

Unit :- 1

Construction Industry and Management

* Organization (Construction Organization) :-

Organization is a group of a person working together to achieve and establish the goal.

- It is relationship which exist between all the members working together or separately or individually taking the part in a activity.
- It defines the responsibility and authority in relationship of 4M (Man, Material, Machine, Money) which constitute the resource as of an organization.
- An organization needs a manager because a manager can effectively manage the function of any job with in limited number of person.
- The construction industry is a competitive field which has so many risk, variable problems for labours, engineers etc.

* Types of organization :-

There are two types of organization

- 1) Line organization.
- 2) Line & staff organization.

1) Line organization :-

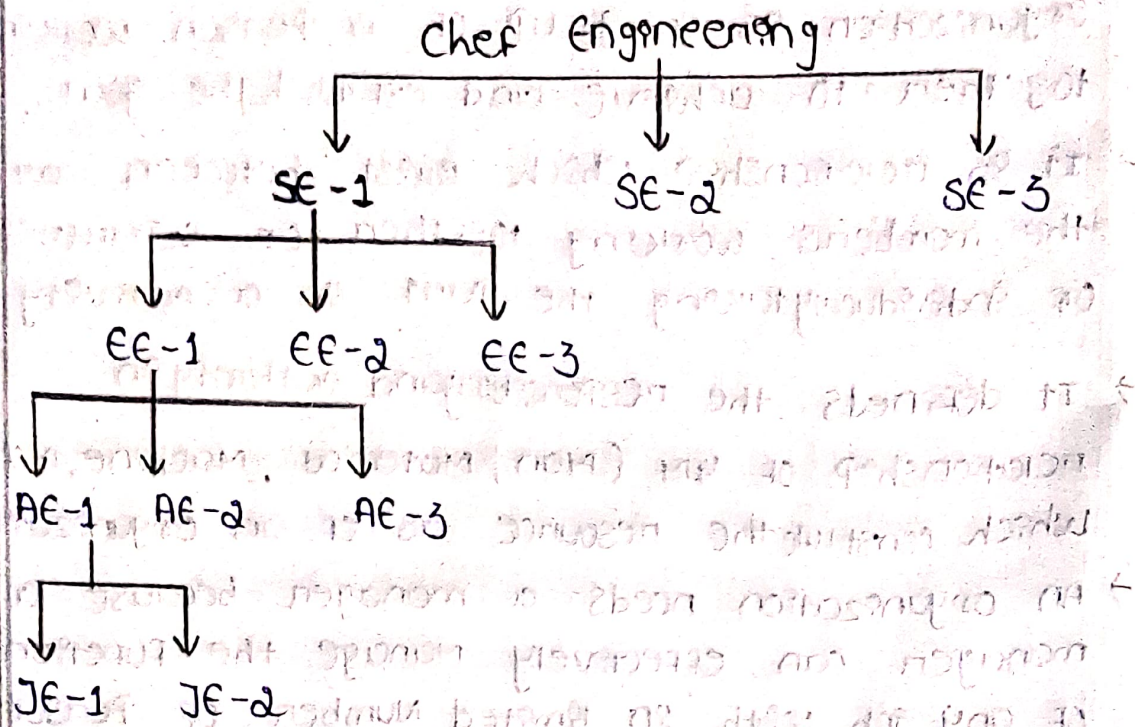
It is the one of simplest for the organization and it is commonly adopted in civil engineering project.

Merits :-

- i) It is simply and easy to understand
- ii) It permits quick decision.

Demerits

The HOD one over burdened as all decisions have to be taken by them.



* Principles of an organization

- 1) Control
- 2) Authority
- 3) Responsibility
- 4) Job & task
- 5) Leadership

1) Control :-

→ Fundamental managerial function which measure current performance from the pre-determined objective.

→ It is essential for control the progress as per plan. Setting of individual and organization standard as per plan. It consist of very fine wheather everything is going as per plane or not.

→ The instruction issue and all the principle establish to find out weakness and rectification of that weakness.

2) Authority :-

It is the character of organization which is accepted by the members of organization.

→ It contributes to determine what to be do or what not to be do for the organization.

→ According to the Simmons Authority, it is defined as the power makes the decision which guide the action of all employee of the organization.

3) Responsibility :-

A project manager have a responsibility for the successful planning, execution, monitoring and control of the project.

→ They must have combination of skill and ability to ask question and solve all the conflicts as well as shearing more more general management skill.

→ Project manager is a key figure of any service team in which all employee are responsible for the overall success of the project.

4) Job and Task :-

→ Job is the optimize for posting a project manager.

→ It is looking for the reliable construction management for the project and observe their progress as per time and cost.

5) Leadership :-
It is a term to be defined in a simply manner. There are many factors involved for successful leadership such as

- a) Imperfect organization for the structure
- b) Technological, economical and special change
- c) Internal imbalance inspired by the growth.

2) Line & staff organization :-

Line & staff organization are suitable for large and complex project where different types of manpower are required for specific job at different field.

- Different employees of the organization are expert in their specific job.
- Here an authority can not assume direct responsibility of all function to an employee. Different specific employee should take the responsibility of their specific job, such as design, planning, performance, schedule etc.

* Agencies associated with construction work :-

- a) Owner
- b) Promoter
- c) Builder
- d) Designer
- e) Architects.

a) Owner :-

Owner may be individual, group of individuals. Private or public owner has an ultimate

- authority over the Project or the Property.
- owner controls the Project resources such as manpower, fund or Property.
 - The owner also arranged the work with proper maintenance during and after the work.

b) Promoter :-

A Promoter is the entity that initiate, plans & executes a Project.

- An individual or group, company can be a Promoter.
- A Person who construct any structure for the selling that structure to other.
- Promoter is an individual or group or organization which encourage and facilitates for development & growth of the organization.

→ Job of a Promoter :-

- a) Respecting the brand
- b) Engage with customer → (motivation)
- c) Highlight the Product.

d) Builder :-

A builder can design, organize, lead, control & co-ordinate the building or any structure & construction process of that Project.

d) Designer :-

A designer is an organization or individual who prepare & modify a design for a construction Project.

→ The role of a designer is effectively manage the relationship with client, company & guide the design team.

c) Architects :

The art is design the building or any structure which describe details of that projects.

→ Architecture has the knowledge is design for these sign for the construction.

→ The sign is sketching the structure on the drawing sheet or sketch sheet.

Unit 5.3 Planning and Scheduling

* Introduction :- (Project Report Preparation)

The very initial step of an enterprise is the Project. Hence the success or failure of an enterprise, largely depends upon the Project. In simple word, a Project is an idea or a plan which is intended to be carried out.

A Project is the whole complex of activities involved in working to gain benefits.

* Preliminary Project Report (PPR) :-

Preliminary Project Report (PPR) is a formal document that describes specific activities, events or subject of Project to explain progress of Project upto certain point in time.

- Preliminary Project provides an essential & initial overview of the Project.
- It is an evaluation that discusses in depth, finding on a particular subject. All the data are gathered from the subject order to make a determine.
- A Preliminary report is not a final report it can say the analysis about the Project.
- Preliminary means something comes before start a Project on anything else.
- A Preliminary Project report describes the progress of a Project. It should be form on the basis of final Project report.

* Detailed Project Report (DPR) :-

Detailed Project report is the output of planning and design phase of a Project is a very detailed and it then plan

of a project indicate overall programme, role and responsibility, activities required for a project.

- DPR is a complete document for investment decision making approval and planning.
- DPR always created according to guidelines and standards of respective companies and department.
- The company will submit the copies of the detailed project report to the banks and the financial for their participation in the scheme of finance and also working capital requirement of the project.
- DPR can help for further planning and implementation of project.

* Progress Monitoring :-

* Definition and Importance :-

- Progress monitoring is a central aspect of project management that supports the project manager and project team in continuously monitoring, assessing, and making necessary adjustments and corrections to the progress of a project.
- It ensures adherence to schedules, budgets, and quality requirements and identifies potential risks or problems at an early stage.
- Progress monitoring enables the project in relation to its goals and requirements and, if necessary, to take countermeasures when deviations occur. Through systematic collection and analysis of information about project

Progress, Project managers and teams can make targeted decisions and ensure project success.

* Methods of Progress monitoring :-

There are various methods of progress monitoring that can be used depending on the project and its requirements. The most common methods include :

i) Milestone Trend Analysis (MTA) :-

This involves defining project milestones and continuously monitoring their achievement. By comparing planned and actual data trends and potential deviations can be identified and counteracted early.

ii) Earned Value Analysis (EVA) :-

This method captures the values of service delivered up to the current point in time and compares it to planned values. This allows the actual progress of the project in terms of cost and time to be assessed.

iii) Project Status Reports :-

Regular reports on project progress, containing both quantitative and qualitative information allow project participants to grasp the current status of the project and initiate measures if necessary.

iv) Critical Path :-

This method identifies the activities that are crucial for the timely completion of the project and closely monitors their progress.

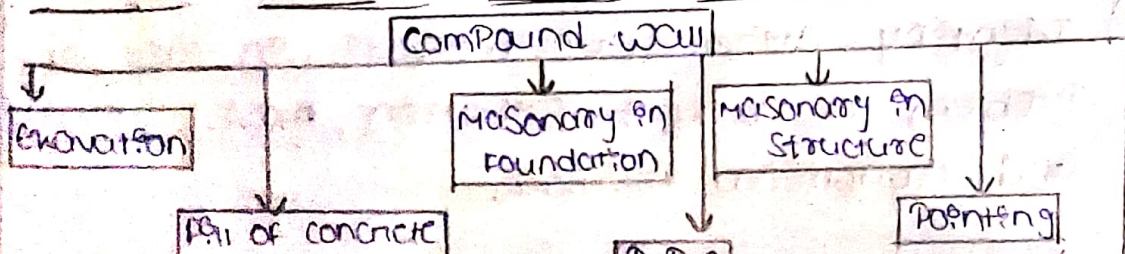
* Importance :- (Construction Planning) :-

- i) Planning is the starting point of all management function.
- ii) Planning leads to organization and staffing directing controlling and coordinating are follows the plan.
- iii) The program should have sufficient work details about total job work should be finish with in stipulated time and cost duration of each work type and quality of material and equipment delivery date and manpower requirement.
- iv) For effective planning it is necessary to break down the total project in to some section and activities.
- v) Each activities may further be sub divided into smaller section for
- vi) It is very important stage in the field of construction because any modification in the project after this stage would prove to be expensive.

* Work breakdown structure :-

- i) The function element of a project and their interrelationship are determine by a technique known as breakdown structure.
- ii) Example - construction of a compound wall may be broken down as given below.

Workdone structure of a compound wall :-



* Construction Planning Stages :-

1) Pre-tender stage :-

Pre tender planning is carried by the construction at the stage in which a contractor has the best opportunity for planning.

→ construction for the further contract and prepare a program for carrying out the work is done by this planning.

At this stage the contractor to make proper tender and prepare a schedule for complete the work in the stipulated time and cost.

During this stage the contractor is profitable or not. Before undertaking the contract, a contractor required to visit the site of construction work is the first part of the pre-tender stage.

→ A pre-tender report is prepare which describes the details of the work. The report includes details of site investigation, availability of resource such as 4m materials, manpower

* Pre-tender planning includes following steps :-

- a) Examining the drawing and to identify various teams of work.
- b) carrying out site site investigation and to access the availability and rates of materials manpower equipment and other facilities.
- c) Identify alternative methods in case of problem in current situation most suitable and economical method.

iv) estimating the quantities of different items and the time required for their completion of work.

v) preparing a construction schedule with reference to the stipulated time of completion.

2) Post - tender stage :-

→ It is also called contract stage or construction stage.

→ After the Pre - tender stage the contractor has to undertake detail planning to organise various activities of construction work so that the project may be completed within a stipulated time.

→ Post tender planning is used in check out at specific details of execution of the project.

* Post - tender planning includes following steps:

i) Establishing a good co-ordination or combination system between all members of construction team i.e owner, architect for the project work.

ii) Evaluating alternative construction methods during the pre-tender stage in order to select the most economical and very efficient.

iii) Calculating the requirement of construction material such as sand, cement, brick etc.

iv) Determining the requirement of machinery including maintenance facility.

v) Prepare details of manpower requirement including labour, supervisor for various stages of work etc.

* Construction scheduling by Bar chart :-

- It is also known as Gantt chart.
- A Gantt chart is a popular type of bar chart that illustrates the project schedule.
- It illustrates start and finish dates of all elements of a project.
- The chart the name of Henry Gantt to design this chart around the year (1910 - 1950).
- In this chart time is spread along the abscissa (x-axis) and activity is indicated along the ordinate (y-axis).

Let us consider a project with 3 activities with duration as follows :-

Activity A - Digging foundation - 20 days

Activity B - Pouring of concrete - 15 days

Finishing work within - 15 days

Duration

The time is mentioned on x-axis and activity are mentioned on y-axis.

The bar of activity starts the point at which it is expected to start.

Some activities may be started simultaneously while others may be started after the completion or partial completion of certain other activities of the project. In the fig. of 9.5 is assumed that erection of sight boards can be started after 5 days of erection of sight boards.

The overlapping of activities can be seen and certain delays may be permitted.

* Preparation of Material Schedule :-

Material schedule showing quantity requirement of materials are prepared from the construction program. It shows unavailability of materials necessary arrangement, as fulfilment of required material in proper timing of delivery.

→ The material schedule may be prepared either monthly or weekly depending on the project and storage space.

* Preparation of Labour Schedule :-

→ The labour schedule should clearly show the labour requirement of the activity.

→ The labour schedule serves as a manpower requirement in a particular section of the project. The sufficient labour should be provided on that section as soon as possible else delay occurs in project work.

* Preparation of Equipment Schedule :-

→ It is prepared for all equipment required for the project. The schedule for which the work

may delay due to non-availability or breakdown of equipment can be avoided. So a schedule is prepared the efficient utilizing of equipment on a project.

- Arrangement of this schedule is helps for using of Particulars equipment in Particular time for Particular job.

* Preparation of Finance Schedule :-

- Finance schedule is essential for both the pre-tender and post-tender.
- Finance schedule shows the amount of cash required at different stage of the construction project.
- It enables long term financial planning for the ent. project to be carried on a efficient manner.
- It also consider cash flow from the running bills. It can indicate finance required for the completion of the project.

* Limitation of Bar Chart :-

The following are the limitation of bar chart? (Which thing's a bar chart can not do)

- a) A bar chart does not establish the control the various activities of the subject project.
- a) A bar chart does not give a brief on overall progress of the project hence. It is not possible to receive the programme which are mentioned in BAR.

- iii) A bar chart does not deal with uncertainties on degree of tolerance for delay in the estimated duration of activities.
(Mean's bar chart is not responsible for delay of work progress)
- iv) A bar chart does not indicate the inter relationship between various activities. In case of complex and large project the interaction between various activities is to be carefully recorded and reviewed. In such case the gantt chart may not served any useful purpose.
- v) A bar chart is unable to supply information to the effect that, what will happen to the succending activity.
(Bar chart does not give any instruction for success of activity only time table)
- vi) When a activity is started or stop hence on delay or stoppage then gantt chart fail.
- vii) The gantt chart requires constant attention.

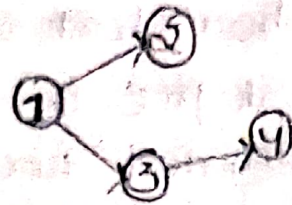
* Construction scheduling By network technique.

* Critical Path Method (C.P.M) :-

- C.P.M uses a network diagram. It consist of activity to reach the project i.e. C.P.M uses activity oriented network diagram in which sequence of activity are represented by arrow ($\rightarrow$).
- C.P.M networks are used for connect between activity of a project estimate of time can be made.

Ex :- construction type Project

so relation is required for accurate.



- In C.P.M cost optimization given more most importance hence cost is the controlling factor.

* Programme Evaluation and Review Technique

(Here member is not responsible only time with work).

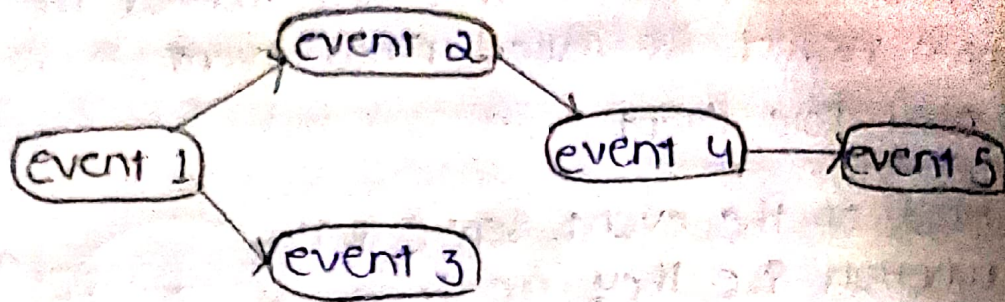
- PERT use a network diagram for reach Project objectives i.e PERT uses event oriented network diagram.
- Here successive event are represented by circle.
- PERT system is use for those project which are not relative in nature and in which management cannot be guided by cost experience, hence on activities are not so accurate and defines.

Ex :- Research type Project.

* Elements of Network

- A network is a flow diagram consist of a activities and events connect in sequentially.
- The Project to be planned by network technique should consist of jobs and operation called activities.
- The activities performing the job is known as activity must have a starting or ending point called event.

- (In which activity starting and ending point is then that is activity)
- An activity represented by arrow ($\rightarrow$) while events are represented by circle (O).



* Event :-

- An event is that particular instant of time at which some specific part of a plan has to be achieved.
- There basic property of an event are :-
 - An event is either to start and completion of an activity.
 - An event represent on significant point is a project i.e. it acts as control points in a project.
 - An event is on successful completion at any time.

* Types of Event :-

1) Start Event :-

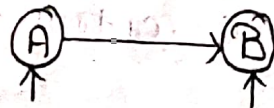
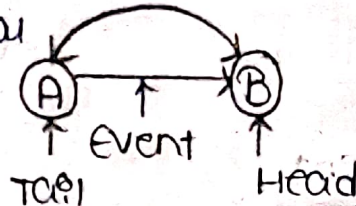
- It is one which mark beginning of a activity.
- If a particular start event mark the beginning of a project it is called as initiation events.

ii) Head Event :-

- All activities have an ending which is marked by an event is known as head event.
- If a particular head event marks the completion of a project is called final event.

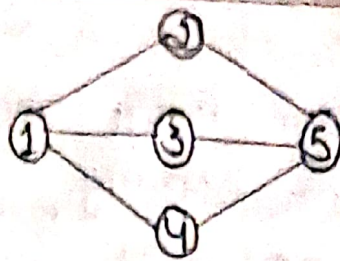
iii) Dual Role Event :-

- Most of the event serve dual function i.e. they are head event to some activity and tail event to some other activity.
- All events expected initial event and final event are the dual role event.
- The order of sequence relates various event such as - success.
- The event that follows another event or it's last event called success or event.



- Also the event are immediately follow another event without any intermediate are called immediate success or event.
- The event occur before another event are called predecessor.
- Also the event are immediately occur before another event without any intermediate are called immediate

* Pressure event :-



0 → Event

- Event 2, 3, 4 is the immediate success or to event 1.
- Event 5 is the success or to event 1.
- Event 5 is the immediate success or event 2, 3, 4.
- Event 1 is the predecessor to event 5.
- Event 1 is the immediate predecessor to event 2, 3, 4.
- Event 2, 3, 4 is the immediate predecessor to event 5.

* Activity :-

- It is the actual performance of a task.
- It is a recognisable part of work that require time and resource for its completion.
- It is of 2 types :-

1) Parallel activity.

2) Serial activity.

1) Parallel activity :-

- Those activity which can perform simultaneously each other are called parallel activity.

2) Serial activity :-

- Those activity which are perform one after another activity.

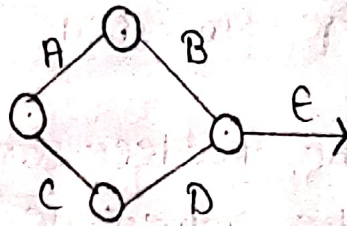
Note :-

Successor and Predecessor event are same as successor and predecessor activity.

Parallel $\rightarrow A \parallel C, B \parallel D$

Serial $\rightarrow A \rightarrow B \rightarrow C \rightarrow O$

$A \rightarrow B \rightarrow D \rightarrow O$



Activity

Predecessor

Successor

A

-

B*, E

B

A*

E

C

-

D*, E

D

C*

E

E

B*, D*, C, A

* Dummy activities :- (---)

It is type of operation in the network which neither required any time nor any resource

$\rightarrow$ It is a device to identify a dependency among the operation.

$\rightarrow$ Dummy activities is a connecting link for the control purpose to maintain uniqueness of the activity.

$\rightarrow$ Dummy activities are indicated by dotted line and they have zero cost and time.

* Critical Path (=) :-

The path joining the critical activity on a network is called critical path.

- It is the longest path in a network.
- The time along this path determines the completion of the time of the project.
- It is indicated on a network by double line or bold line.
- In simple network the average time of completion of the activity enables us to find the critical path.
- In complex network it is necessary to follow the systematic method to determine the critical path.

* Estimation of the time :-

After a network is constructed then is required to determine the time limit required for each event.

- In PERT correct time determination for the various activities can not be match so there are 3 kind of estimate for the account.

i) Optimistic time estimated (T_o)
(Minimum time)

ii) Pessimistic time estimated (T_p)
(Maximum time)

iii) Most likely time estimated (T_c)
(Average time)

i) Optimistic time estimated (T_o) :-

It is the storage possible time to complete an activity based as per man without any problem.

*) Pessimistic time estimated (T_p) -

Maximum time that would be required to complete an activity is called pessimistic time estimated.

→ Time taken to complete a particular activity if everything going wrong or abnormal situation.

→ However it does not include effects of highly natural hazards such as earthquake,

*) Most likely time estimated (T_e) :-

It is the time for complete an activity under normal condition. It lies between optimistic time estimated and pessimistic time estimated.

Note

This 3 time estimation gives useful information about all activities.

<u>Activity</u>	<u>Predecessor</u>	<u>Duration (Week)</u>
-----------------	--------------------	------------------------

A	-	6
---	---	---

B	-	3
---	---	---

C	-	4
---	---	---

D	A	5
---	---	---

E	B	2
---	---	---

F	C	7
---	---	---

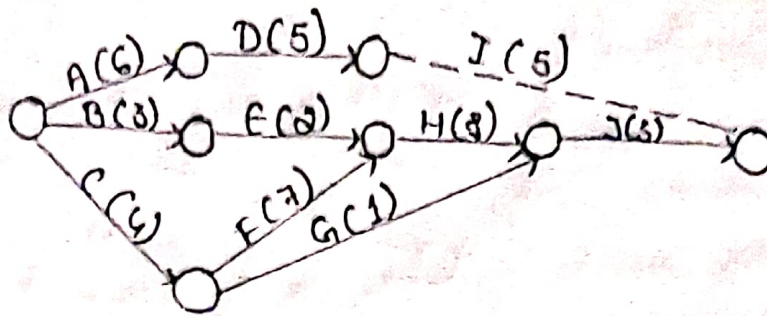
G	C	1
---	---	---

H	E, F	8
---	------	---

I	D	5
---	---	---

J	H, I	3
---	------	---





- 1) $A \xrightarrow{6} D \xrightarrow{5} I \quad 5 = 16$
- 2) $B \xrightarrow{3} E \xrightarrow{2} H \xrightarrow{8} J(3) = 16$
- 3) $C \xrightarrow{4} F \xrightarrow{7} H \xrightarrow{8} J(3) = 22$
- 4) $C \xrightarrow{4} G \xrightarrow{1} J(3) = 8$

Crítico/CAU Path = $C \rightarrow F \rightarrow H \rightarrow J = 22$
 $4 + 7 + 8 + 3 = 22$

Activity

Predecessor

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

A

A

C

B

D, E

G

H

F

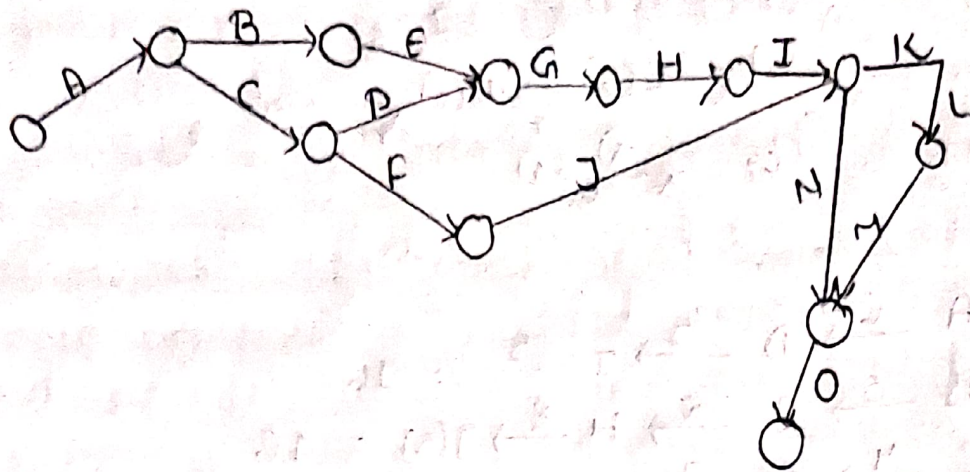
(I, J)

K

L

J

M, N



* Network Analysis :-

* Earliest event time (T_e) :-

- It is the earliest possible time of an event.
- The earliest possible time, when all activity leading to an event to be completed.
- It is denoted by ' T_e '.

* Last event time (T_L) :-

- It is define as the last possible occurrence of an event without delay.
- It is the last time when all activities leading to an event may be completed without delay.
- It is denoted by ' T_L '.

* Earliest start time (EST) :-

- It is the earliest time when the activity can started.
- Since the starting point of an activity is the tail event.
- The earliest start time of an activity is the T_e of the tail event.

→ EST of an activity $EST = TL$ of the 100% event

* Earliest finish time (EFT) :-

→ It is the earliest time when an activity can be finished.

→ EFT of an activity $EFT = EST \text{ of activity} + \text{duration of activity}$.

* Latest finish time (LFT) :-

→ It is the longest time when an activity may be finished without delay.

→ LFT of activity $LFT = TL$ of the head event.

* Latest start time (LST) :-

→ It is the longest time when an activity may be started without delay.

→ LST of activity $(LST) = LFT \text{ of the activity} - \text{Duration of activity}$.

* Application of PERT and CPM technique in simple construction work :-

→ CPM and PERT in construction project are the tools used for efficient management of activities.

→ CPM technique is used in construction project based on the knowledge and experience past project. Then it may accurately finish in time during the execution of the project.

→ Time required for each activity is known and it defines for the project.

→ The total time required for the given project can be estimated based on this technique.

→ CPM is an activity oriented system as the time required for construction are estimate more accurately.

Characteristics of construction Project on CPM and PERT are :-

i) The Project must consist of a well defined collection of jobs or activities which can be completed with mark the end of the Project.

ii) The jobs must be such that they can started or stop independently of each other within the in a given sequence.

iii) Construction Project can be completed within the time limit within the cost.

iv) Use of these tools does not desire outcome due to bad management, problems, strikes by labour etc.

v) The CPM efforts management with information for taking decision and focusing its attention to essential.

* Advantages of PERT :-

→ It provides the management tools for estimating the impact of schedule change and prepare to correct such situation.

→ The task relationship are graphically represented for easier evaluation and individuals in different location can easily determine their role in the total task requirement.

→ It results in improve communication, the network provide a common goal for various party such as designers, contractors and project managers etc. and they all understand each other role and condition.

* Disadvantage of PERT :-

- i) The cost may be higher than the conventional method of Planning and control.
- ii) Uncertain about the estimate of time and resource.
- iii) It is not suitable for repetitive process.

* Advantage of C.P.M :-

- i) C.P.M makes it easier for the project manager to build a team and create human network for efficient handling of a multitask project.
- ii) C.P.M binds entire team together and motivates the human resource on timely completion of a task on a project.
- iii) The help of the C.P.M, the project manager can determine the duration and estimate time and cost of the project.

* Disadvantages of C.P.M :-

- i) In a big project a C.P.M can become extremely complicated.
- ii) It cannot effectively handle sudden changes in the implementation of the plan.
- iii) It is very difficult to redraw the entire C.P.M Plan.
- iv) The critical path of the C.P.M of a big project is not always clear, the project manager has to spend a lot of time to calculate it carefully.

<u>Activity</u>	<u>Predecessor</u>	<u>Duration (Days)</u>
A	-	3
B	A	4
C	A	2

D	B	5
E	C	1
F	C	2
G	D, E	4
H	F, G	3

EST	ACT	EFT
LST	Duration	LFT

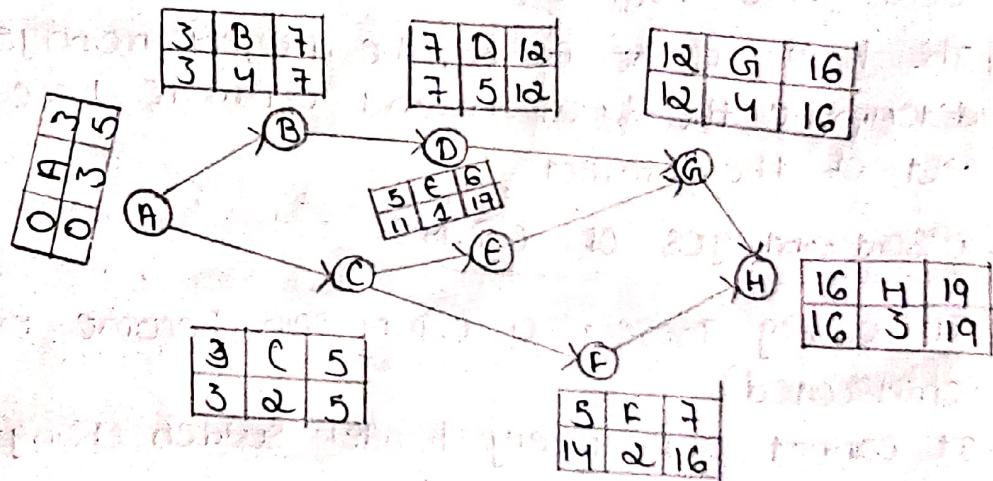
EST :- Earliest starting time.

ACT :- Activity

EFT :- Earliest finish time

LST :- Latest start time (start without delay)

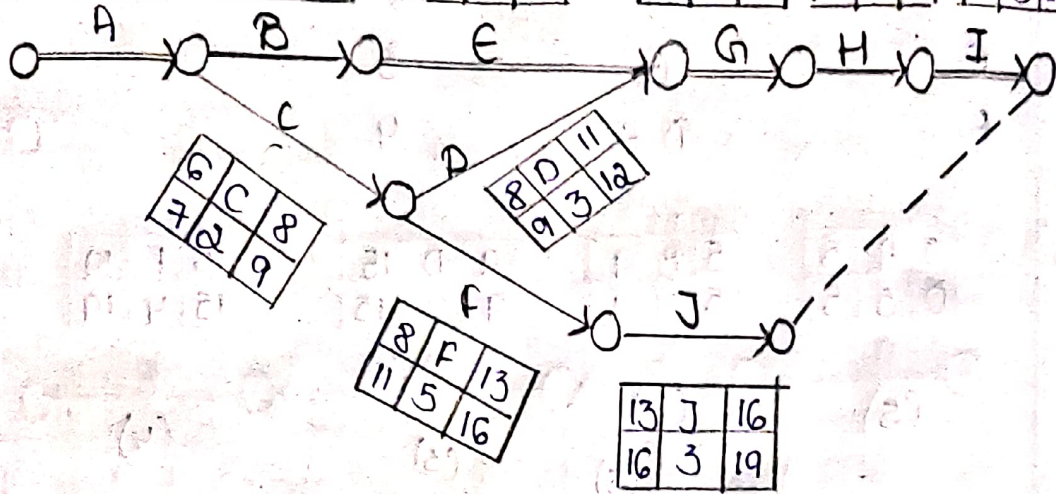
LFT :- Latest finish time (finish before time)



ACT	Preced	Duration
A	-	6
B	A	3
C	A	2
D	C	3
E	B	3
F	C	5
G	D, E	2
H	G	3

Act	Preced	Duration
I	H	5
J	F	3

0 A 6	6 B 9	9 E 12	12 G 14	14 H 19	19 I 24
0 6 6	6 3 9	9 3 12	12 2 14	14 5 19	19 5 24



EST	ACT	EFT
LST	Duration	LFT

EST LST
 \$ \$
 EFT LFT

LAST EFT = LAST LFT

LST = LFT - Duration

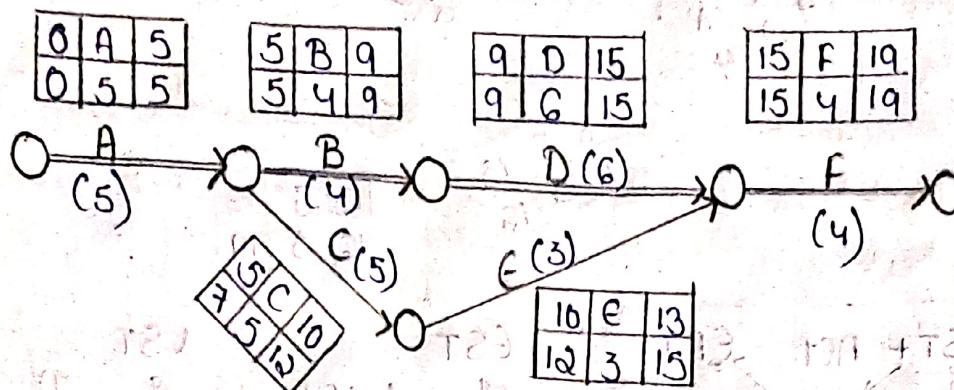
Left to right = Maximum

Right to left = Minimum

Critical Path

- 1) A → B → E → G → H → I
 (6) (3) (3) (2) (5) (5) = 24
- 2) A → C → D → G → H → I
 (6) (2) (3) (2) (5) (5) = 23
- 3) A → C → F → J
 (6) (2) (5) (3) = 16

Act	Preced	Duration
A	-	5
B	A	4
C	A	5
D	B	6
E	C	3
F	D, E	4



Critical Path

A → B → D → F
 (5) (4) (6) (4) = 19

A → C → E → F
 (5) (5) (3) (4) = 17

* crashing a network :-

crashing an activity means reducing the time required to complete that activity. For reducing the time it may require additional labour, equipment etc.

- Reducing the duration of an activity on the critical path also reduce the time of the total project.
- Reducing the duration may change the path also.

→ Reducing the duration of an activity may change the cost of the total project.

* Normal time (NT) :-

The expected or standard time usually or normally allowed to complete an activity that is known as normal time.

* Normal cost (NC) :-

The expected or standard cost usually or normally allowed to complete an activity that is known as normal cost.

* Crash time (CT) :-

If the estimated time or duration of an activity increases then the project may face an extra cost.

* Crash cost (CC) :-

If crash time occurs in a project then that project may face crash cost.

→ If loss of material, damage of equipment and modification of structure occurs then the project may face crash cost.

* Cost slope :-

It is the rate of increase in direct activity cost per unit reduction in time.

→ It is calculated as

$$\text{Cost Slope} = \frac{\text{Crash time} - \text{Normal time}}{\text{Normal time} - \text{Crash time}}$$

* Optimization of cost and duration :-

Optimization of cost and duration required to find the best total project cost by balancing

direct cost and indirect cost.

Note :-

Direct cost means estimated cost.

Indirect cost means extra cost.

* Material and stores management :-

Classification of stores :-

Stores may be classified into two types :-

a) Centralize store

a) Decentralize store

a) Centralize store :-

→ In a small industry it is described to centralize the material to show may be brought under the control of store keeper. The store room should near the place where materials are to be used.

→ If there are in similar manufacturing department the store room will be situated where it is near to all the department.

(If all department same thing require then that room should near of all department)

→ This will reduced handling a lot of manual work. This type of store is known as centralize store.

a) Decentralize store :-

→ In large industry there are similar department using different type of material.

→ So, it becomes beneficial to separate the stores. This type of store is known as decentralize store.

* Issue of materials :- (Types of record)

* Indent :-

- It is also called material issue register.
- Material requisition is an important document of an authority to notedown the material.
- It is a formal written request from Production department to store.
- It is assigned by the authorize person so that there should not be any wrong withdraw of material.
- It is prepared in two copies, one send to the store and another one copy is send costing department.
- It includes dates, quantities, unit price, total value, etc.

Book no -
Dept -

Indent NO -
Date -

Sl. No	Description	Quantity	Unit Price	Total value
(1)	Cement	10 bag	2000	20.000

* Invoice :-

- A document send to a by buyer that specified the amount and cost of product or services that have been provided by a seller.
- An invoice indicates what should be paid by the buyer according to the payment terms of the seller.
- Payment terms specified the period of time with in payment should be sent to the seller for the goods and services that

they have purchase.

* Bin Card :-

- All the materials are not kept at one place but at different places for easy identification. Place or space is known as bin card. This space is known as Bin.
- A card is attached to the bin to show the details of the materials is known as bin card.

* Store Accounting Procedure :-

- Mostly store accounting are preferred the details of the material which is not for self.
- A better store procedure is a safe card against waste of material in order to mention the efficiency record of stores.
- The most popular method of accounting are :-

a) FIFO [First In First Out]

b) LIFO [Last In First Out]

c) First In First Out (FIFO) :-

It implies the oldest inventory items recorded as the item sold first but do not necessarily mean that the oldest stock should be touched or sold first. Oldest item sold will record.

d) Last In First Out (LIFO) :-

It means that the most recently produce item are recorded has sold first.

Newly item will sold first.

* Stock Register :-

a) Dead stock or non consumable register :-

- This is the register which is updated by store keeper in which non-consumable articles are such as machine equipment and furniture etc.
- The register shows the complete details of articles together.
- The different items are entered on different pages.
- All transaction about a particular item are entered on 1 page.

b) Consumable Register :-

- In this register store keeper maintains record of consumable articles such as oil, kerosene, paint, etc.
- The different items are entered on different pages.

c) Daily Receipt Register :-

This is a register in which different materials enter regularly or maximum time for the store. It is maintained date wise.

- The suitable materials are found and then enter in stock register.
- If the material is found defective then the material and bill, report will be sent to the supplier.

d) Issued Register :-

This is a register in which all store material issues are entered date wise in it by store keeper and it is prepared by account section by the help of receipt.

v) SURPLUS STOCK REGISTER :-

Sometimes some materials are purchased and those are not used for long time, say three years, such materials are then declare surplus material and enter on surplus stock register.

v) SUSPENSE REGISTER :-

The defective item which are receive in excess quantity and those items should not be placed in the store but it kept in suspense sell.

→ A separate register is maintained by store keeper for this. Such item is place in suspense is known as suspense register.

v) LOAD REGISTER :-

Sometimes non-consumable materials is issued from store by load for temporary period.

→ Before using material should enter on the register and there should be the signature of the buyer and taken on this register and of authority is kept safe.

→ When the material come back then the slip is returned and it should notedown on load register.

INSPECTION OF STORES :-

INSPECTION OF STORE IS

* Pre-Dispatch Inspection :-

This is inspection which is taken before dispatch of material usually specified on the purchased order. The inspection is carried out at supplier work.

* Stage Inspection / Final Inspection :-

For critical item it is required to conduct stage inspection of items at suppliers work. In such cases the supplier provides an inspection duty to the inspection agency.

* Document Inspection :-

For some items inspection can be carried out through the verification of supplier certificate such as material test certificate, manufacturing certificates, guarantee or warranty certificate.

* Store Inspection :-

Important items are inspected through this route.

→ Materials are receive on the receiving way of stores such items are usually tested visual examination and verification of document.

* Ordering cost :-

All the expenses required for Purchase buying any items.

→ For buying different administrative cost are required such as Paper work (Documentation) Insurance etc.

→ All business man should have the knowledge about all these cost because these are also included in total budget.

* Inventory cost :-

All the expenses such as investment, purchase cost, storing cost, managing cost, through out the supply chain is known as inventory cost.

* Economic order quantity (EOQ) :-

It is the term used in inventory management to determine the optimal order size which minimize the total cost, or balancing cost of holding cost. Mathematically,

$$EOQ = \sqrt{\frac{2DS}{H}}$$

Where,

D = Annual demand

S = Ordering cost

H = Holding cost

* Inventory control by ABC technique :-

Inventory refers to all the item, stock and material held by a business for selling in the market and on the profit.

The actual meaning of inventory means account or listing of items.

Inventory is a current asset and the value goods which you are selling product.

ABC inventory control is a technique that categorizes in three groups such as A, B, C.

It is categories based on the value.

Group A categories for high value product.

Group B categories for moderate value product.

Group C categories for low value product.

Group A :- (High value)

Less number of items but account for large percentage of total inventory value is the group A inventory.

Group B :- (Moderate value)

Moderate number of items but account for large percentage of total inventory value is the group B inventory.

→ It required reasonable attendance and Periodic review.

Group C :- (Low value)

Large number of item but account for low percentage of total inventory value is the group C inventory.

→ It required control on the product, but bulk ordering.

Construction Contract & Specification

Construction contract is a legal binding agreement, which define project scope, cost, timeline, & responsibility between owner & contractor for the successful achievement of a project. Others are included in this contract such as architecture, sub-contractor & suppliers as well as payment term, time line, responsibilities.

* Types of construction contract :-

Mainly construction contract is 4 types :-

- 1) Lump - sum (Fixed Price)
- 2) Cost - plus Contract
- 3) Time & Material Contract
- 4) Unit Price Contract

1) Lump - Sum contract (Fixed contract) :-

Lump sum contract is also called fixed contract, means total price of the entire job. This contract protect the unexpected loss of project.

→ Many contractor charges an additional percentage for signify a lump-sum contract because it has high risk & pressure.

2) Cost Plus contract :-

It has a ~~price~~ ^{Price}, agreed by the owner should be pay to the contract. It will be a case of total project.

It avoids conflict & ensure contractors are paid overhead. This contract is used when construction project expenses are uncertain.

3) Time & material contract :-

It is an agreement where a client pays a contractor based on actual time spent, material used, rather than a fixed price.

→ one party is agree to pay contractor for the cost of all product which are need for the project.

4) Unit Price contract :-

Unit Price is a construction agreement where payment is based on the actual measure quantities of work performed.

* Contract Document :-

It include the condition of contract, employees req, contractor's proposal & analysis of contract with bill.

It is used to communicate information about all parties or parties on customer.

It is the collection of written agreement defining roles, responsibilities, scope, cost, & timeline to prevent dispute.

* Essential components of contract document

- Agreement
- General condition
- Specification
- Drawing
- Bill of quantity & Price

Special condition

General condition

A document used to responsibility of the parties affected by the contract.

Establish the payment process.

Identify warranty period & process.

Specification :-

Technical information about material equipment work methods & quality of workmanship.

Contract Management :-

It is the systematic end to end process of creating negotiating, executing & monitoring agreement with client or partners to maximize the performance & minimize the financial risk.

Systematically & efficiently managing contract creation, execution & analysis for the purpose of maximizing financial & operational performance & minimize risk.