Guided Exercises / Practical Work 3

To be, or not to be

Exercise 1:

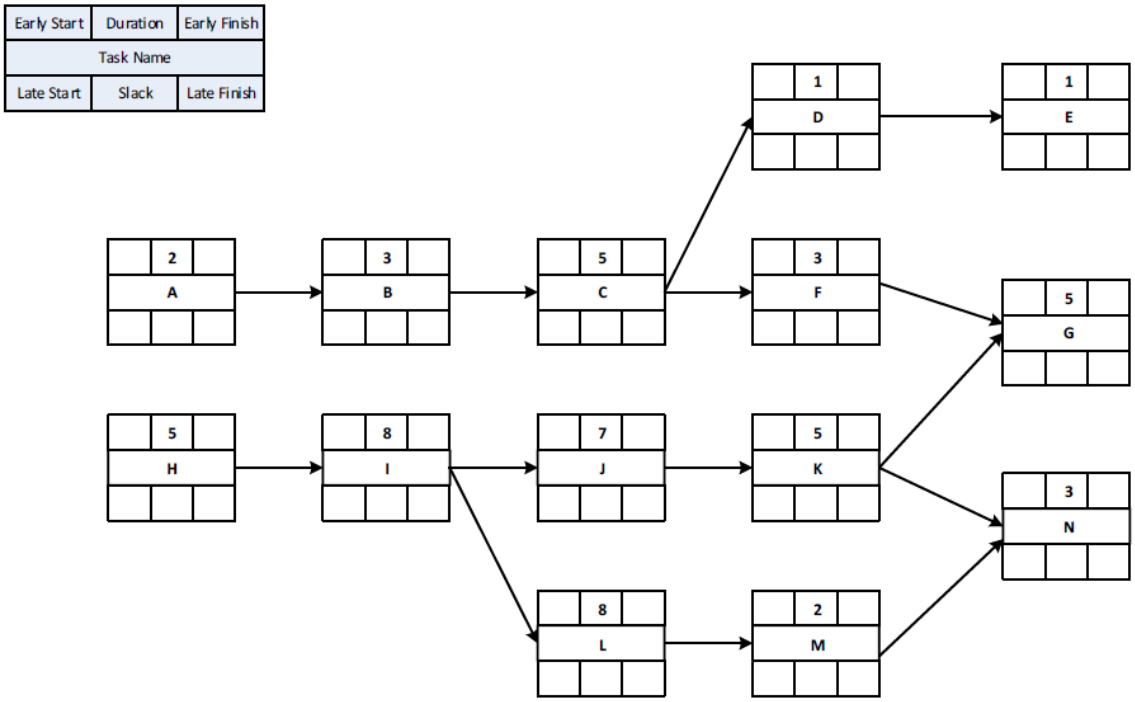
1. Draw the network diagram
2. List the network paths
3. Determine the critical path(s)
4. Determine the float for each activity

Table 1: Activity List with Dependencies

Activity	Duration	Dependency
Start	0 days	—
A	5 days	Start
B	2 days	Start
C	3 days	A, B
D	5 days	Start
E	6 days	Start
F	4 days	D, E
G	2 days	C, F
H	5 days	G
I	7 days	G
J	3 days	H
Finish	0 days	I, J

Exercise 2:

1. Perform a Forward Pass and a Backward Pass of the network diagram below .
2. Which Activities have the same Early Finish as their Late Finish?



Exercise 3:

For the following table of information:

1. Draw the network diagram
2. List the network paths
3. Determine the critical path(s)
4. Determine the float for each activity

Table 2: Activity List with Dependencies

Activity	Duration (Days)	Dependency
Start	0	—
A	8	Start
B	5	A
C	6	B, H
D	8	C
E	9	D, F
F	3	C, I
G	7	Start
H	8	G
I	9	H
J	5	I
K	2	J
L	3	J
Finish	0	K, L

Exercise 4:

A construction project consists of the following activities:

Activity	Predecessor	Duration (days)	Relationship	Lead/Lag
A	–	5	–	–
B	A	8	FS	2-day lag
C	A	6	FS	0
D	B	4	FS	1-day lead
E	C	5	FS	0
F	D, E	3	FS	0

- FS = Finish-to-Start
- Lag = waiting time before successor can start
- Lead = successor can start before predecessor finishes

1. Draw the project network diagram showing all activities and the associated lead and lag times.
2. Perform a **forward pass** to calculate the **early start (ES)** and **early finish (EF)** for each activity.
3. Perform a **backward pass** to calculate the **late start (LS)** and **late finish (LF)** for each activity.
4. Identify the **critical path**.
5. Determine the **total project duration**.
6. Explain how the **lead and lag** times affect the critical path.

Exercise 5:

A project consists of the following activities:

Activity	Predecessor	Normal Time (days)	Crash Time (days)	Normal Cost ($)	Crash Cost ($)
A	–	6	4	600	1000
B	A	5	3	500	900
C	A	4	3	400	700
D	B	6	4	800	1200
E	C	5	4	500	650
F	D, E	3	2	300	450

Indirect cost = $200 per day

1. Draw the project network.
2. Determine the **normal project duration**.

3. Identify the **critical path**.
4. Compute the **cost slope** for each activity:

$$CostSlope = \frac{CrashCost - NormalCost}{NormalTime - CrashTime}$$

5. Crash the project step-by-step to reduce the duration by 2 days at **minimum cost**.
6. Determine:
   (a) New project duration
   (b) Total direct cost
   (c) Total indirect cost
   (d) Total project cost
7. Find the **optimal project duration** (minimum total cost).

Exercise 6:

A project has the following activities:

Activity	Predecessor	Normal Time (days)	Crash Time (days)	Normal Cost ($)	Crash Cost ($)
A	–	4	3	400	700
B	A	6	4	600	1000
C	A	6	4	600	900
D	B	5	3	500	900
E	C	5	3	500	800
F	D, E	2	2	200	200

Indirect cost = $150 per day

1. Determine:
   (a) The normal project duration.
   (b) All critical paths. *(Hint: Two paths have equal duration.)*
2. Compute the cost slopes for all crashable activities.
3. The project manager decides to crash **Activity B** by 1 day because it is on the critical path.
   (a) What is the new project duration?
   (b) What are the new critical path(s)?
4. To reduce the project by 1 day, determine the **minimum-cost strategy**.