PAGE NO

INDUSTRIAL MANAGEMENT

System

A System is defined as a collection of interacting elements that operate to perform a pre-determined objective. A system may be visualized as a processing unit which takes in some input and produces a desirable output.

Variable of a system.

Environment
Technology
Structure
Size
Strategy
Culture

Management

Management involves creating an internal environment. It is the management which puts into ~~the~~ use the ~~factors~~ various factors of production. Therefore it is the responsibility of management to create such conditions which are conducive to the maximum effort of the people, so the people can do their work efficiently and effectively.

Management Consists of

- Planning
- organising
- Staffing
- Leading
- Controlling

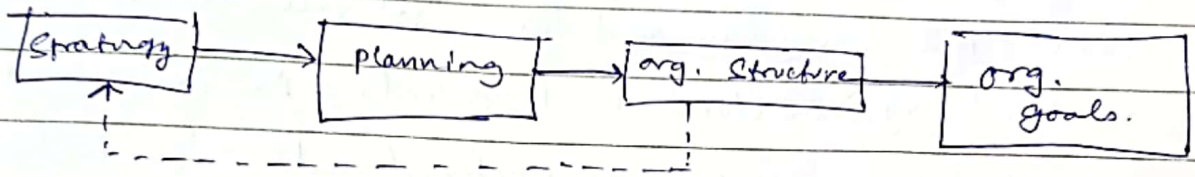
Organisation Structure

Structure : Structure refers to the components of an organised whole.

Organised Structure : It is a framework of the relationship b/w the various component of the organisation such as jobs, systems, People working together to achieve the goals.

Factors affecting an Org. Structure

- **Strategy**: Strategy determines a course of predetermined set of actions that are taken to reach a goal.



Strategies are designed to achieve the org. goals by designing the desired org. structure. The org. Struct and Strategy are closely related to each other. When a strategy is made to reach a goal the org. structure is framed in a way to match that strategy.

- **Technology**: Depending on the type of unit, the structure of the org. is to be determined.

People: The people are of a great organisational asset and greatly affect the design of the organisational structure. Organisation has to be a source of satisfying people's individual needs so that people in turn satisfy the org. needs.

Size: As the org grows in size the req. for more smaller workers, decentralisation and Standardisation also inc. and the org. are structured accordingly.

Environment: A closed environment where workers work on same jobs everyday and the job role doesn't change frequently a closed org. structure is preferred. An environment where the jobs are constantly restructured and the technology is changing frequently, a organic org. structure is preferred.

PAGE NO

Org STRUCTURE

i) Functional Structure (Top-down decision making process)

In these employees are grouped and work in diff dfft depts. by specialization. There is a leader assigned to each team and leads of -

ii) Divisional Structure

A div. structure organises the employee around a common product or geographical location.

Div. org. have team focus on a specific market or a product line.

Independent

Eg. McDonalds.

iii) Matrix Structure

Team members report to several managers at once. People from dfft. dept. come to work on a single proj when the project is done they get back to their respective dept.

SONDHA

TEAM STRUCTURE

A team based org structure creates small teams which focus on delivering a single product or service.

NETWORK STRUCTURE

It is an act of joining the efforts of two or more org with the goal of delivering one product or service.

Organisation Culture

Organisation culture is a system of shared meaning held by its members. It is expressed in terms of norms, values and beliefs held by members of the org. An org culture does not change over time. It influences the behaviour and hence affect the performance of the org and the industry

Org Climate	Org Culture
refers to the current atmosphere of the org.	Takes a long time
It is the superficial maintenance	
Can be easily manipulated or	

PAGE NO.

6 key features for better org. Structure.

i) Work specialisation : Dividing the employees and putting them to work in which they have specialized. This helps in better achivement of the goals.

ii) Departmentalization : Grouping of similar jobs for better coordination.

iii) Chain of Command : A line of authority that extends from the top of the org to the lowest part and also clarifies who reports to whom.

iv) Span of Control : The no. of employees a manager can efficiently manage. The wider the span of control more efficient the org.

v) Centralisation : → concentration of power and authority to the higher part of the organisation.

Decentralisation → Conc. of power and authority to diff levels of org.

vi) Formalisation : The deg. to which the jobs in the org. are standardised.

Function of Management

Management is Composed of two 5 function

i) Planning: It is the basic function of management and chalking out a future course of action and deciding what would be the most appropriate course of action to achieve the pre-determined goals.

ii) Organizing: Organizing is the process of bringing together the Physical, financial and human resources together and developing an productive rel. b/ them.

iii) Staffing: Staffing is the process of manning the org. and keeping it manned. The main goal is to find the right person for the right job.

iv) Directing / Leading: Leading is that inert-personnel aspect of management. It involves influencing, guiding, motivating the people in order to achieve the goals.

v) Controlling: Controlling is the Process of Checking if Proper prog is made towards the goal or not and making Changes if not Proper progress is made.

NETWORK ANALYSIS

Project

- A Project is a Series of ~~steps~~ Tasks that need to be ~~done~~ computed in a Sequence inorder to reach a Specific outcome
- Through network analysis we will learn how to manage these activities effectively.

~~Def~~ ~~Do~~.

Dev. of Project Network

- An activity is rep. by an arrow.
- An activity must have a preceding and a Statine event

Project Network & Construction.

Activity	Time (days)	Immediate Predecessors
A	4	—
B	3	—
C	5	A, B
D	1	—
E	5	C
F	2	D
G	5	E, F
H	6	G

PAGE NO.

~~Project m~~

Phases of Project Management

1) Planning – The planning phase involves splitting the total project into small projects.

2) Scheduling: Objective of the scheduling phase is to prepare a time chart showing the start and finish times for each project.

3) Controlling – Controlling phase is the follow up phase of planning and scheduling phase.

Teeh of Magne

PERT
CPM.

Common Errors in Drawing Networks

1) **Dangling** : To disconnect an activity before the completion of all the activities.

2) **Looping** : Drawing an endless loop in a network is known as error of looping.

3) **Redundancy** : Unnecessarily inserting the dummy activity in a network, is

PAGE NO.

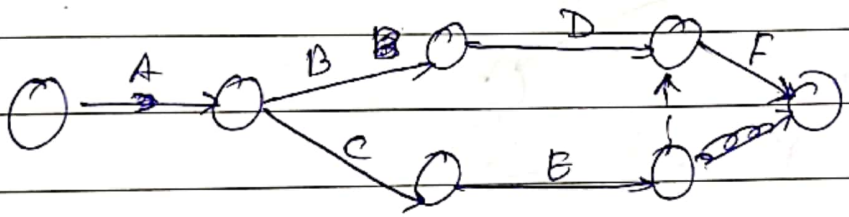
DATE

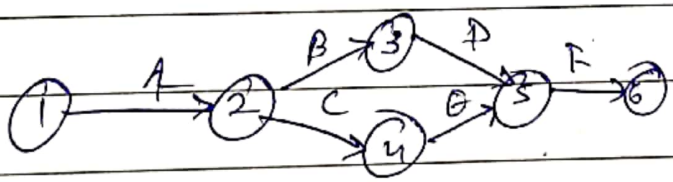
EXPT. NO.

Network diagram Construction.

(1)

Activity	Predecessor Act
	—
A	—
B	A
C	A
D	B
E	C
F	D, E





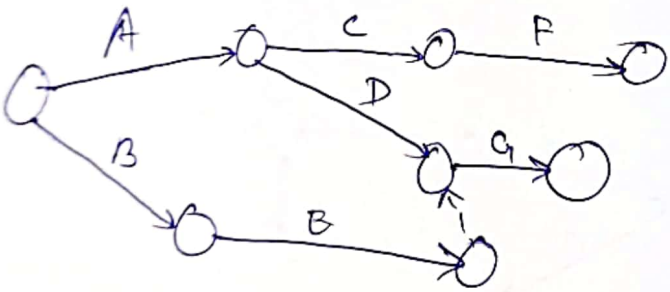
DHA

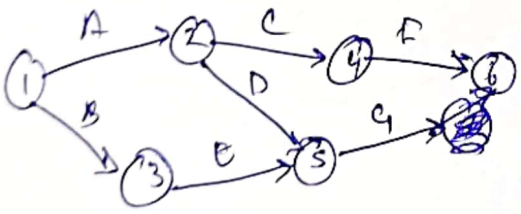
Industrial Manage

Java revision full

②

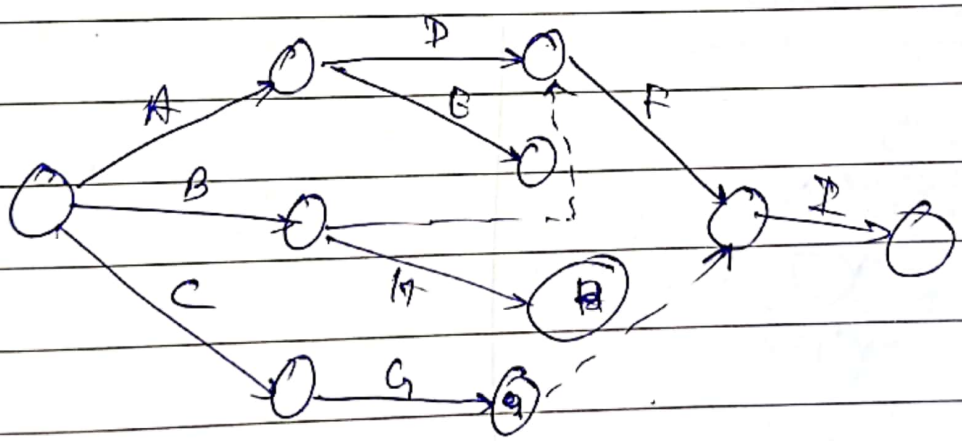
Activity	Predecessor Activities
A	—
B	—
C	A
D	A
E	B
F	C
G	D, E





PAGE NO.

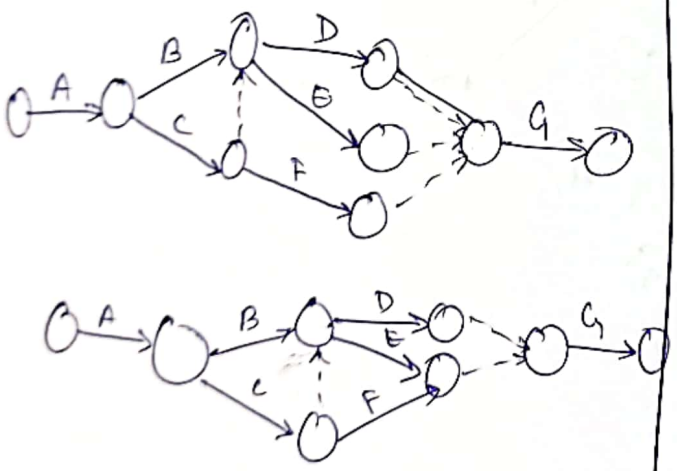
Activity	Predecessor Activity
A	—
B	—
C	—
D	A
E	A
F	B, D
G	C
H	B
I	F, G.



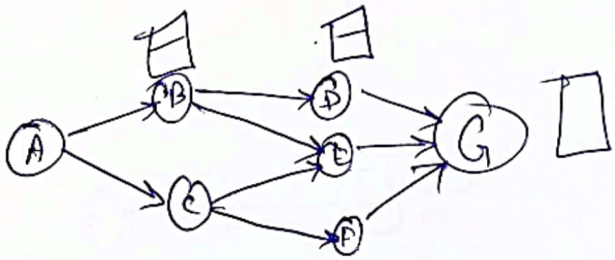
Rough Network

Activity	Predecessor Activity
A	—
B	A
C	A
D	B
E	B, C
F	C
G	D, E, F

(AOA)
Activity on Arrow



~~A O D~~ AON



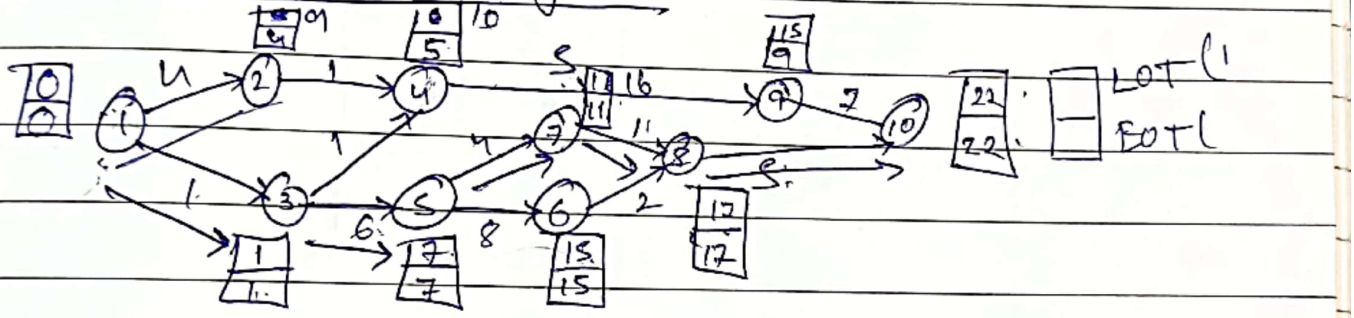
PAGE NO.

Critical Path Method.

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8
Time day	4	1	1	1	6	5	4	8	1	2

8-10	9-10
5	7

Draw the network diagram



Forward Pass Computation.

$$(EF)_{ij} = (ES)_{ij} + t_{ij}$$

$$E_j = \text{Max}\,(E_i + t_{ij})$$

Backward pass Computation.

$$(LF)_{ij} = (LF)_{ij} - t_{ij}$$

Activity	Time (t_{ij})	Earliest		Latest		
	t_{ij}	Start (ES) E_i	Finish (EF) $E_i + t_{ij}$	LS $L_j - t_{ij}$	LF L_j	Total float LS − ES
1-2	4	0	4	5	9	
1-3	1	0	1	0	1	0
2-4	1	4	5	9	10	
3-4	1	1	2	9	10	
3-5	6	1	7	1	7	0
4-9	5	5	10	10	15	
5-6	4	7	11	12	16	
5-7	8	7	15	7	15	0
6-8	1	11	12	16	17	
7-8	2	15	17	15	17	0
8-10	5	17	22	17	22	0
9-10	7	10	17	15	22	

Free float

FF

$E_j -$

Critical Activity $(TF_{ij}) = 0$

1 − 3 − 5 − 7 − 8 − 10

1 + 6 + 8 + 1 + 5 = 22

Total project duration 22 days.

PAGE NO.

DATE

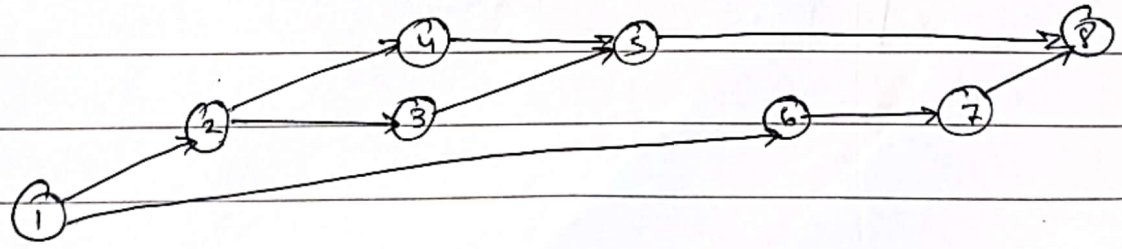
EXPT NO

PERT

Programme Evaluation and Review Technique

Activity	Est. duration (weeks)		
	Optimistic (t_o)	Most likely (t_m)	Pessimistic (t_p)
1-2	1	7	13
1-6	2	5	14
2-3	2	14	26
2-4	2	5	8
3-5	7	10	19
4-5	5	5	17
6-7	5	8	29
5-8	3	3	9
7-8	8	17	32

1) Draw the project network.

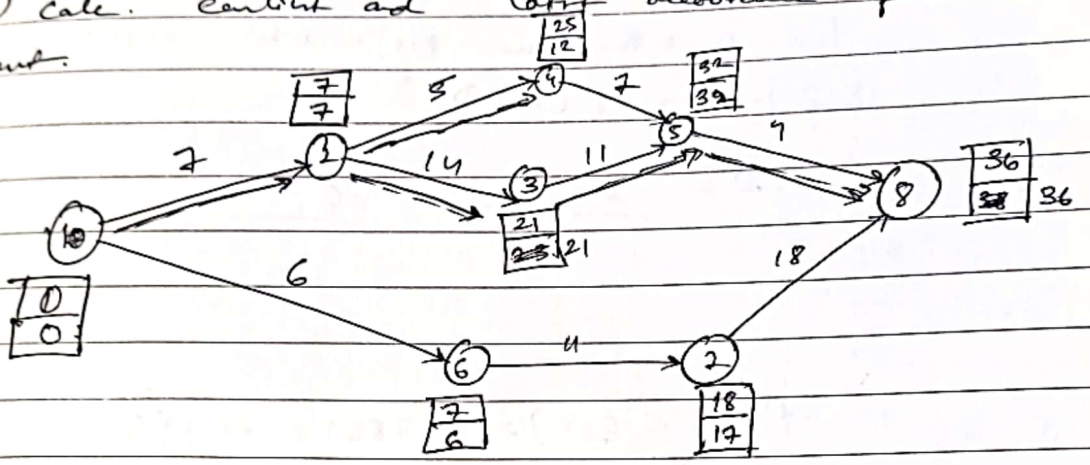


2) Find the expected duration and variance of each activity.

$t_e = \frac{t_o + 4t_m + t_p}{6}$	$\sigma^2 = \left(\frac{t_p - t_o}{6}\right)^2$
$\frac{1 + 4.2 + 13}{6} = 7$	$\left(\frac{13-1}{6}\right)^2 = 4$
$\frac{2 + 2.5 + 14}{6} = 6$	$\left(\frac{14-2}{6}\right)^2 = 4$
$\frac{2 + 4\times14 + 26}{6} = 14$	$\left(\frac{26-2}{6}\right)^2 = 16$

5	1
11	4
7	4
11	16
4	1
18	16

3) Calc. earliest and latest occurrence of each event.



4) Calc. expected project length.

1 – 2 – 3 – 5 – 8

Circle the path.

Expected project duration. = 7 + 14 + 11 + 4

= 28 + 11 + 2

= 36 weeks.

5) Calc. the variance and S.D.

Proj. length variance = 4 + 16 + 4 + 1

= 25.

SD = $\sqrt{6^2}$ = $\sqrt{25}$ = 5

6) Find the Prob. of Project Completion in 40 days.

The prob that the proj will be completed in 40 days is given by $P(Z \leq D)$

$$D = \frac{T_s - T_e}{\sigma} = \frac{40 - 36}{5} = \frac{4}{5} = 0.8.$$

$$P(Z \leq 0.8) = 0.7881 = 78.81\%.$$

PAGE NO.

Crashing

Activity	Normal time	Normal Cost	Crash time	Crash cost	Cost slope
1-2	2	800	1	1400	600
1-3	5 4s	1000	2	2000	333.33
1-4	5	~~500~~ 1000	3	1800	400
2-4	1	500	1	500	—
2-5	5	1500	3	2100	300
3-4	4	2000	3	3000	1000
3-5	6	1200	4	1600	200
4-5	5	900	3	1600,	350.

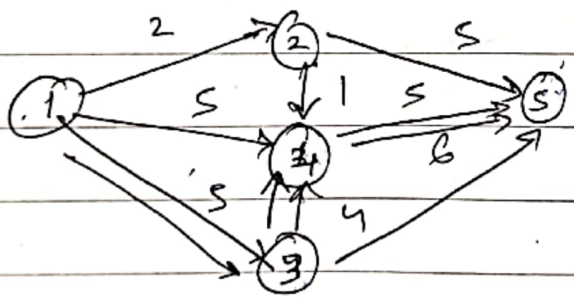
Σ : 8900

Cost slope = Crash cost − Normal cost

~~Crash time~~ − ∴

Normal time − Crash time

Drawing the network



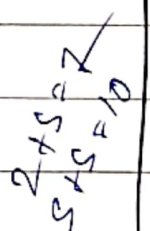
Calc. the critical path

2 + 5 = ~~6~~ 7

5 + 5 = 10

5 + 4 + 5 = 14

(1 − 3 − 4 − 5)



$13800 + 333.33 - (350 \times 1)$

=

Total cost of project duration is 14 weeks.

Indirect cost = 350

$= 8900 + 350 \times 14 =$ 13800

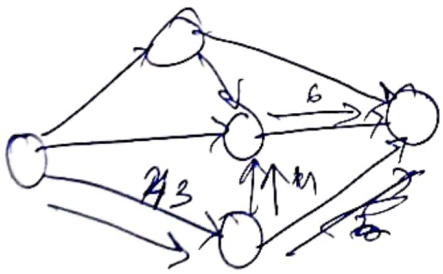
Crashing the network

(Crash time − Normal time)

Critical path	Critical act	Crash Limit	Slopes
1-3-4-5	1-3	3 → 0	333.33
	3-4	1	1000
	4-5	2	350

$8900 + 333.3 - (350 \times 3)$

$= 8,183.3$



Critical path	Critical act	Crash time	Slope
1-3-4-5	1-3	2	333.33
	3-4	1	1000
	4-5	2	350

$= 8,183.3 + 333.3 - (350 \times 2)$

$= 7,816.6$

	Coarse Unit	Slope
1-5	1	833.3
1-2	1	1000
2-4	2	350
4-5		

$= 7,816.6 + 383.3 - (350 \times 1)$

$= 7799.6909$

	Coarse Unit	Slope
1-3	0	
3-4	1	
4-5	21	350

$= 7799.09 + 350 - (350 \times 1)$