Q) Find the Critical path for the following Activities.

Activities	Predecessor	Duration (in Month)
A	—	3
B	—	4
C	—	6
D	B	3
E	A	9
F	A	1
G	B	4
H	C, D	5
I	C, D	4
J	E	3
K	F, G, H	6
L	F, G, H	3
M	I	6
N	J, K	9

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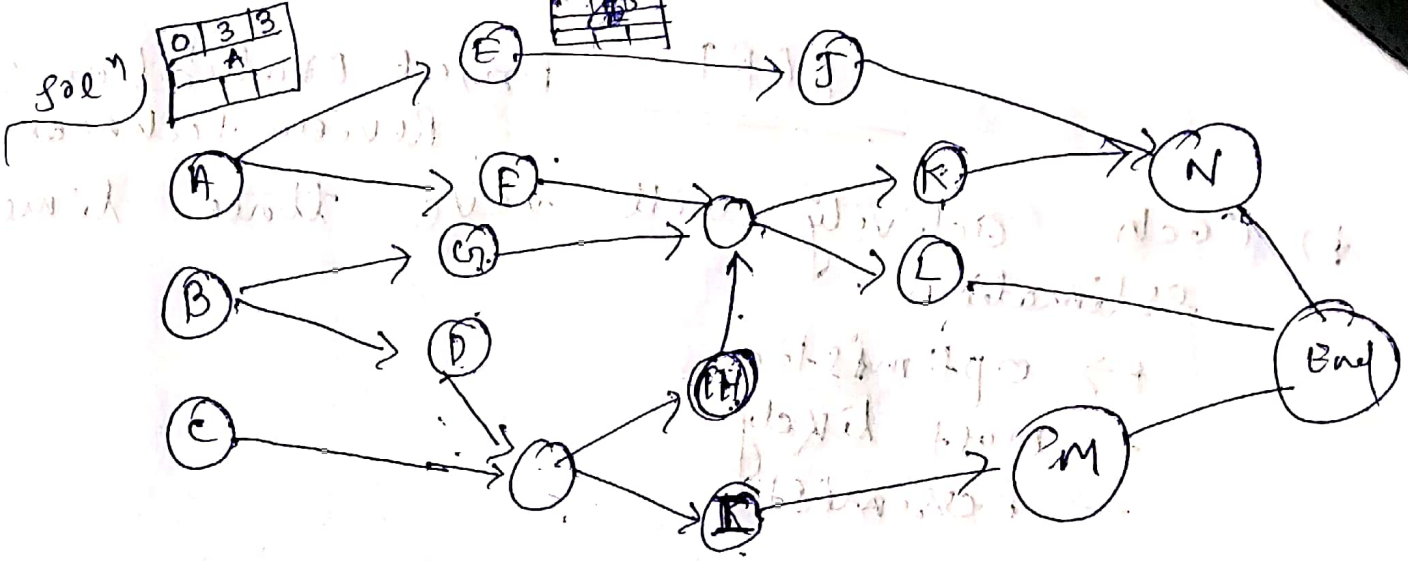
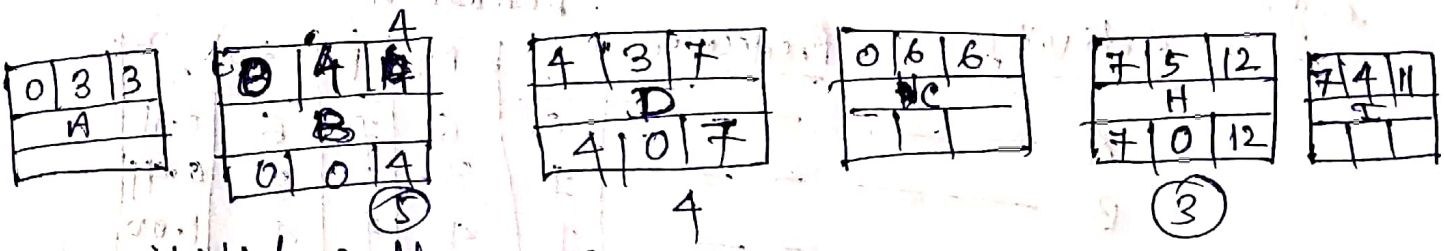
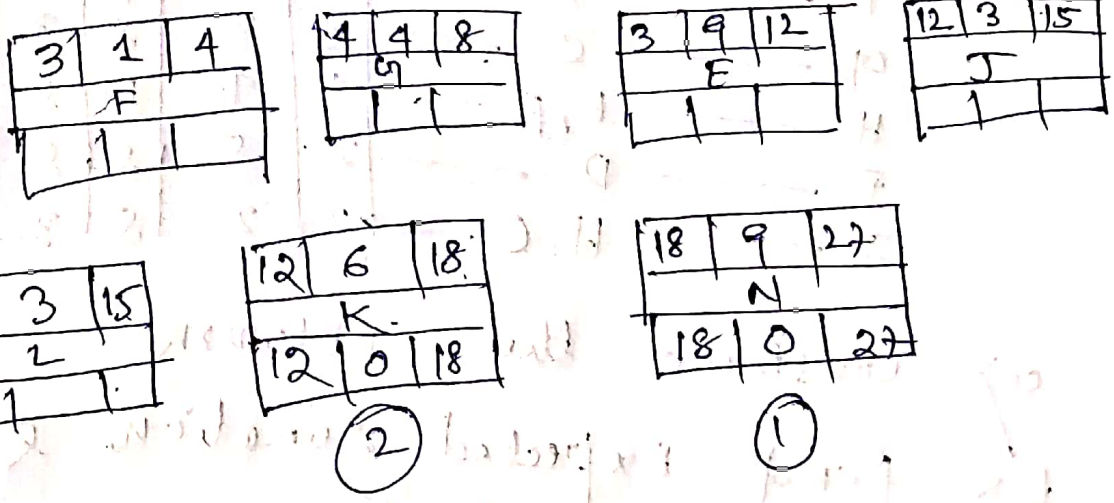




critical path = B → D → H → K → N

= 4 + 3 + 5 + 6 + 9 = 27.



PERT (Project Evaluation & Review Technique)

+) Each activity will have three time estimation.

↓ → optimistic
↔ → most likely
→ → pessimistic

e.g.

Activity	Predecessor	Duration: O	M	P	t_e	σ^2
A	—	5	6	7	6	0.11
B	—	1	3	5	3	0.44
C	—	1	4	7	4	1.00
D	A	1	2	3	2	0.11
E	B	1	2	4	3	1.77
F	C	1	5	9	5	1.77
G	C	1	2	8	3	1.00
H	E, F	4	4	10	5	1.00
I	D	2	5	8	5	1.00
J	H, C	2	2	8	3	1.00

a) Construct the network
b) Find Expected Duration & Variance of Each Activity.
c) Find the Critical path & Expected completion time of Project
d) What is the Probability of completing the proj on or before 22 weeks.

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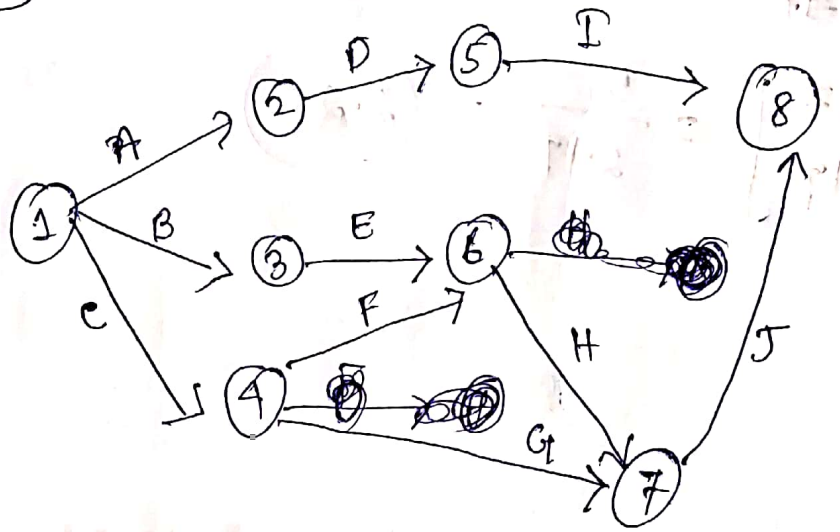
Soln



a) Expect duration / Min duration & Variance.

$$te = \frac{O + 4M + P}{6}$$

for A = $\frac{5 + (4 * 6) + 7}{6} = 6$ ✓

b) Variance $\sigma^2 = \left[\frac{P - O}{6}\right]^2$

for A = $\left[\frac{7 - 5}{6}\right]^2 = \left[\frac{2}{6}\right]^2 = \frac{4}{36} = 0.11$

for B = $\left[\frac{5 - 1}{6}\right]^2 = \left[\frac{4}{6}\right]^2 = \frac{16}{36} = 0.44$

c) critical path & Expected Compl^n time.

Use critical path method (CPM)

1 → 4 → 6 → 7 → 8.

d) Activity : te σ^2

C — 4 — 1.00
F — 5 — 1.77
H — 5 — 1.00
J — 3 — 1.00
19 $\sigma^2 = 4.77$ $\sigma = \sqrt{4.77} = 2.1840 = 2.19$

$P(x \leq 22) = P\left[\frac{x - \min(te)}{\sigma}\right]$ =

$P\left[\frac{22-17}{2.19}\right] = \frac{5}{2.19} = 2.28$