6/1/25

UNIT - I

I) Project Overview : → high level summary

key components of Project overview :

i) Project Objectives ii) Scope iii) Stakeholders
iv) Resources v) Timeline vi) Budgets vii) Risks & Assumptions

Risks < known / unknown

II) Feasibility study in IPM :

> Technical > Economics > Operational > Legal > Schedule

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2.1 Methods of Cost Estimation

1. Expert Judgement
2. Analogous Estimation
3. Parametric Estimation
4. Bottom-UP Estimation
5. Top-Down Estimation

Tools for cost Estimation
> COCOMO → constructive cost Model
> Function Point Analysis (FPA)
> Micros of t project

2.2. Factors Affecting Cost Estimation

> project size > complexity > Tech stack > Team Expertise > Timeline

Importance of cost Estimation :

> Ensures budget adherence
> Facilitates resource planning
> Helps in decision-making & project viability assessment

(X.) NPV, BCR (X) Problems

1) Payback Period (t)

$$t = \frac{\text{Initial Investment}}{\text{Annual cash Inflow}}$$

The time required to recover the initial Investment

2) Net Present value (NPV)

$$NPV = \sum \frac{\text{Cash Inflow}_t}{(1+r)^t} - \text{Initial Investment}$$

r → discount rate

→ measures the profitability of the project

3) Internal Rate of Return (IRR)

IRR > cost of capital ⇒ profitable or viable

4) Benefit cost Ratio (BCR) BCR > 1 viable project

$$BCR = \frac{\text{Total Benefits}}{\text{Total cost}}$$

5) Profitability Index (PI)

$$PI = 1 + \frac{NPV}{\text{Initial Investment}}$$

example sum :

1. i) year 0

NPV of year 0 $= \frac{C_0}{(1+0.1)^0} = -50000$

year 1 ⇒ 10909

year 2 ⇒ 12396

3 ⇒ 13524

4 ⇒ 6830

5 ⇒ 4968

ii) Total NPV = −1373

iii) So not viable & not proceed with the project

Problem 2 :

Initial INV $100,000 r → 8 y.

year 1 → 30,000 2 → 40,000 3 → 35,000
4 → 50,000

i) NPV of yr 0 = −100,000

yr 1 = $\frac{30000}{1.08}$ = 27778

yr 2 = $\frac{40000}{1.08^2}$ = 34294

yr 3 = $\frac{35000}{1.08^3}$ = 27784

yr 4 = $\frac{50000}{1.08^4}$ = 36751.49

Total NPV = 126,607 − 100000
= 26607

+ve so viable

Problem 3

Initial INV $200,000 , 1 → 25000 2 → 30000 3 → 35000
4 → 40000 5 → 50000 r → 7 y.

i) NPV of yr 0 = −200000

1 = $\frac{25000}{1.07}$ = 23364.48

2 = $\frac{30000}{1.07^2}$ = 26203.16

3 = 28570.42

4 = 30,515.81

5 = 35649.31

Total NPV = −55698 Not viable

(2) Imp (1)

(3) BCR = PV of benefits → From year 1 to n (NPV)
PV of cost → Initial Investment

> ~~Project overview~~ & Demand NPV, BCR (Project estimation problems)
> Market Analysis
> Project Overview
> comparison of PERT & CPM
> Problems from PERT, CPM

Activity	Description	Predecessor	Duration	Optimistic Time (o)	Most Likely Time (M)	Pessimistic Time (P)
0	Profile	-	2	3	3	6
1	Academics	0	10	2	2	2
2	courses currentsem	1	2	4	4	4
3	End sem assessment	2	3	1	6	5
4	Course Reg	2	3	2	4	6
5	Timetable	4	2	3	4	5
6	Internal Marks	1	2	3	6	9
7	Attendance	1	3	6	3	9
8	Hour wise Attendance	7	2	1	2	3
9	Exam schedule	1	2	6	6	12
10	Hall Ticket	9	2	1	1	2

11	Fee	0	7
12	Absent details	7,8	2
13	Examination	1,9	8
14	Credits & Marks	13,3	2
15	Arrear details	13,14	2
16	Certificate	0	1
17	Room details	0	3
18	ABC ID	0	2
19	Change password	0	1
20	Logout	-	1

CPM (Critical Path Method)

Float : → Total Float => LS - ES or LF - EF
→ Free Float = ES (next task) - EF (current task)

> Critical path → longest duration

> Dependencies → FF, SS, SF, FS
(Finish-to-Finish, start-to-start, ...)

> Tail Event - starting event of N/W

> Head Event - Ending event of N/W

PERT :

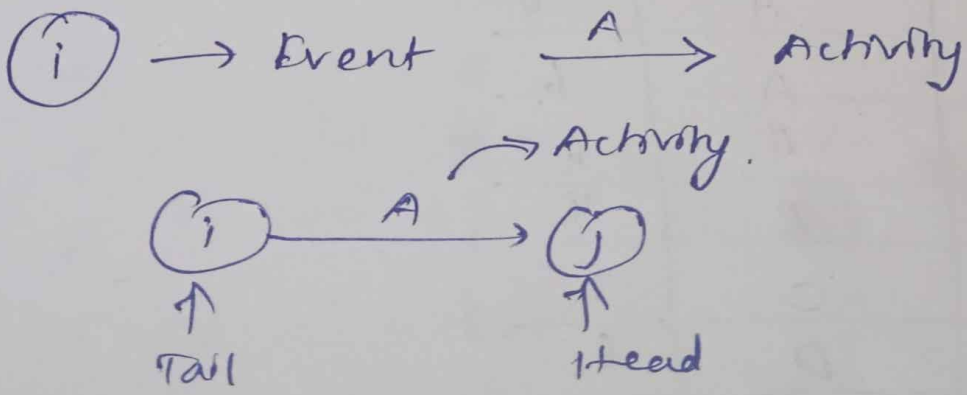
Probabilistic Time Estimates

> Optimistic time (O) → shortest time an activity can be completed under favourable conditions

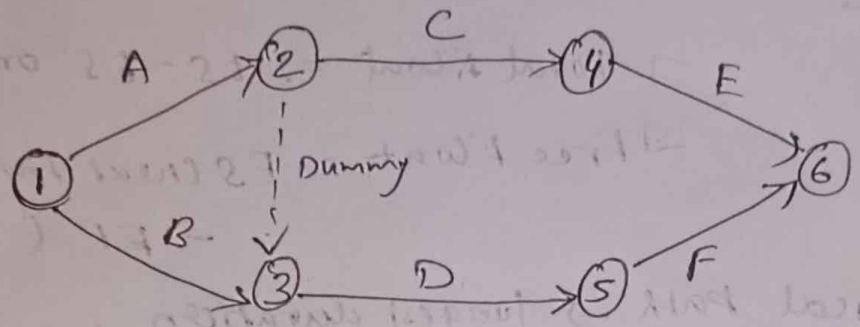
> Pessimistic time (P) → longest time on unfavourable

> Most likely time (M) → best time under normal conditions

$$TE = (O + 4M + P) / 6$$



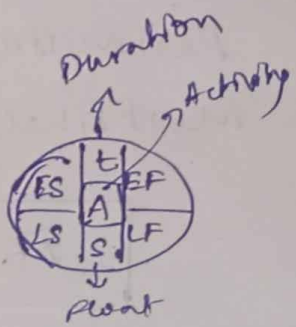
Example:



Soln:

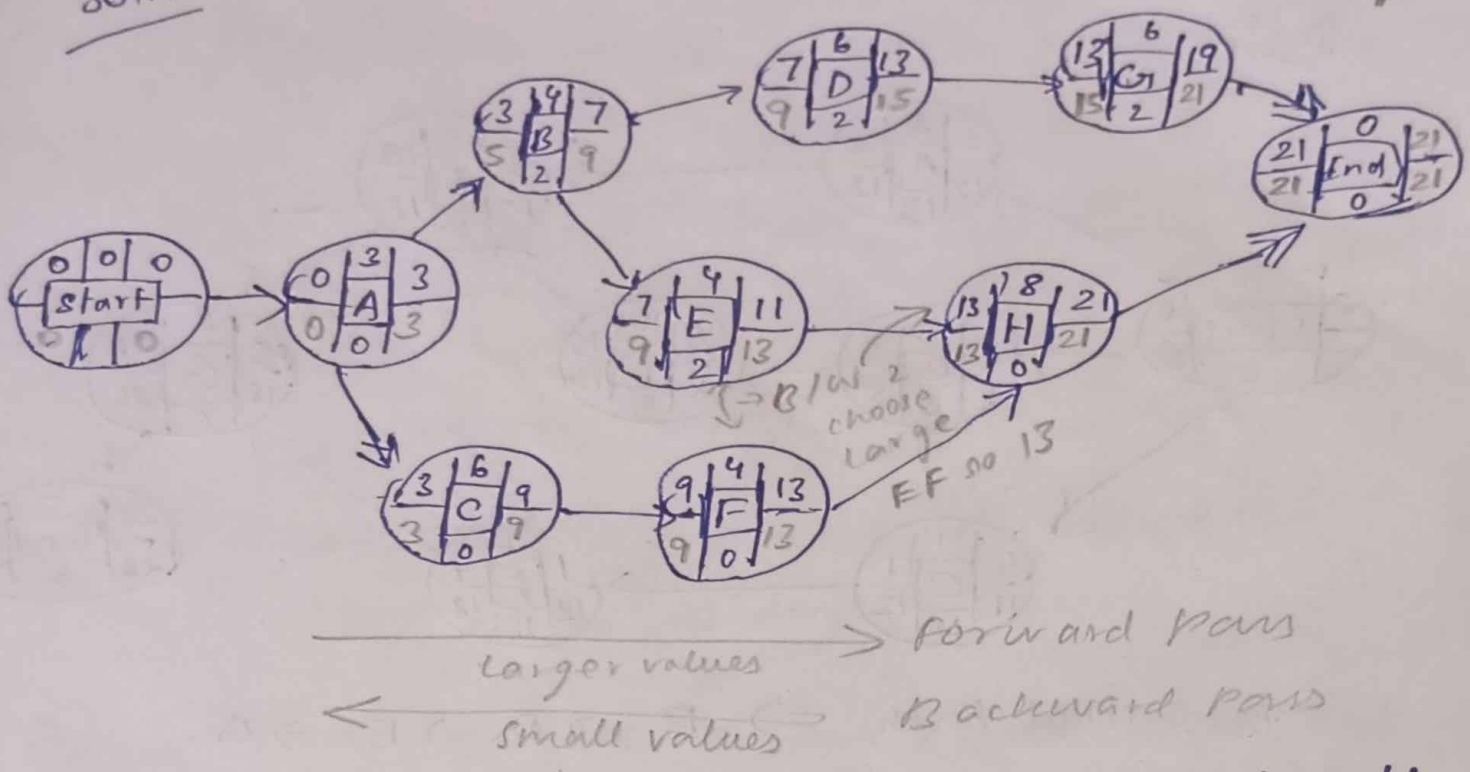
Name of the activity	starting & ending events	Predecessor
A	(1,2)	–
B	(1,3)	–
C	(2,4)	A
D	(3,5)	A, B
E	(4,6)	C
F	(5,6)	D

2) Activity on Node Method:



Activity	Immediate Predecessor	Time (Days)
A	–	3
B	A	4
C	A	6
D	B	6
E	B	4
F	C	4
G	D	6
H	E, F	8

Soln:



Critical activities have float=0 ⇒ A → C → F → H

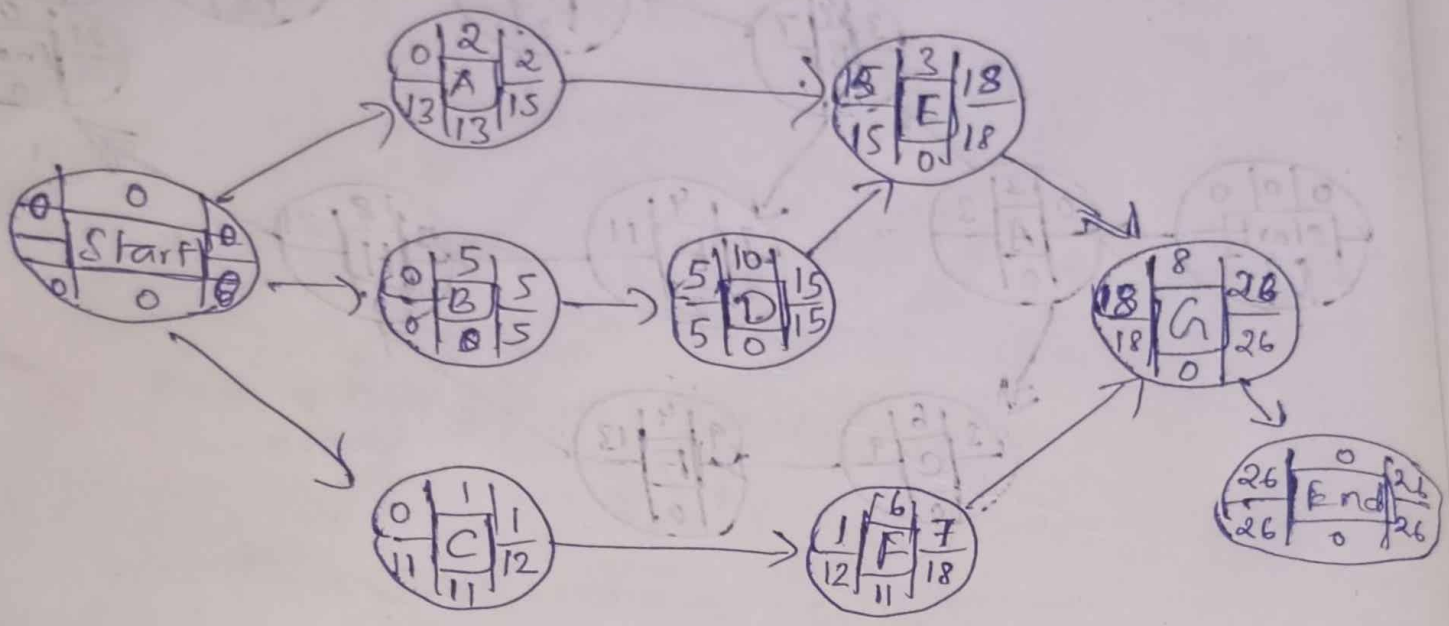
∴ Total days = 3 + 6 + 4 + 8

= 21 days

3) AON: (Ques in whatsapp)

Activity	Predecessor	Time (days)			
		o	m	p	ET
A	-	1	2	3	2
B	-	3	5	7	5
C	-	1	1	1	1
D	B	6	10	14	10
E	A, D	2	3	4	3
F	C	4	6	8	6
G	E, F	5	8	11	8

Soln:



So critical path => B → D → E → G

Total duration = 5 + 10 + 3 + 8 = 26 days

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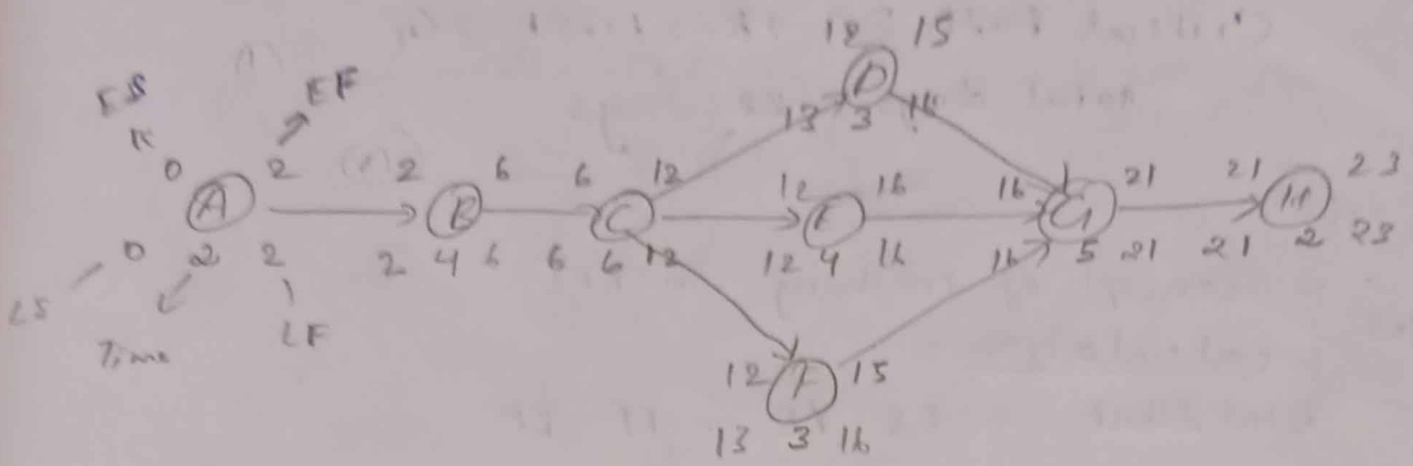
7)

Activity	Predecessor	Duration	ES	EF	LS	LF	Float
A	–	2	0	2	0	2	0
B	A	4	2	6	2	6	0
C	B	6	6	12	6	12	0
D	C	3	12	15	13	16	1
E	C	4	12	16	12	16	0
F	C	3	12	15	13	16	1
G	D, E, F	5	16	21	16	21	0
H	G	2	21	23	21	23	0

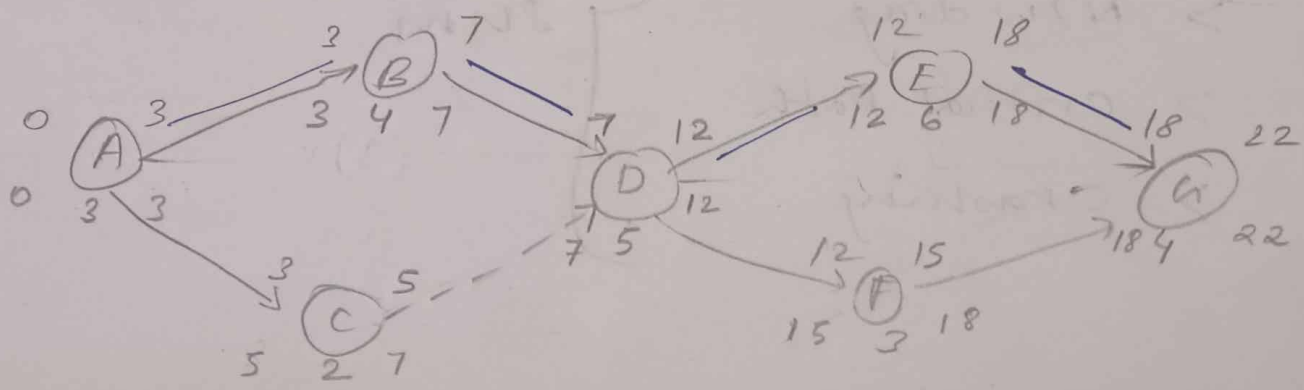


Critical Path A → B → C → E → G → H

Total Time = 23 days

2)

Activity	Predecessor	Duration	ES	EF	LS	LF	Float
A	–	3	0	3	0	3	0
B	A	4	3	7	3	7	0
C	A	2	3	5	5	7	2
D	B, C	5	7	12	7	12	0
E	D	6	12	18	12	18	0
F	D	3	12	15	15	18	3
G	E, F	4	18	22	18	22	0



Critical Path A → B → D → E → G

Total days = 22 days

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> Concept of crashing for PPT

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Float calculation :

Total Float = ES - LS or EF - LF

Free Float = ES of next activity - EF of current activity

Crashing

Cost slope =

UNIT - 1 Theory

CIA - E

> Market Analysis & Demand — 2 Theory

> PERT, CPM intro, properties — 2 sums

> Diff b/w Pert, CPM

> BCR, NPV

> N/W diag

> Critical Path

> Crashing

} SUM

5 x 10 = 50