 4,5 is 10, 1,7 is 11 and at 3,5 is 14
all are Ignore, Because it create a circle.



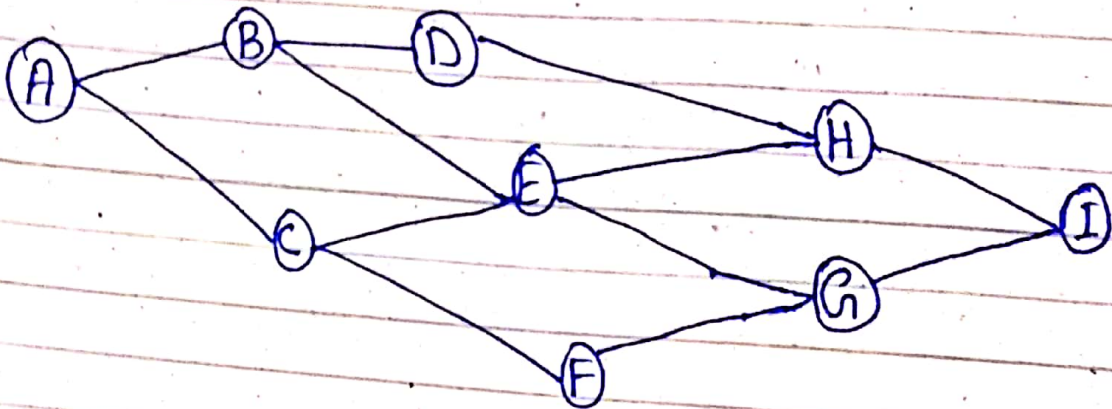
We now have minimum cost spanning tree is
 $4+8+1+2+7+4+2+9=37$

P.T.O

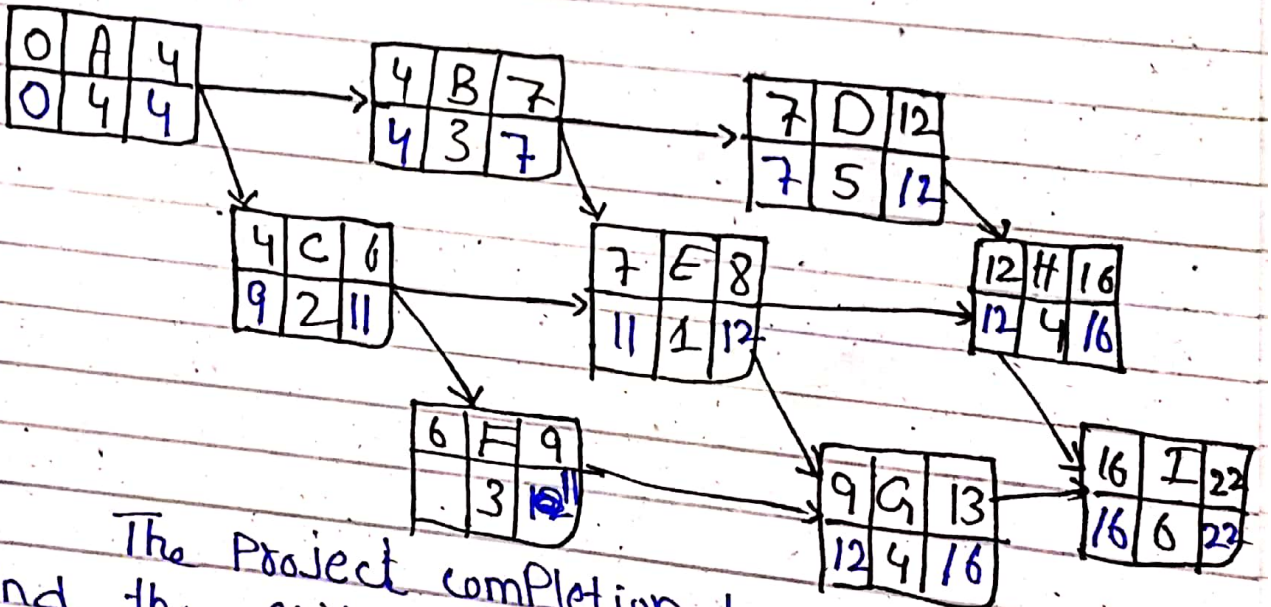
Q1:-

Ans:-

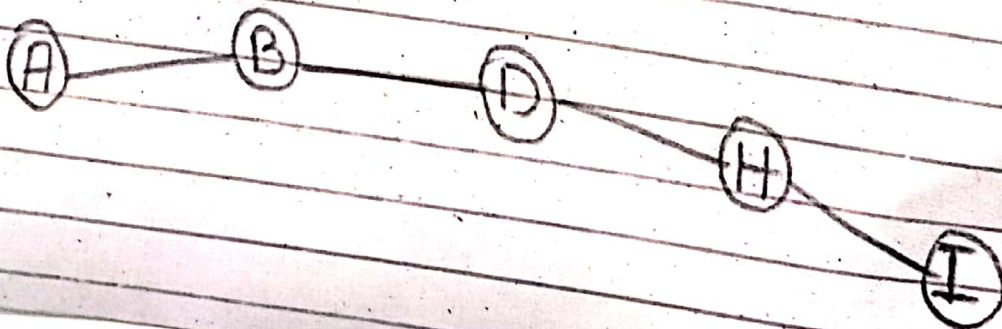
(A) CPM network



(b)



The Project completion time is 22 days.
And the critical path is

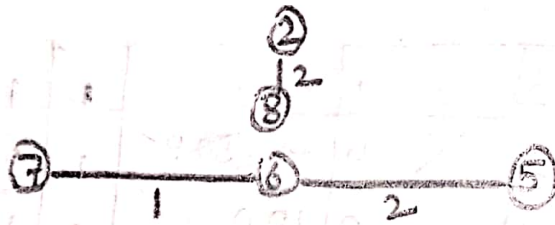


②

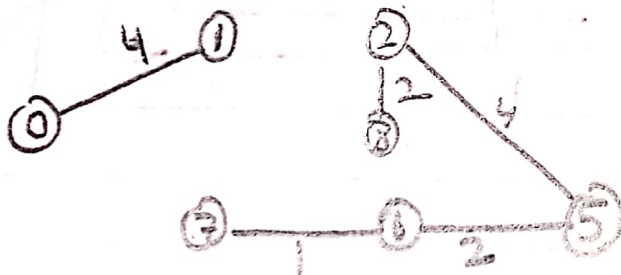
Step 3:- Add the edge which has the least weightage



Next cost is "2" The Edge is (6,5) and (2,8)



Next cost is "4" at 0,1 and 2,5



(2,5) is create a circle so we ignore it.

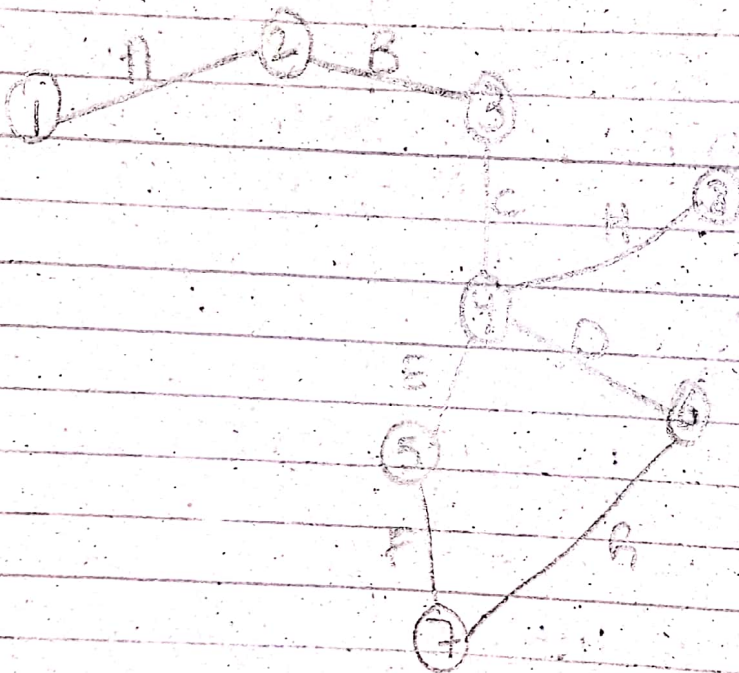
P.T.O

Q2:

Ans:

Solution

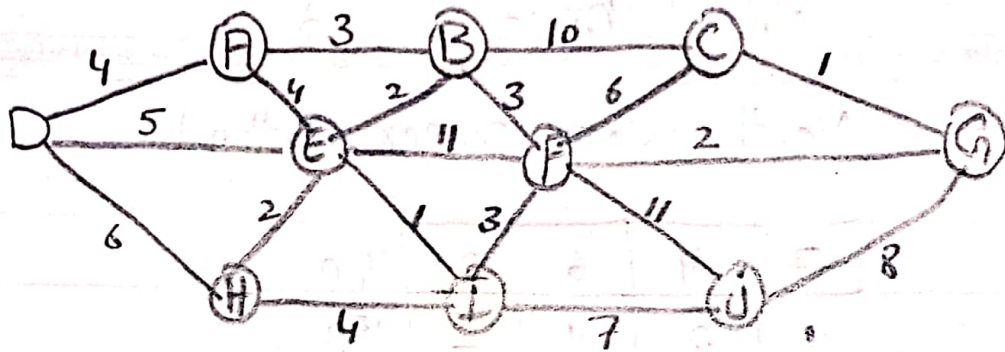
(a) Construct the Project Network,



5

Q3:-

ANS:-



Step 1:- Remove all loops and Parallel edges

Step 2 = Choose any arbitrary node as root node.
In this case we choose 'D' node as a root node.

Step 3:- Check outgoing edges and select the one with less cost.

After choosing 'D' we see that D,A, D,E and D,H are edges with weight 4, 5 and 6.



Now the tree D-4-A is treated as one node, and we check all edges going from it. we select the one which have lowest cost

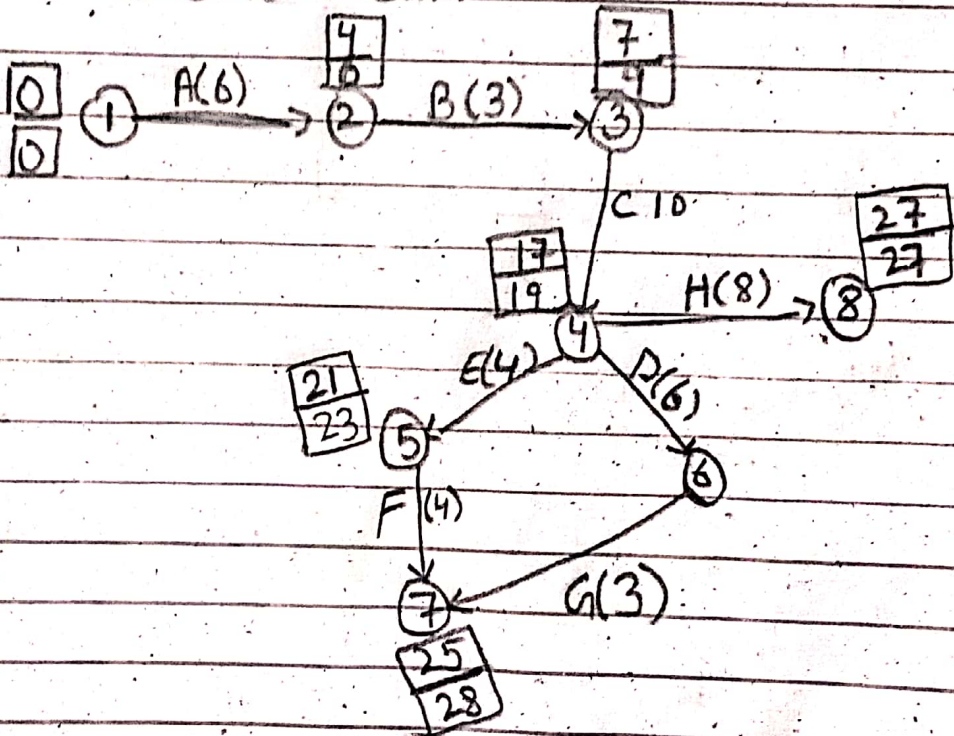
P.T.O

$$\sigma_7 = \left(\frac{4-2}{6} \right)^2 = \left(\frac{2}{6} \right)^2 = 0.11$$

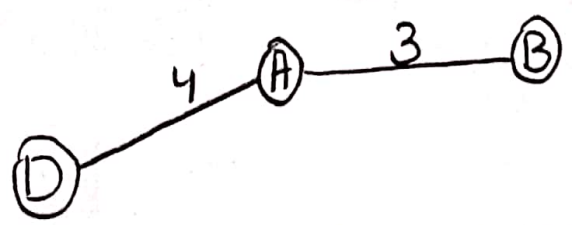
$$\sigma_8 = \left(\frac{15-5}{6} \right)^2 = \left(\frac{10}{6} \right)^2 = 2.76$$

(C) Find the critical path and expected project completion time

Critical Path

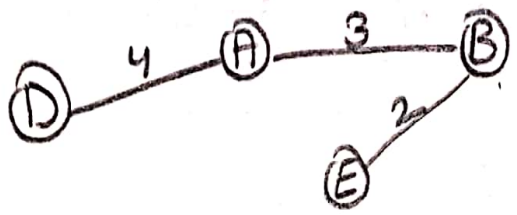


(6)

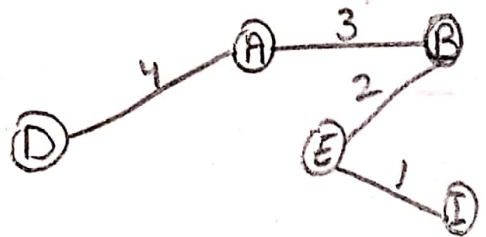


After this step D-4A-3-B tree is formed.
 we treated B as a node and check all the edges.

New node is B-3-E

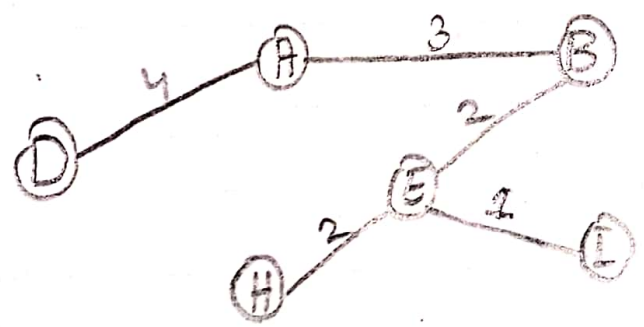


The Next node is E-1-I



After this step D-4A-3-B-2-E-1-I tree is formed.

The New Node is E-2-H



(8)

Q5:

ANS: Operation research

Operation research is an analytical method of Problem-solving and decision-making that is useful in the management of organization. In operation research Problem are broken down into basic components and then solved in defined steps by mathematical analysis.

Important of operation research in our daily life

→ 1 You have the opportunity to solve the real world Problem.

② ~~You~~ We can use our analytical skill and our creativity.

③ We have mobility across industries careers.

④ we do not have to subscribe to a dominant worldview.

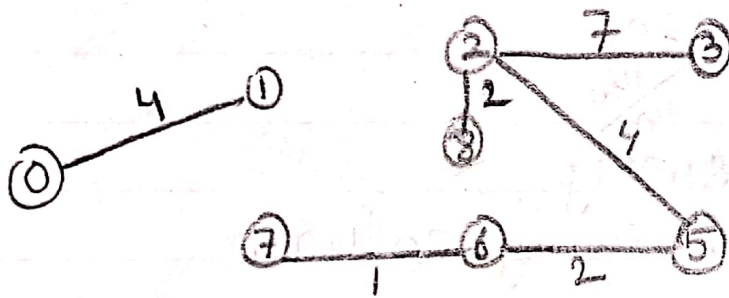
(9)

- (5) we become a better strategist.
- (6) we become an essential link between technology department and organization management.
- 7) we can make a great living
- (8) we are not part of a fad.
- (9) we can have fun at work
- (10) we are extremely relevant today. In the "Science of better" tools and approaches for harvesting insight from data to make dramatic improvement throughout the organization.

(3)

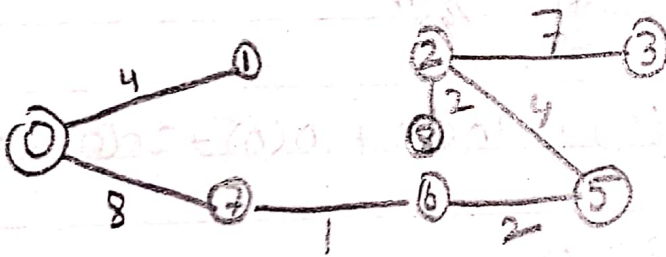
Next cost is "6" at (8,6) and it create a triangle so Ignore it.

So the Next cost is "7" at 2,3 and 7,8



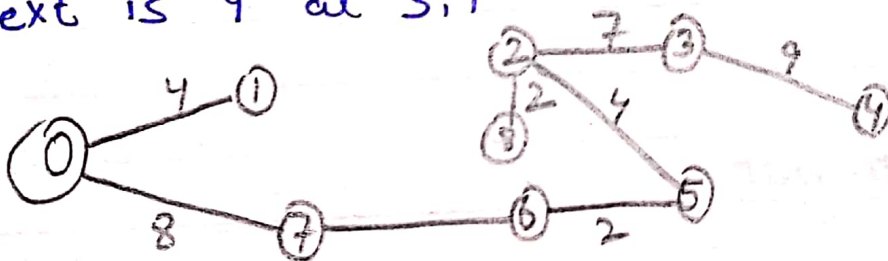
Ignore 7,8.

Next cost is "8" on 0,7 and 1,2



Ignore 1,2

Next is "9" at 3,4

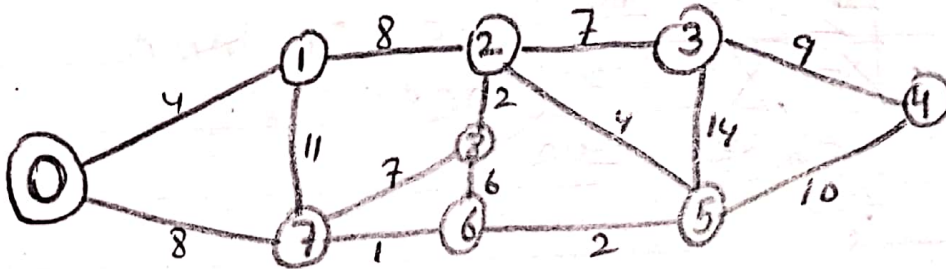


P.T.O

①

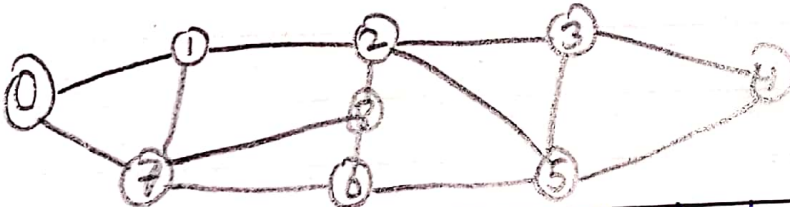
~~NAME~~
NAME = SHAYAN
ID = 14487
Section = BS(SE) A

Q4:-
ANS:-



Step 1:- Remove all loops and parallel edges,
but there is no parallel edges, and
loops.

Step 2 Arrange all edges in their increasing
order weight

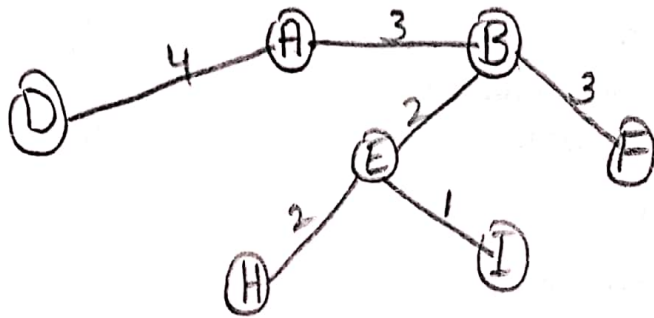


7,6	6,5	2,8	0,1	2,5	8,6	2,3	7,8	0,7	1,2	3,4	4,5	1,7	3,5
1	2	2	4	4	6	7	7	8	8	9	10	11	14

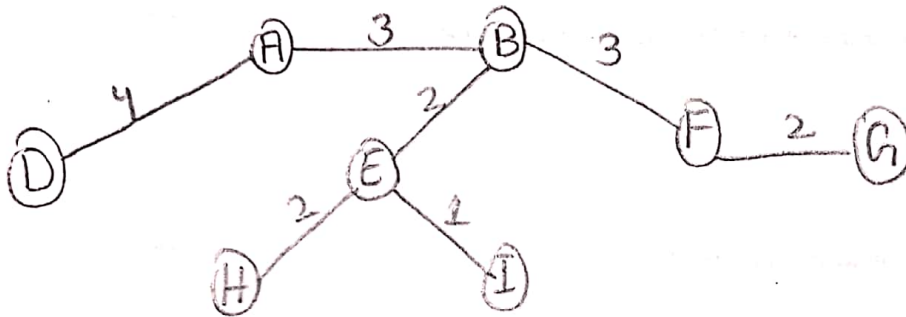
P.T.O

7

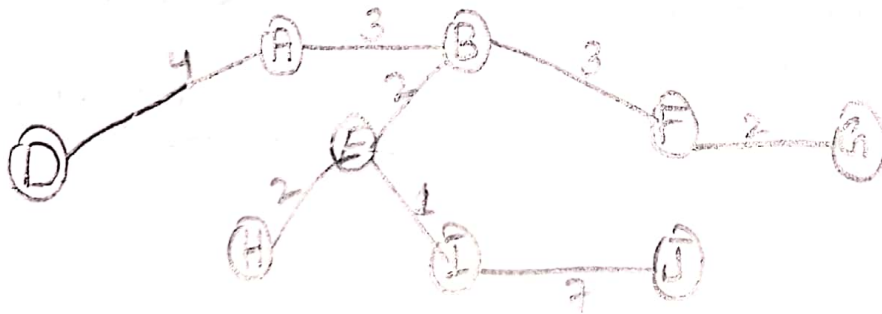
After the step tree is formed and the
New node is B-3-F



and the next new node is F-2-G



The next new node for the tree is I-7-J



The tree is formed and the
minimum cost is $4+3+3+2+2+1+7+2=24$

$$t_6 = \frac{2 + 4(4) + 6}{6} = \frac{2 + 16 + 6}{6} = 4$$

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

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

Variance σ^2

By formula $\sigma^2 = \left(\frac{t_P - t_0}{2} \right)^2$

$$\sigma_1^2 = \left(\frac{12 - 4}{6} \right)^2 = \left(\frac{8}{6} \right)^2 = (1.33)^2 = 1.77$$

$$\sigma_2^2 = \left(\frac{4 - 2}{6} \right)^2 = \left(\frac{2}{6} \right)^2 = 0.11$$

$$\sigma_3^2 = \left(\frac{22 - 6}{6} \right)^2 = \left(\frac{16}{6} \right)^2 = 7.09$$

$$\sigma_4^2 = \left(\frac{8 - 4}{6} \right)^2 = \left(\frac{4}{6} \right)^2 = 0.44$$

$$\sigma_5^2 = \left(\frac{5 - 3}{6} \right)^2 = \left(\frac{2}{6} \right)^2 = 0.11$$

$$\sigma_6^2 = \left(\frac{6 - 2}{6} \right)^2 = \left(\frac{4}{6} \right)^2 = 0.44$$