PERT Example:-

2) The time estimates (in week) for acti of a PERT Network are given below:-

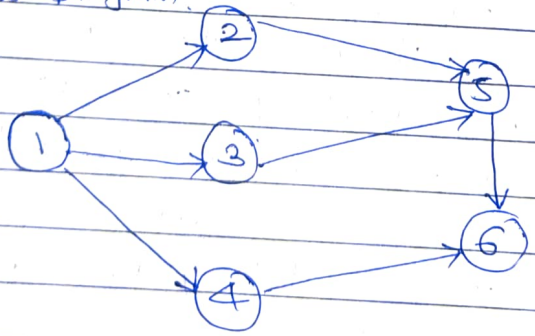
Activity	to	tm	tp
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

a) Draw Project Net
b) Determine exped Project length.
c) Calculate Std. dev & variance of proj length.

d) If project due date is 19 weeks, what probability of not meeting due date?
e) The probability that the project will b completed on schedule if the scheduled completion time is 20 weeks?
f) What should be the scheduled completion time for the probability of completion to be 90%.

⇒ Solution :-

a) N/w Diagram:



b) Expected project duration/length:-

Activity	to	tm	t.p.	TE
1-2	1	1	7	$\frac{1+4(1)+7}{6}=2$
1-3	1	4	7	$\frac{1+4(4)+7}{6}=4$
1-4	2	2	8	$\frac{2+4(2)+8}{6}=3$
2-5	1	1	1	$\frac{1+4(1)+1}{6}=1$
3-5	2	5	14	$\frac{2+4(5)+14}{6}=6$
4-6	2	5	8	$\frac{2+4(5)+8}{6}=5$
5-6	3	6	15	$\frac{3+4(6)+15}{6}=7$

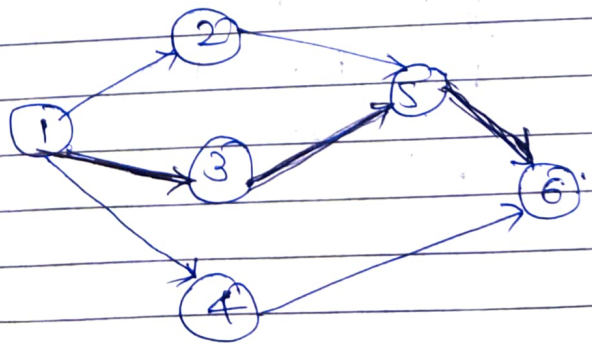
- Critical Path:-

Path 1: $1 \rightarrow 2 \rightarrow 5 \rightarrow 6$.
$2+1+7 = 10$ weeks

Path 2:- $1 \rightarrow 3 \rightarrow 5 \rightarrow 6$.
$4+6+7 = 17$ weeks.

Path 3: $1 \rightarrow 4 \rightarrow 6$.
$3+5 = 8$ weeks.

Critical Path is $1 \rightarrow 3 \rightarrow 5 \rightarrow 6$ with expected project duration 17 weeks.



c) Std. deviation & variance of the project.

Activity	to	tp	σ	σ^2
1-2	1	7	1	1
1-3	1	7	1	1
1-4	2	8	1	1
2-5	1	1	0	0
3-5	2	14	2	4
4-6	2	8	1	1
5-6	3	15	2	4

Std. deviation $\sigma = \frac{tp - to}{6}$

Variance, $\sigma^2 = \left(\frac{tp - to}{6}\right)^2$

* Total project variance & std. deviation is calculated by summing variance along the critical path.

Critical Path is: $1 \rightarrow 3 \rightarrow 5 \rightarrow 6$

Total project variance = 1+4+4

Total project variance = 9

* Std. deviation of project is

$\sigma_{project} = \sqrt{9.00}$

$\sigma_{project} = 3$

d) Find probability of not meeting due date.

Project due date = 19 weeks.

Expected time = 17 weeks

$$z = \frac{19-17}{3} = \frac{2}{3} = 0.33$$

$$z = 0.67$$

So from z-table $P(z=0.67)$ is 0.8407486 = 74.

So, probability of not meeting

So, from z-table $P(z=0.67)$ is 0.7486 = 74.86%

So, probability of not meeting due date is $(1-P)$

$$= 1 - 0.7486$$

$$= 0.2514$$

$$= 25.14\%.$$

e) Probability of completing project with due date 20 weeks is

$$z = \frac{20-17}{3}$$

$$= \frac{3}{3}$$

$$z = 1$$

∴ So, from z table $P(z=1)$ is 0.843 = 84.3%

f) probability of completion is = 90%

$$= 0.9$$

So from z-table, $z = 1.28$.

$$\therefore 1.28 = \frac{x-17}{3}$$

$$x - 17 = 1.28 \times 3$$

$$x = 3.84 + 17$$

$$x = 20.84 \text{ weeks}.$$