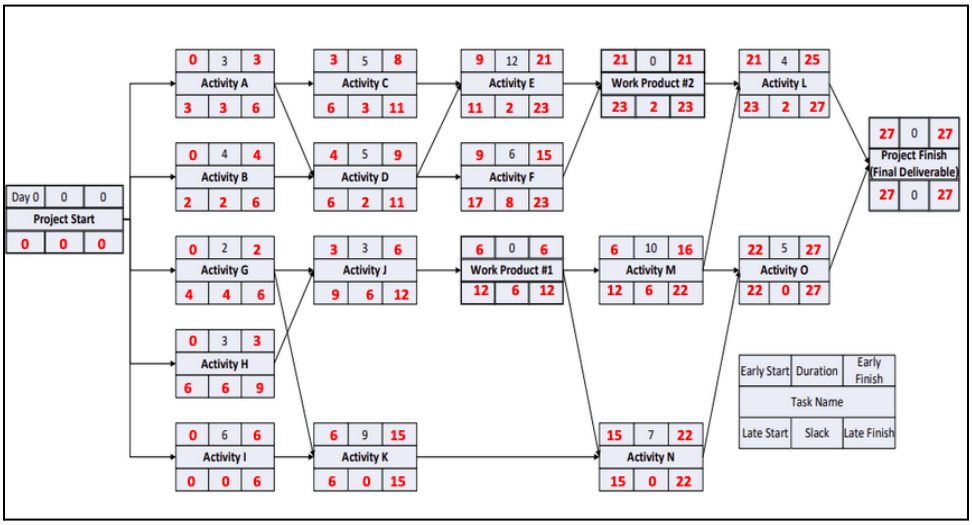
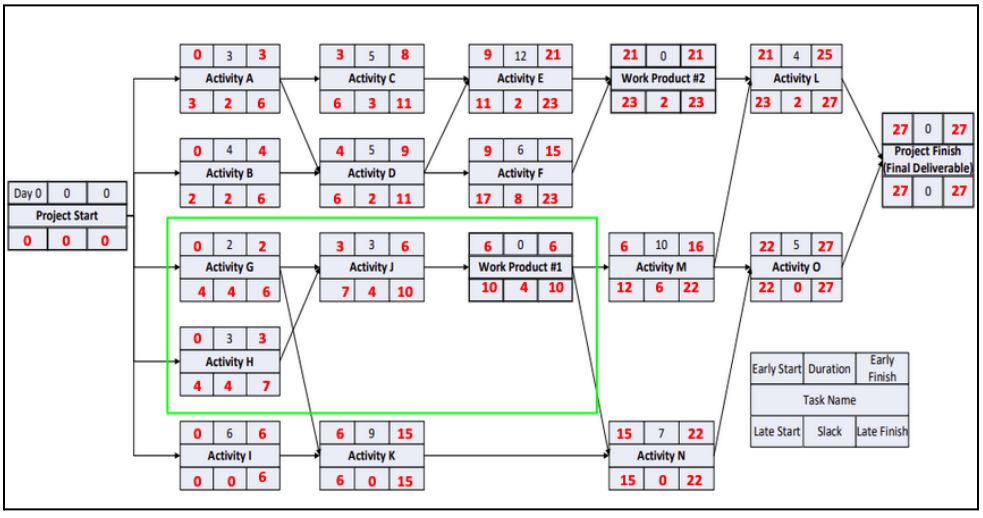
Case Study 2

1. For the activities shown on the activity network next page (Times are in days – Calculations must be to TWO decimal points):
   a. Complete the missing information in the diagram.



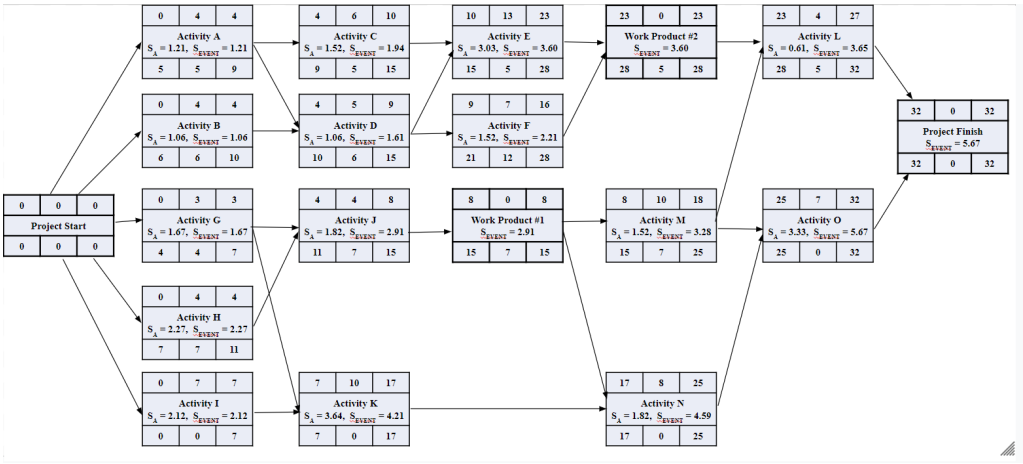
   b. What is the critical path and the estimated duration of the project?
      Critical path = I, K, N, O & project duration = 27 days
   c. If the "WP #1" was requested to be presented by a max of 10 days from the start of the project, what would be the effect on the rest of the network? Redo calculations on the activity network and determine what would be the new estimated duration of the project.
      If WP1's latest finish time is changed to day 10, then two of the activities that compose it (H, J) and the WP1 have their slack times decreased by 2 days. Since neither of these activities (H, J) and WP1 are on the critical path, their slack time reducing by 2 days does not have an effect on the project completion.



d. The following table is for the same activity network (as in point “a”). Complete the missing information (Round up T_e fractions ≥ 0.1 and assume the values in the table were made at 95% confidence level.)

Activity	Predecessor	Optimistic	Normal	Pessimistic	t_e	$S_{activity}$	S_{event}
A	NONE	2	3	6	4	1.21	1.21
B	NONE	2	4	5.5	4	1.06	1.06
C	A	4	5	9	6	1.52	1.94
D	A, B	3.5	5	7	5	1.06	1.61
E	C, D	10	12	20	13	3.03	3.60
F	D	5	6	10	7	1.52	2.21
WP #2	E, F	Event: WP #2 Presentation					3.60
G	NONE	1.5	2	7	3	1.67	1.67
H	NONE	2.5	3	10	4	2.27	2.27
I	NONE	4	6	11	7	2.12	2.12
J	G, H	1	3	7	4	1.82	2.91
WP #1	J	Event: WP #1 Presentation					2.91
K	G, I	6	9	18	10	3.64	4.21
L	WP #2, M	3	4	5	4	0.61	3.65
M	WP #1	7	10	12	10	1.52	3.28
N	WP #1, K	6	7	12	8	1.82	4.59
O	M, N	4	5	15	7	3.33	5.67

e. Refill the activity network based on the table in the previous point “d”.



f. What is the critical path and the expected duration for the project in this case?

Critical path = I, K, N, O & project duration = 32 days

g. What is the meaning of the S_{event} values at WP #1 and WP #2?

The meaning of S_{event} at WP#1 and WP#2 means that the expected time to present each work product can deviate by the S_{event} days. For WP#1 the presentation date has a standard deviation of 2.91 days, and for WP#2 it has a standard deviation of 3.60 days.

h. What is the probability that the project is completed in:

i. 28 days or less?

$$z = \frac{T - t_e}{\sqrt{S^2}} = \frac{28 - 32}{5.67} = -0.7055$$

From Z-table: (Z(- 0.70)+Z(-0.71))/2 = 0.240405

Therefore the probability that the project is completed in 28 days or less is approximately 24.04%.

ii. 33 days or less?

$$z = \frac{T - t_e}{\sqrt{S^2}} = \frac{33 - 32}{5.67} = 0.1773$$

From Z-table(0.18) = 0.5714

Therefore the probability that the project is completed in 33 days or less is approximately 57.14%

i. If we want to communicate a project expected duration with risk probability of 2.1% (meaning, the risk of exceeding this expected duration is 2.1% only). What would be this duration?

From (z-table) = 0.979, thus z = (2.03 + 2.04) / 2 = 2.035

$$z \times \sqrt{S^2} + t_e = 2.035 \times 5.67 + 32 = 43.54\ days$$

Therefore, with a risk probability of 2.1% the duration of the project would be approximately 43.54 days.