UNIT 4 ACTIVITY PLANNING

- A detailed plan for the project include a schedule indicating the start & completion times for each activity. This will enable us to :

1. Ensure that the appropriate resources will be available precisely when required.
2. Avoid different activities competing for the same resources at the same time.
3. Produce a detailed schedule showing which staff carry out each activity.
4. Produce a detailed plan against which actual achievement may be measured.
5. Produce a timed cash flow forecast.
6. Replan the project during its life to correct drift from the target.

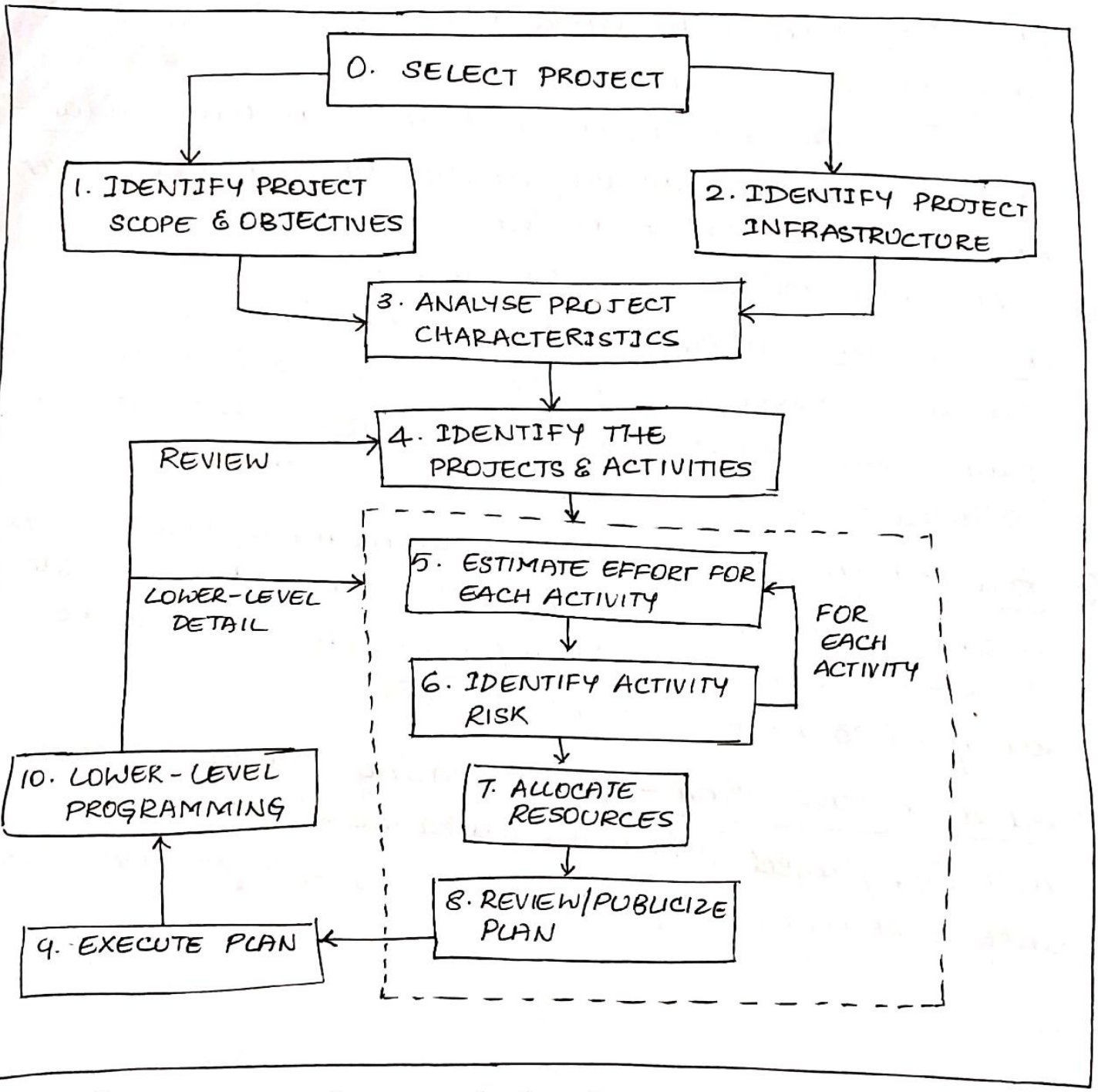
- To be effective, a plan must be stated as a set of targets, by providing a target start & completion date for each activity.
- Monitoring the projects progress is a case of ensuring that the products of each activity are delivered on time.
- The activity plan should provide a means of evaluating the consequences of not meeting any of the activity targets dates & guidance as how to plan might most effectively modified to bring it target.

OBJECTIVES OF ACTIVITY PLANNING

1. Feasibility Assesment - Is the project possible within required timescales & resource constraints?
2. Resource Allocation - What are the most effective ways of allocating resources to the project? When the resources be available?
   The project plan allows us to investigate the relationship b/w timescales & resource availability & the efficacy of additional spending on resource procurement.
3. Detailed Costing - How much will the project cost & when is that expenditure likely to take place? After producing an activity plan & allocating specific resources, detailed estimates of costs & their timing can be obtained.
4. Motivation - Providing targets & being seen to monitor achievement against targets is an effective way of motivating staff, particularly where they have been involved in setting those targets in the first phase.
5. Coordination - When do the staff in different departments need to be available to work on a particular project & when do staff need to be transferred b/w projects?
   The project plan, particularly with large projects involving more than a single project team, provides an effective vehicle for communication & coordination among teams.

... and Backward Pass

Project Schedule



- The project plan must be developed to the level of showing dates when each activity should start & finish & when & how much of each resource will be required.
- The refined project plan at this level is called as Project Schedule.

① The first step in producing the plan is to decide what activities need to be carried out & in what order they are to be done.

From this we can construct an ideal activity plan - a plan when each activity would ideally be undertaken were resources not a constraint.

② The ideal activity plan will then be subject of an activity risk analysis, aimed at identifying potential problems, suggesting alterations to the ideal activity plan & will certainly have implications for resource allocations.

③ Resource allocation - expected availability of resources might place constraints on when certain activities can be carried out, & our ideal plan might need to be adapted to take account of this.

④ Schedule production - After allocating resource to each activity, project scheduled indicating start & completion dates & resource requirement statement for each activity

Sequencing & scheduling Activities

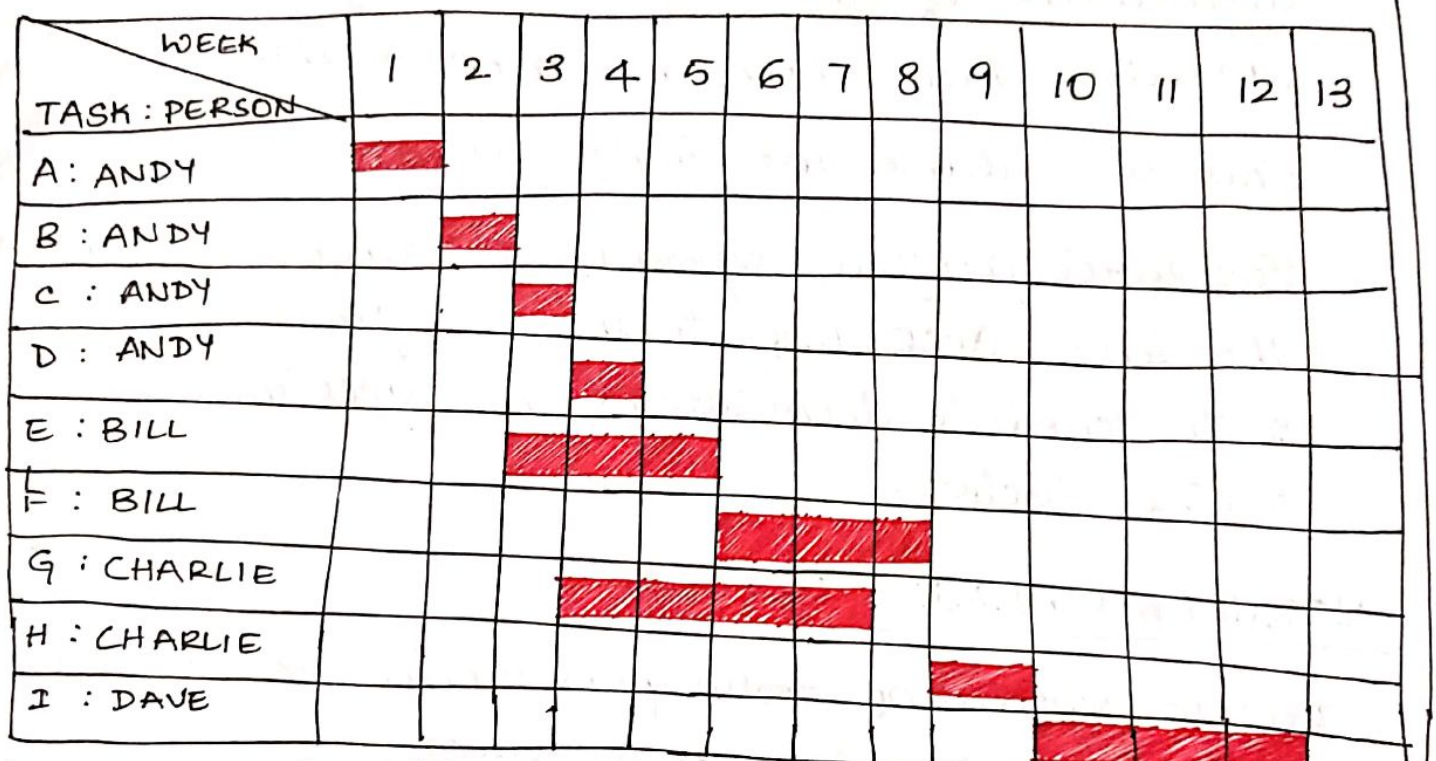


FIG: PROJECT PLAN AS A BAR CHART

- Throughout a project, a schedule clearly stating when each of project activity is planned to occur & what resources it will need is required, for ex. in a bar chart as shown above.

① Sequencing of the tasks - identify the dependencies among activities dictated by the development process.

② Scheduling - Specify when they should take place.

- The scheduling has had to take account of the availability of the staffs & the ways in which the activities have been allocated to them.
- This is suitable for simple projects.
- For large projects, seperate 2 stages: to sequence the tasks according to their logical relationships & to schedule them taking into account resources & other factors.

NETWORK PLANNING MODELS

- Project scheduling techniques model project's activities & their relationships as a network.

Ex: ① CRITICAL PATH METHOD (CPM)

1. A list of all activities required to complete the project (typically categorized within a work breakdown structure).
2. The time (duration) that each activity will take to complete.
3. The dependencies b/w the activities &
4. Logical end points such as milestones or deliverable items.

Forward and Backward Pass

- Using these values, CPM calculates the longest path of planned activities to logical end points or to the end of the project, & the earliest & latest that each activity can start & finish without making the project longer.
- This process determines which activities are CRITICAL (on the longest path) & which have "total float" (can be delayed without making the project longer).

② Ex: PERT (Program Evaluation Review Technique)

- Both techniques use activity-on-arrow approach to visualize the project as a ~~techniq~~ network where activities are drawn as arrows joining the circles or nodes - possible start &/or completion of an activity or set of activities.

PRECEDENCE NETWORKS - uses activity-on-node n/w where activities are presented as nodes & links b/w nodes represent precedence (or sequencing) requirements.}

FORMULATING A NETWORK MODEL

Step 1: Represent the activities & their inter relationships as a graph.

Step 2: Activity-on-node ⇒ Activities = nodes (boxes)
dependencies = lines b/w nodes

1. CONSTRUCTING PRECEDENCE NETWORKS

1. A project network should have only one start node.
2. A project network should have only one end node.
3. A node has duration - takes time to execute.
4. Links normally have no duration - Links represent the relationships b/w activities

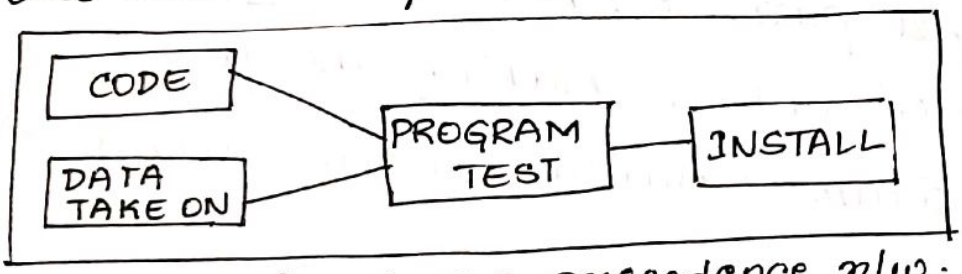


FIG: Fragment of a precedence n/w.

5. Precedents are the immediate preceding activities
6. Time moves from left to right.
7. A n/w may not contain loops - A loop is an error in that it represents a situation that cannot occur in practice, when loops occured in sense of iteration, may be in practice, but not directly represented in project n/w.

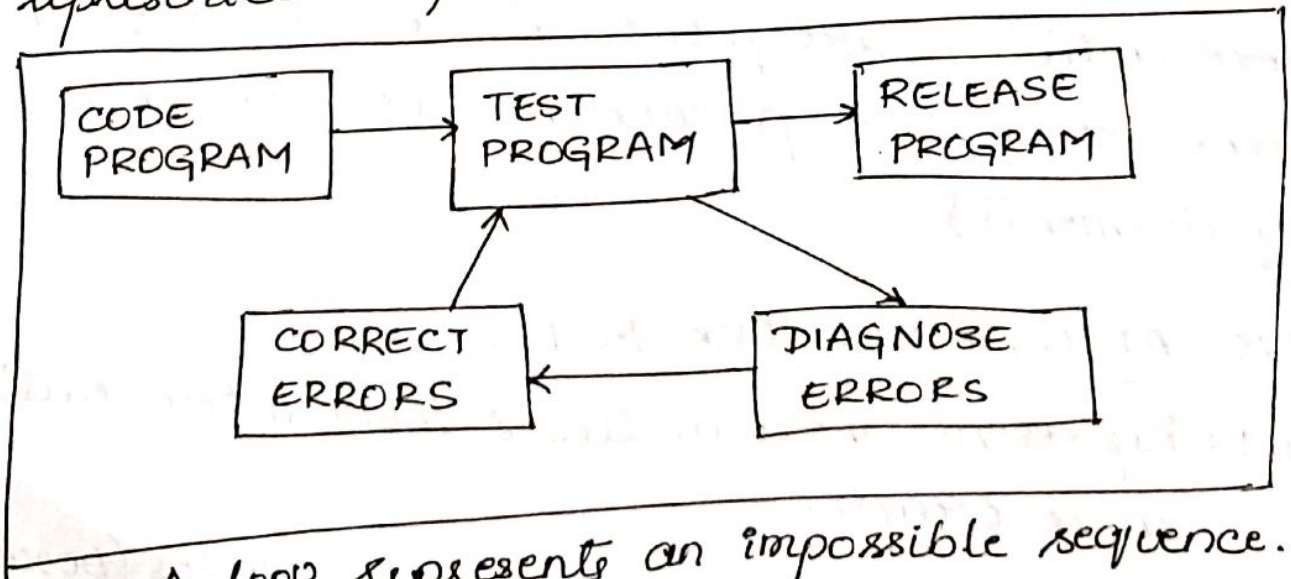


FIG: A loop represents an impossible sequence.

Forward and Backward Pass

.8. A n/w should not contain dangle – Indicates errors in logic when activities are added as a after-thought.

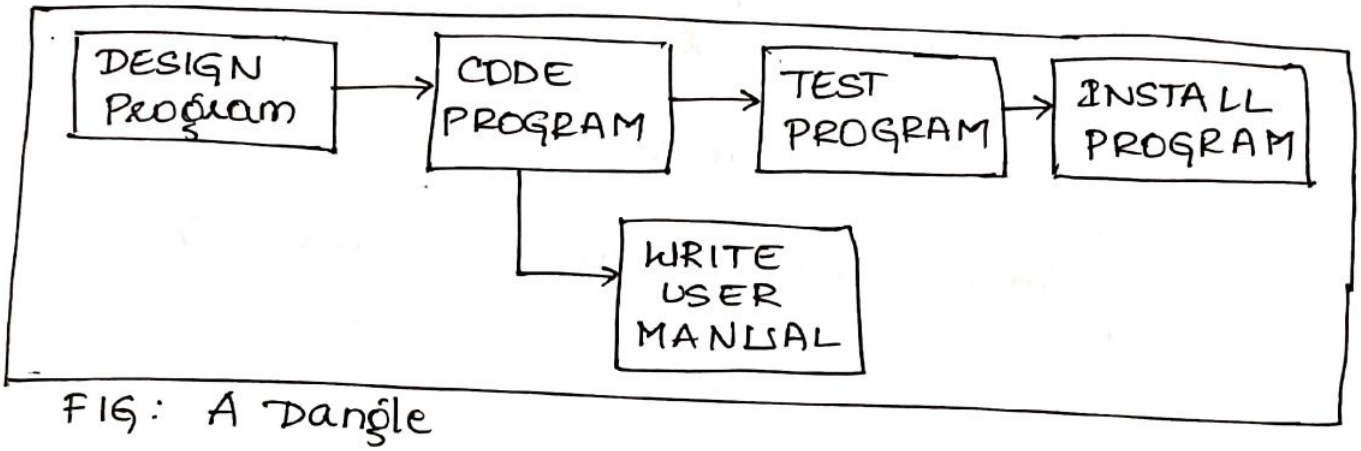


FIG: A Dangle

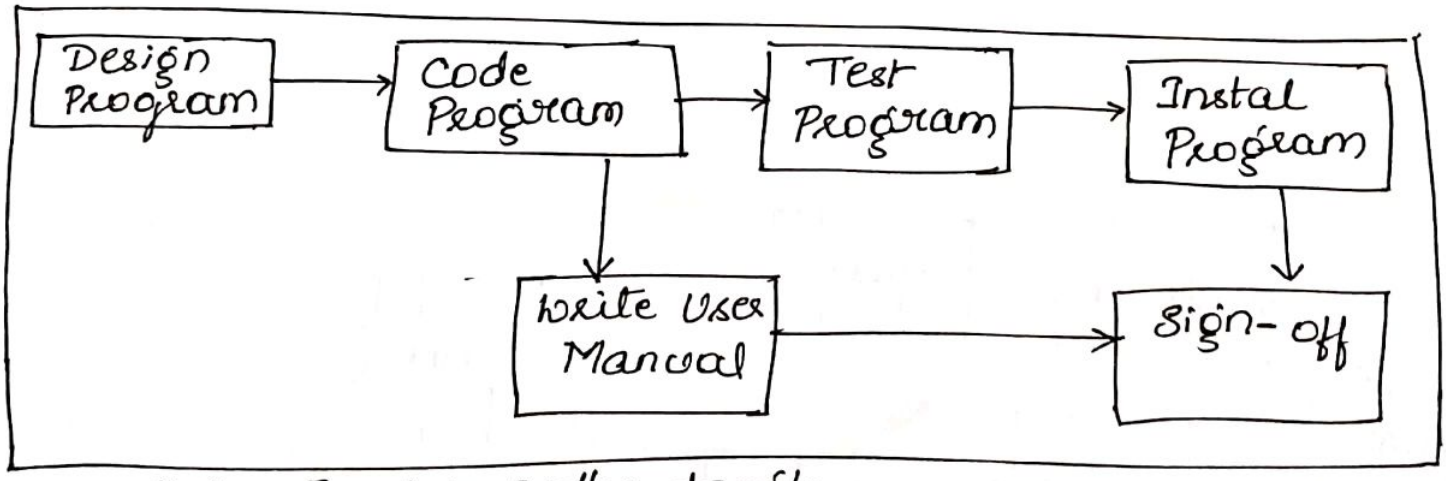
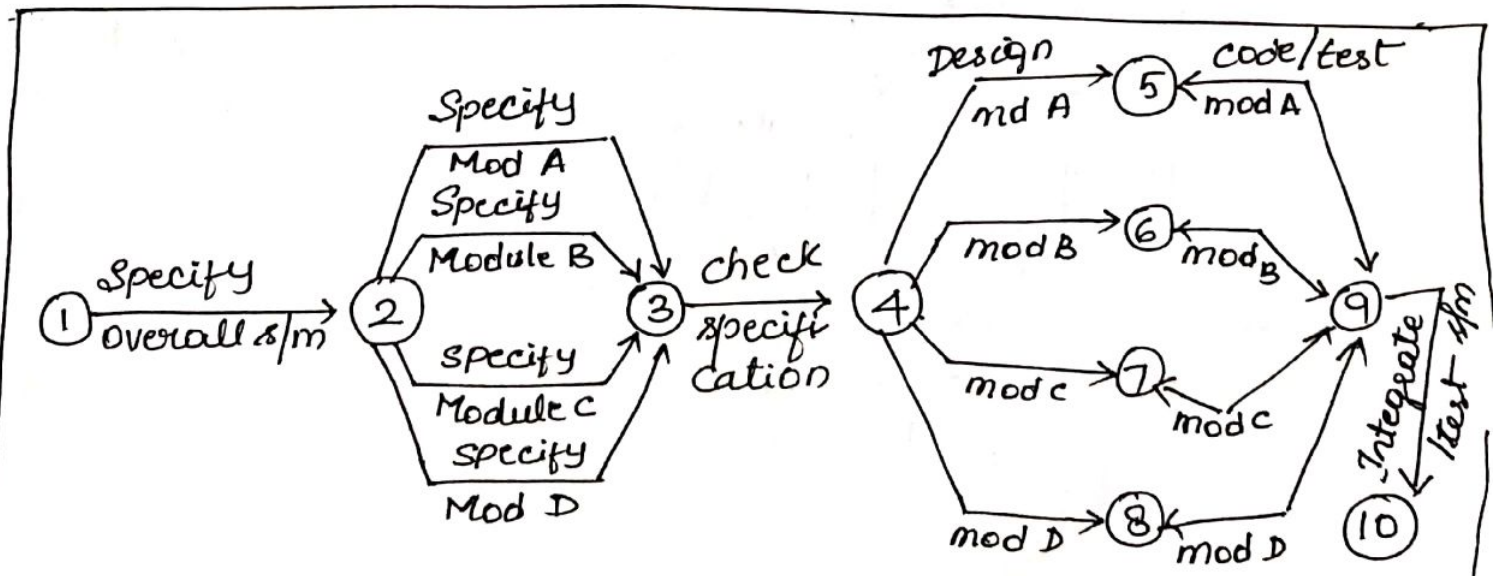


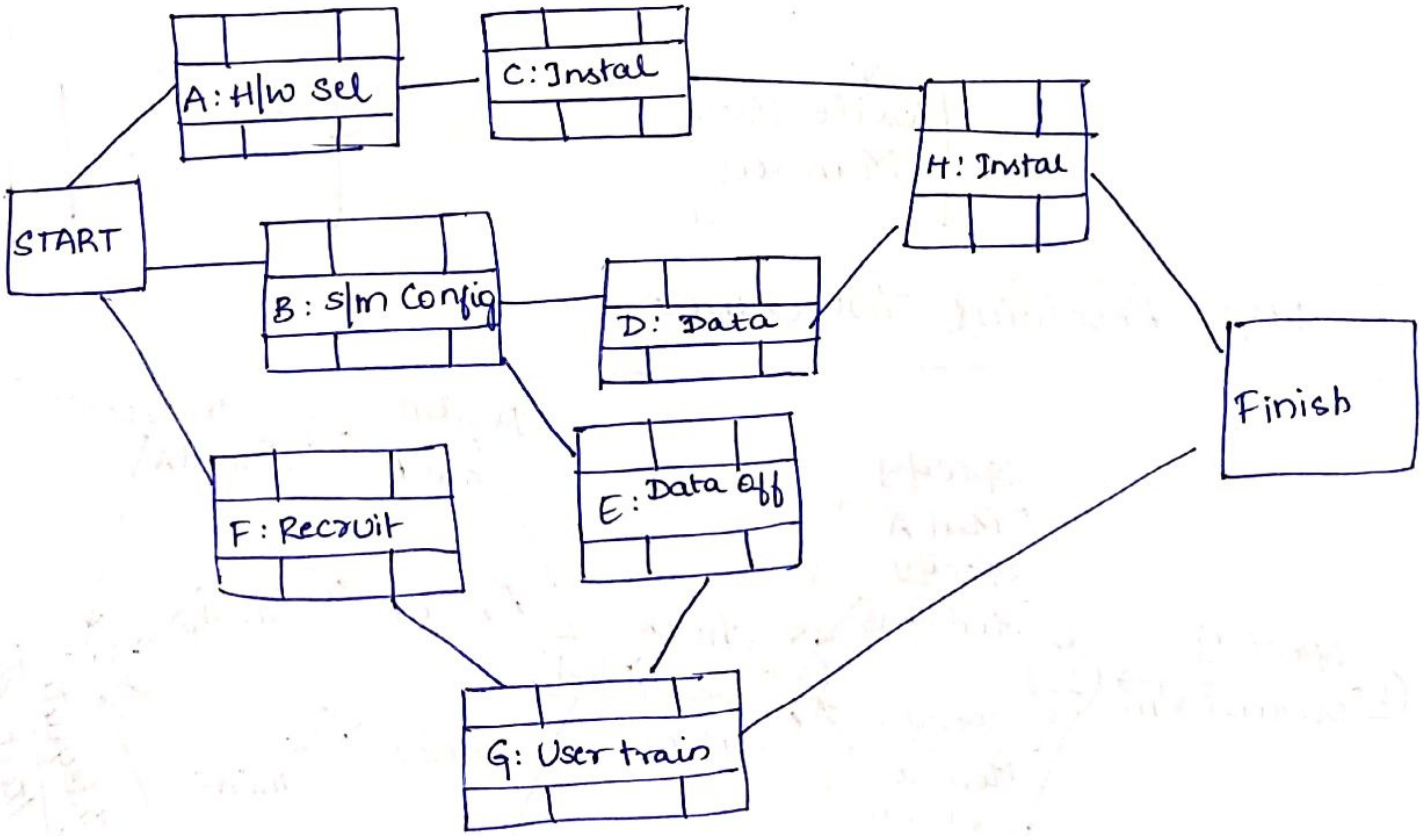
FIG: Resolving the dangle.



Labelling Conventions

- The activity label is a code developed to uniquely identify the activity & may incorporate a project code.

Earliest Start	Duration	Earliest Finish
Activity label, Activity Description		
Latest Start	Float	Latest Finish



Forward and Backward Pass

N/w diagrams :

1. Splits up the decision making process into
   a) Method/logic - the order in which tasks have to be completed
   b) Time - estimates for the time to completion can be added to each task.
   c) Resources - these can be added & then analysis is carried out.

Analysis can be carried in 2 types :

1. Forward Pass - Calculate the duration of the project.
2. Backward Pass - Calculate the slack/float for each task & shows the critical path.

FORWARD PASS : The forward pass is carried out to calculate the earliest dates on which each activity may be started & completed.

Ex: An example project specification with estimated activity durations & precedence requirements.

	ACTIVITY	DURATION (WEEKS)	PRECEDENTS
A	Hardware selection	6	
B	System Configuration	4	A
C	Instal hardware	3	B
D	Data migration	4	B
E	Draft office procedures	3	
F	Recruit staff	10	
G	User training	3	E, F
H	Instal & test system	2	C, D

To calculate the total duration of the project :

For each task : Take the Earliest Start Time (EST)

Calculate Earliest Finish Time (EFT)

EFT = EST + DURATION

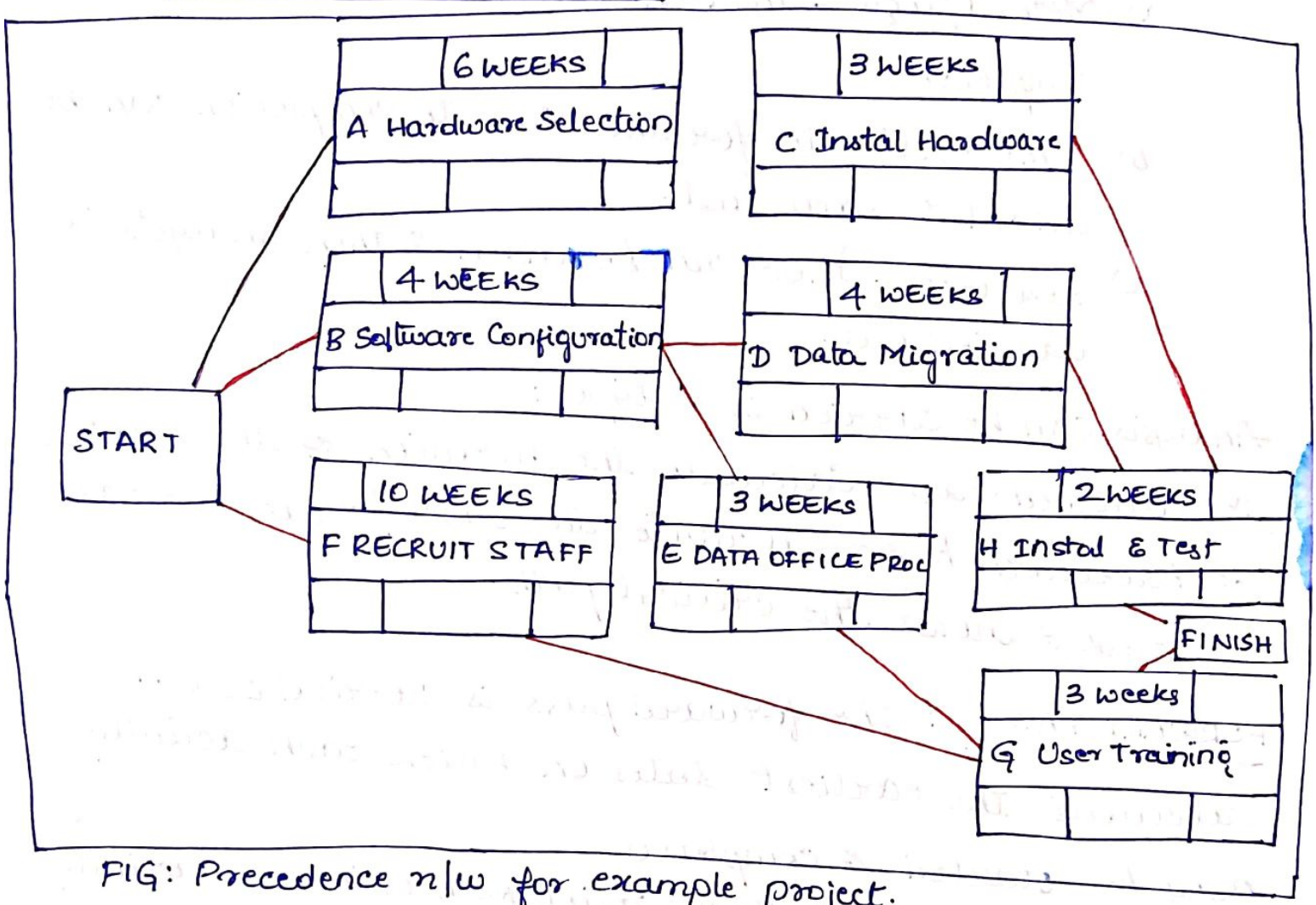


FIG: Precedence n/w for example project.

RULE: The earliest start date for an activity is the earliest finish date for the preceding activity.

When there is more than 1 immediately preceding activity, is the latest of the earliest finish dates for those activities are selected.

The fwd pass & the calculation of the earliest start dates are carried out acc. to the foll. reasoning :

1. Activities A, B, F may start immediately, so ESD is 0.
2. Activity A will take 6 weeks, so earliest it can finish is week 6.
3. B → 4 weeks, so earliest finish = week 4.

4. Activity F will take 10 weeks, so earliest it can finish is week 10.

5. Activity C can start as soon as A has finished so its earliest start date is week 6. It will take 3 weeks so the earliest it can finish is week 9.

6. Activities D & E can start as soon as B is complete so the earliest they can each start is week 4. Activity D, which will take 4 weeks, can ∴ finish by week 8 & acti E, which takes 3 weeks, can ∴ finish by week 7.

7. Activity G cannot start until both E & F have been completed. It cannot ∴ start until week 10 – the later of weeks 7 (for Acti E) and 10 (for activity F). It takes 3 weeks & finishes in week 13.

8. Activity H cannot start until week 9 – the later of the 2 earliest finish dates for the preceding activities C & D.

9. The project will be complete when both activities H & G have been completed. Thus the earliest project completion date will be the later of weeks 11 & 13, week 13.

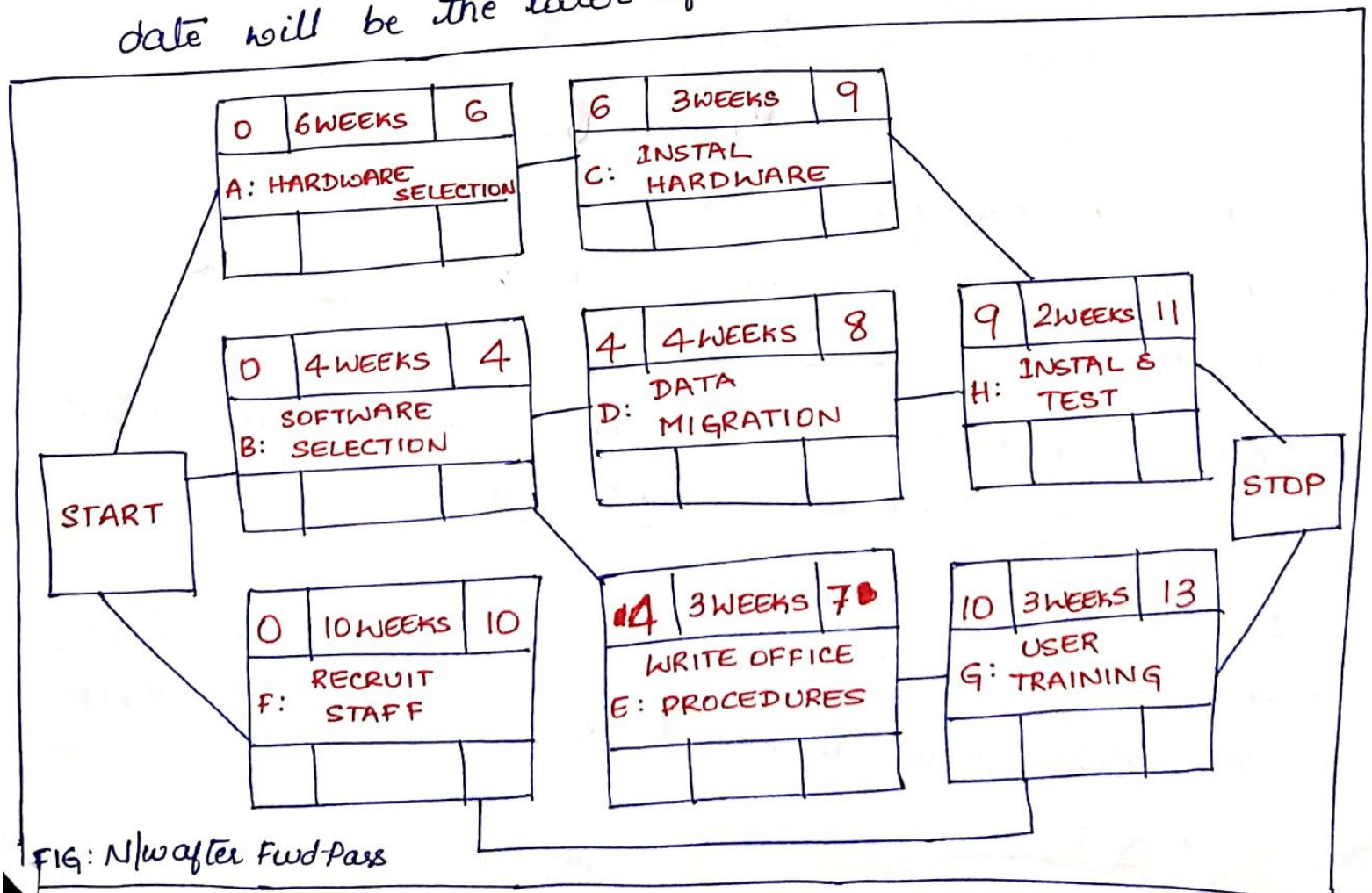


FIG: N/w after Fwd Pass

The Backward Pass

- The II stage in the analysis of a critical path n/w is to carry out a backward pass to calculate the latest date at which each activity may be started & finished without delaying the end date of the project.
- Latest finish date for the project is the same as the earliest finish date – project should be completed as soon as possible within given duration.

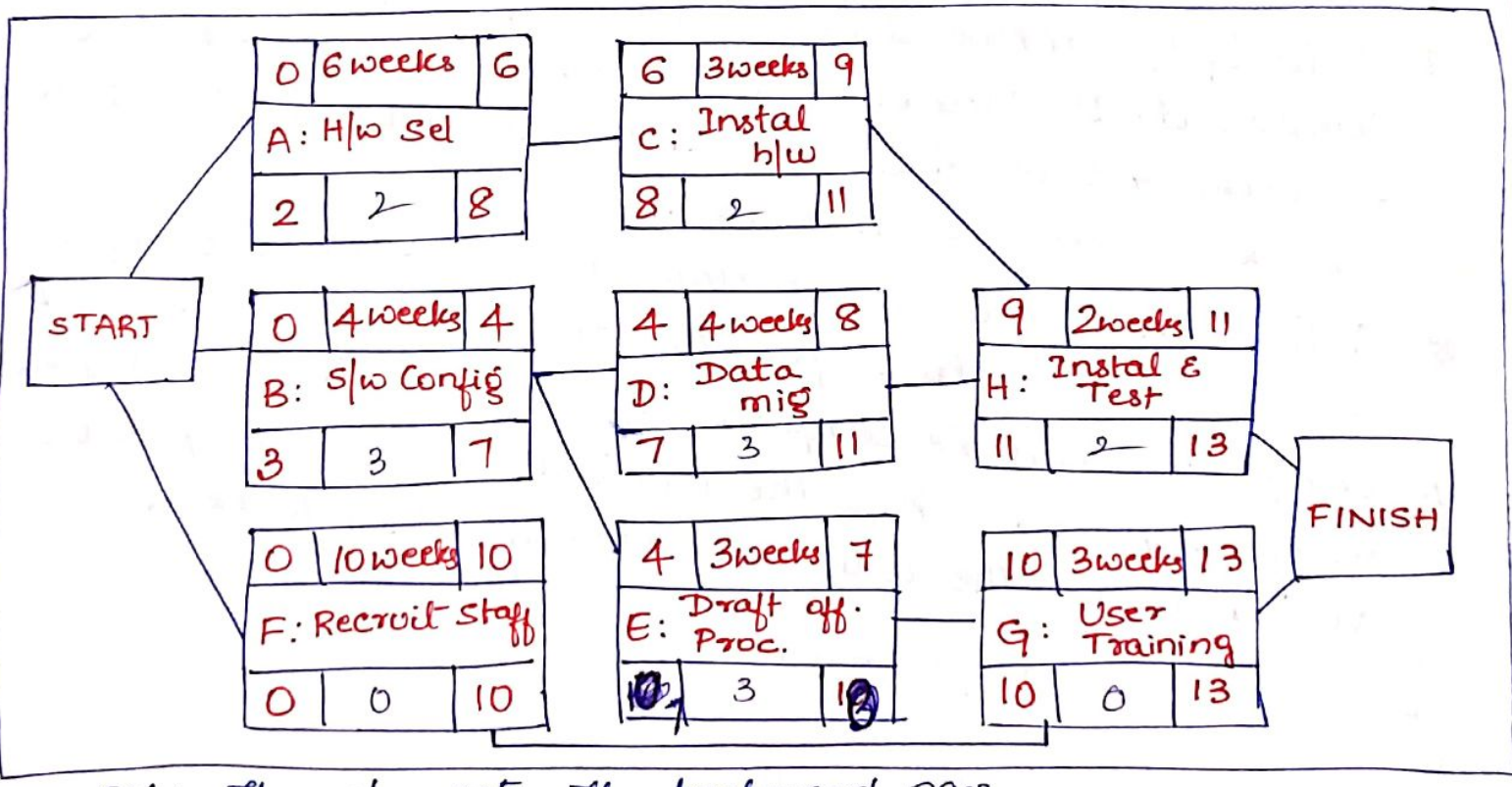


FIG: The n/w after the backward pass.

1) The latest completion date for activities G and H is assumed to be week 13.

2) Activity H must ∴ start at week 11 at the latest (13 − 2 = 11) & the latest date for activity G is week 10 (13 − 3 = 10).

3) The Latest completion date for activities C and D is the latest date at which activity H must start ie., week 11.

∴ Activity C latest start date week 8 (11-3)
∴ and activity D is week 7 (11-4).

4. Activities E and F must be completed by 10th week so earliest start date E = week 7 (10-3)
F = 0 (10-10).

5. Activity B completes by week 7 (latest start date for activity D & E) so start date of B = week 3 (7-4).

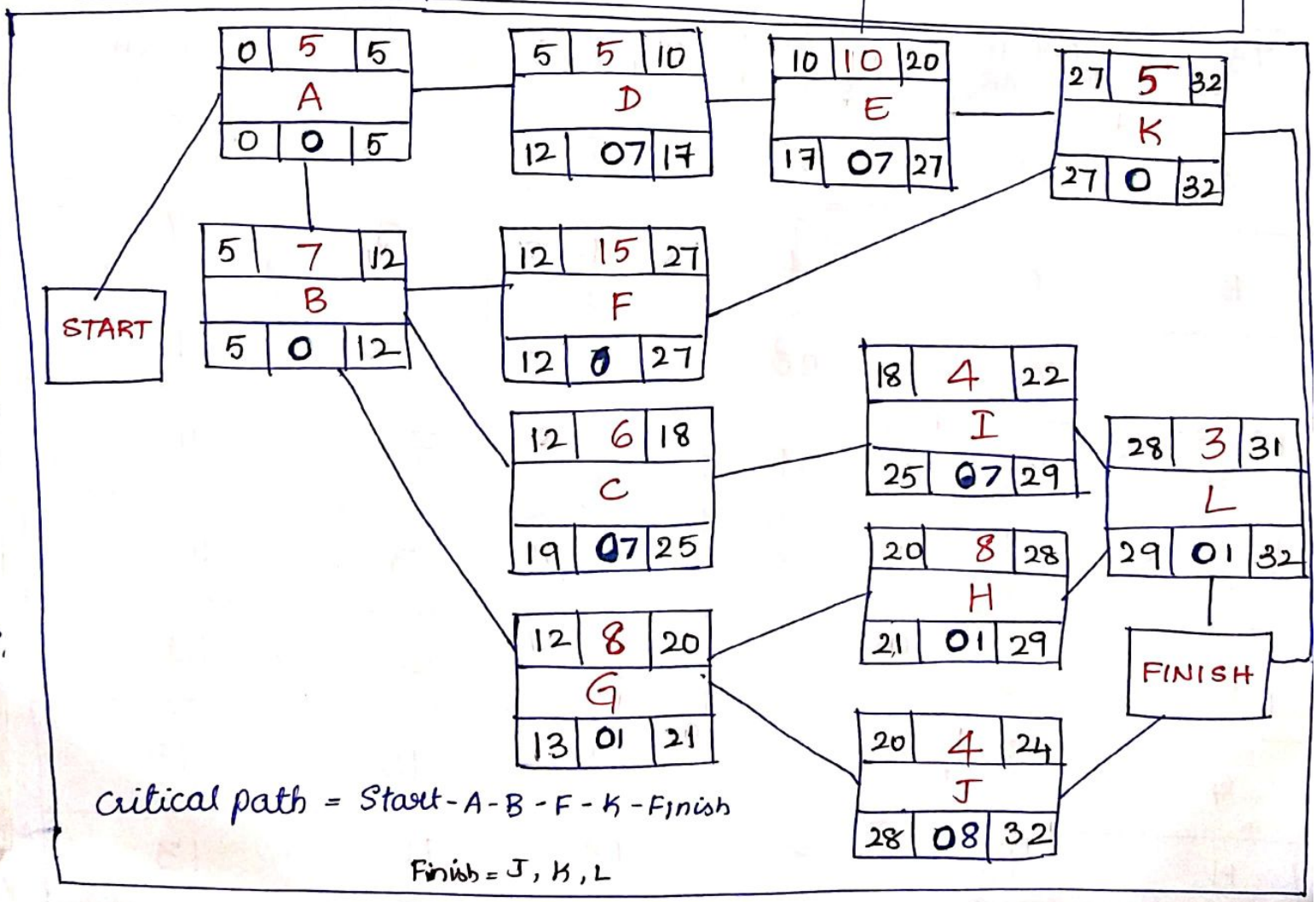
6. Activity A completes by week 8 (start for activity C) start week 2 (8-6).

7. The latest start date for project start is the earliest of the latest start dates for activities A, B, F. This is week zero.

TASK	EARLIEST START	DURATION (WEEKS)	EALIEST FINISH	LATEST START	LATEST FINISH
A	0	6	6	2	8
B	0	4	4	3	7
C	6	03	09	8	11
D	4	4	8	7	11
E	4	3	7	3	10
F	0	10	10	0	10
G	9	2	11	10	13
H	10	3	13	11	13

Ques: Create a precedence activity n/w:
a) Fwd pass b) Bkwd pass

ACTIVITY	DEPENDS ON	DURATION (IN DAYS)
A		5
B	A	7
C	B	6
D	A	5
E	D	10
F	B	15
G	B	8
H	G	8
I	C	4
J	G	4
K	E, F	5
L	I, H	3



Critical path = Start - A - B - F - K - Finish

Finish = J, K, L