LECTURER NOTES ON CONSTRUCTION MANAGEMENT

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Ch-1 # INTRODUCTION Dt - 23.04.20

1.1 Introduction to construction management :-

→ The basic requirements of a man are food, clothing and shelter.

→ From the very ancient times man has struggled for these basic requirements.

→ Construction industry plays a critical role in the around development of the country.

→ As the volume of construction industry is directly connected with the increase in population.

→ Also more than 50 % of expenditure is incurred for construction work in all the 5 years plans.

→ So it directly affects the national development.

→ The population and size of the country and volume of construction industry are directly linked to each other, because with the increase of population the need of housing and industry also increase.

→ Thus construction industry is the second largest industry in india.

1.2 → Concept of construction management :-

→ The management may be defined as the process consisting of planning, organising, activating and controlling the performance to determine and accomplish the objective by the use of men, machines, materials and money.

→ The success of an organisation directly depends on the proper management system applied in organisation and of course, management can't work alone without the help of money, men, machine and material.

→ So management is the art of securing max"

results with the minimum effort.

→ Objectives of construction management :-

The following are the main objectives of the construction management.

- The work should be completed with in estimated budget and specified time.
- There should be motivating to working people to give their levels best with in their capacities to complete the work.
- Their should be qualified and trained staff to supervise the work properly.
- The execution of work should be done as per specification.
- The execution of work should be done as most economically
- The working quality and workmanship should be good.
- There should be a proper plan of work and it should be organised properly.
- There should be an awarness of creating an organisation that works as a team.
- The workers should have been provided with safe and satisfactory working condition.

→ Necessity of construction management :-

construction management is necessary for the following causes.

- By adopting the new technologies of construction and supervision the economy is affected.
- co-ordination between different agencies.
- Economy in construction.
- Development of management and machinery.
- speed of construction.
- Quality Control of materials and workmanship.

1.2 → Function of construction management :-
The following are the function of construction management.

(1) Planning
(2) organising
(3) staffing
(4) Directing
(5) controlling
(6) co-ordinating
(7) communicating

(1) Planning :-
→ Planning is a basic managerial function planning helps in determing the course of action to be followed for achiving various organisational objectives It is a decision in advance.
(a) what to do.
(b) when to do.
(c) How to do and
(d) who to do.
→ Planning is a process which involves Thinking before doing. Planning is the identification of a number of alternatives works plans for achiving a specific objective to select a plan Finally which is the best suited.
→ planning is concerned with the mental state of a manager he thinks before intertaking a course of action By which certain results are to be achieved.
→ Planning is a process of Looking ahead.
→ The primary objective of planning is to achive better results.
→ It is the primary function of management.
→ Planning is Formation of Future Course of action.
→ planning makes things happen.
→ planning function is performed by managers at all levels.

② Organising :-
The process of organisation involves the following state.
→ To identify the work to be performed.
→ To classify or group the work.
→ To assign these group of activities or work to individuals.
→ To delegate authority and fix responsibility.
→ To co-ordinate there authority - responsibility relationships of various activities. However, the organisation structure should be simple and flexible. The characters and types of organisation depends upon the size and nature of the enterprise.

- organizing is concered with -
→ Division of the total construction work into manageble departments / sections.
→ systematically arranging various operations by delegating specific talks to individuals
→ The relationship between various perssonal are established.
→ The organizations structure of the project is depicted by a flow chart.

③ staffing :-
organising involves the division of projects work into sections and staffing is provision of people to fill the positions so created.

- staffing functions include:-
→ Requirting the right people
→ Arranging staff training course.
→ carry out proper staff assessment.

④ Directing:-
→ The directing function is concerned with training subordinates to carryout assigned tasks;

supervising their work and guiding their efforts.

→ The essence of directing lies in the ability to motivate people individually and as groups to utilize their creative efforts in achieving specified objectives.

(5) Controlling :—

→ control is essential for achieving objectives of an enterprise.

→ controlling is necessary for ensuring effective and efficient working.

→ controlling is the process which enables the management to get its policies implemented and take corrective action.

→ It involves a constant review of the work plan to check on actual achievements and to discover and rectify deviations through appropriate corrective measures.

- The essentials in management control are :—

→ Actual performance measurement (Progress, quality, cost)

→ Comparison of actual and planned performance.

→ Analysis of shortfall in performance, identification and implementation of suitable remedial measures.

→ Quick and accurate flow of information is a vital aspect.

(6) Co-ordinating :—

→ since authority converges to the top of the organizational pyramid. it is necessary to bring together and coordinate the work of various departments and sections.

→ It requires an efficient system of communication so that each department and section is aware of

its role and the assistance to be expected from others.
→ Regular meetings of departmental heads with top management are fundamental to proper co-ordinations.
→ plans, problems and remedies are discused for determing best solutions.

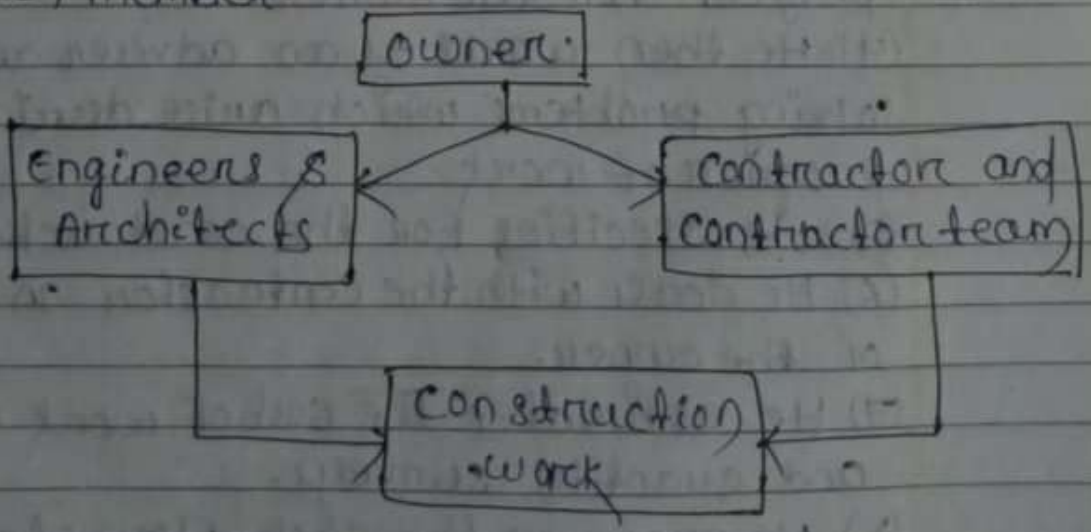
→ Resources for construction management :-
The following are main resources which are needed for the construction industry.

- Money :-
→ money is first and foremost requirement for any projects and it should be arranged before starting any construction project for smooth implementation of a project.
→ Adequate money is highly essential for all other resources are dependent on it.
→ There should be regular supply of money to keep the project moving progressively.

- Materials :-
→ Sufficient quantity of material are required for the completion of any project and also should be available at the site.
→ These materials required for the project are estimated before starting the project
→ If the regular supply of material is not done properly the work may be stopped.
→ The materials required for a construction project are bricks, cement, stones, shuttering, timber, water supply, electrical fittings etc.
→ These materials should be arranged with proper care.

- machinary :-
→ Different types of machinaries and equipment are require for any construction work.
→ It is economical to use machines for heavy and large works.
- Man powers :-
→ For the succesfully completion of any project, man power is an important factor.
→ It may be both skilled and unskilled.
→ There is a requirement of all manpower to start a project from a unskilled labour to supervious staff according to the planning.
- Management :-
→ management is the set of administration which includes to plan, organise, control, co-ordinate and direct the use of other resources to achive the organisational objective.

1.3 → Construction Team components :-
→ Any project can't complete by a single individual.
→ There is a requirement of group of person with specific duties to be performed by each member.



- Owner :—
→ The owner of a construction project may be an individual group of individuals, private or public body.
→ The owner finances the projects and also recognises the need for a project.
→ This is the power of an owner to control the project of the work and resources.

→ Engineers and Architects :—
→ structural engineers are to prepare structural design of structures.
→ mechanical engineers are to design and preparation of working drawings for all mechanical services associated with the construction project.
→ An architecture is to asses the clients fundamental requirements architect / engineer being a professional man:
(1) He supervises the construction of the project.
(2) He 1st does the priliminary investigation for the proposed project.
(3) He then prepares plans and designs the projects for the owner.
(4) He then works as an adviser and help in solving problems which arise during the progress of work.
(5) He specifies for the construction.
(6) He deals with the contractor on behalf of the owner.
(7) He estimates the cost of work to be done and quantity surveys.
(8) He prepares the cash-flow state-ments

during construction.
(9) He prepares the bill of quantity & tender documents before tendering.
(10) He prepares the final account on completing of the project.

→ contractors :—
→ The contractors may be an individual for small contractors or large Construction Company for project.
→ There is the need of a qualified engineers to every contractor whether small or big.
→ The contractor executes various types of works and also make necessary arrangements for labour, machinery, materials, in order to complete the project in the limited scheduled time.
→ when the bid or rate is agreed, then the contractor constructs the projects.

CH-2 CONSTRUCTIONAL PLANNING

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→ planning is a managerial process by which suitable decision is taken out of the various alternative methods available for the execution of work or selecting best method among various alternative.

→ constructional planning is the specific process construction managers use to layout how they will manage and execute a construction project from designing the structure to ordering materials to deploying workers and sub-contractions to complete various tasks.

→ planning is an important part of all management functions.

→ There is a vital role of planning in construction management.

→ Before starting a construction project, planning is the future line of action.

→ planning is nothing but decidicing a problem about what to do, when to do, how to do, and who will do and also where to do.

1.1 → Important of construction planning :—

Importance of construction planning are as -

→ The work may be completed with in the scheduled time.

→ The work may be executed most economically.

→ The work will be both qualitative & quantitative

→ There shall be minimum wastage during construction work.

→ The work should be completed as per specification

→ There will be a min^{m} cost of maintainance of machinery and equipment

→ There will be optimum use of available resources

→ controlling of construction activities can be possible

→ Scope of construction planning :—

→ The main objective of planning is to complete the project with utmost economy.
→ It should be properly done for various elements of the work.
→ There should be proper selection of equipment and machinery for the project.
→ The arrangement for repair of machinery and equipments should be done near the working site so as to make them ready for work.
→ There should be availability of material well in advance at the construction site.
→ Trained & expurienced workers should be employeed for the project.
→ Arrangement for the constant flow of funds should be made till the completion of project.
→ There should be arrangement of welfare schemes for the staff & workers.
→ Provision of incentives & other benefits should be provided to the good workers.
→ proper safety measures should be there for the workers & staff.

2.2 → Developing work breakdown structure for construction work :—

→ It is the process of breaking down a project in to sub-systems and each sub-system into major components and discrete activities.
→ Also it is a technique through which the functional elements of a project and their relationship are determined.
→ This technique establishes the hierachical [illegible] in a system by breaking the project in to major systems, sub-systems and discrete activities.

→ until the system is reduced by breaking down the sub-system & subsystem in to components or activities representing manageable units for planning, the breakdown process is continued.

→ In general, the main objective of breakdown structure in a project is to identify discrete activities which can be planned, scheduled, estimated, executed.

Project

objective

objective specified in terms of it's end activities

activities

↓

subactivities

↓

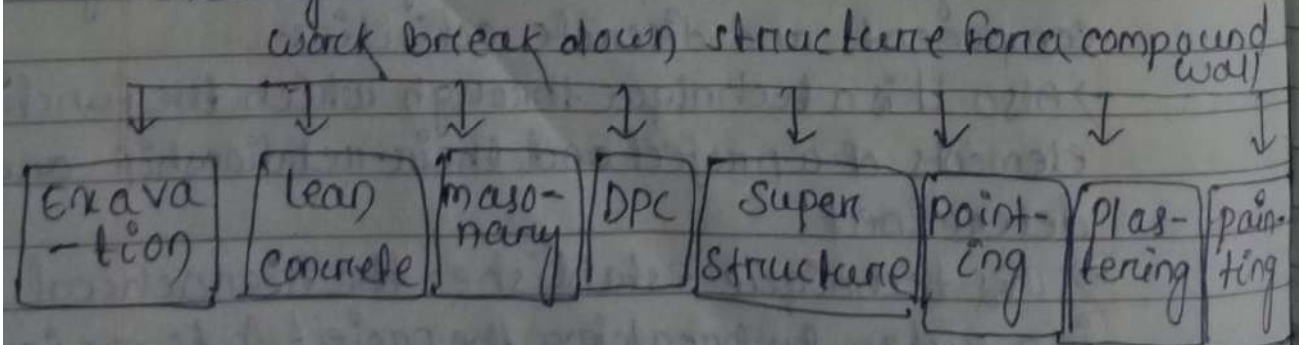
components

↓

elements.

→ In this systems, the major project is first identified in terms of the end activities, then activities are broken its subactivities, components & elements.

Ex:- For example the construction of a compound wall may be broken down as shown in the figure.



2.3 → Construction planning stages :—

→ Planning is a very essential activity for efficient implementation of a project at various stages.

→ construction planning can be divided in the following two stages.

(1) Pre-tender stage

(2) Contract stage / post-tender stage

① Pre-tender stage planning :—

→ The pre-tender planning is carried act by the contractor after the receipt of tender notice and before submitting the tender paper.

→ In this stage, the contractor plan his best method of construction for the future contract and also makes plans and programmes for carrying out the work.

→ At this stage the contractor prepare himself for completing the work in the stipulated time

→ The contractor is to be required to visit to the site of construction work.

→ A pre-tender planning report describes the complete circumstances of the work and it it also describe the site of conditions under which the work is carried out.

- Step in pre-tender planning :—

→ At the 1st step there should be a careful study of tender documents, drawing & specification do identify the quantities of each time of work.

→ Also there should be a careful study of tender document about the time limit, i.e the project should be completed with in the

stipulated period of time.
→ There should be a site investigation and market survey to determine the rates and availability of materials, manpowers, and machenary.
→ The availability of required materials near the site of work should be determined and if not, also how these can be procured economically.
→ The section of the most suitable & economical method out of the alternative methods should be carefully determined for executing the work.
→ The quantities of different iteams should be estimated.

(2) Contract stage / post tender stage planning :-
→ contract stage is otherwise by called as post tender stage. This stage is starts after the acceptance of the tender and extends till the completion of the contract.
→ At this stages of the contractor fully utilies the pre-tender stage planing to organise the various activities of construction work so that the work may be completed within the sceduled time economically without delay & difficulty.
→ post tender planning is used to check out the details for execution of the project.
→ Improper and inadequate planning at this stage may cause heavy loss of money and time.
→ Also benefits from the project may also be dropped drastically.

- Steps in post-tender planning :-
→ The section of most suitable & economical method act of all the alternative methods consided at pre-tender stage should be carefully determined for execution of the work.
→ The quantities of materials required at each stage of the work.
→ Inter-relationship of various items of work should be studied and the proper sequence of operations.
→ Total no. of requirement of machinary and equipments at various stages of work should be worked out and arranged.
→ The work programme of each work should be dicided and it's starting & completing data also be finalised.

4. → Construction Sceduling :-
→ Scheduling of a project is done often it is properly planned.
→ A schedule for a construction activities is a graphical representation which determines the time of starting and completing data of each activity in order to complete the whole construction project.
→ In other words, sceduling is the time table for executting each and every activity with its fixed starting and Finishing data.
→ The process of fixtation of time for each activity of the work to execute the whole work in a systematic and orderly manner can be defined as scheduling.
→ The no. of sequence activities one after another increases so as to have control over the work by

adopting different methods.

- Preparation of construction schedule :-
  These are the procedures for preparing a construction schedule.
  → At first the whole project it divided in to a small number of operations.
  → Then the inter-dependance among on between the operations are carefully studied and their sequence is decided.
  → The quantity of work is to be determined which is to be done in each operation.
  → The total time to complete the each operation and total project is determined.
- Bar chart schedule :-
  → A bar chart is formed with a list of activities specifying the start data, duration of the activitity and completion data of each activity and then plotted on a project timescale.
  → The detailed level of the bar chart depends on your project complexity and the intended use of the schedule.

2.5 → Classification of sceduling :-
Schedule can be classified in to various group
1. material schedule
2. Labour schedule
3. Equipment schedule.
4. Financial schedule.

1. Material schedule :-
   → A material schedule is a detailed list of construction material required for a specific job.
   → The schedule should be prepared well in advance of the start of the work.

Ex:- cement may lose its strength by 50% if stored for six month and steel may be attacked by corrosion due to long storage at site.
→ Therefore at the time of preparing the material scedule, following point must be kept in mind.
(a) The materials should be delivered at site at least one week before its use.
(b) The materials at site should not remain unused for long.

(2) Labour Scedule :—
→ The labour scedule is prepared for deciding the actual number of skilled and unskill labour which is required for the construction work i.e the aim of the scedule is to decide the number of skilled and unskilled labour required for the execution of different operations on different dates.
→ with the help of this schedule required labour can be arranged will in time.
→ it is difficult as well as costly to arranges skilled labour as and when required.
→ Also constructions schedule may act as a guide for the preparation of labour schedule.
→ Labour schedule helps for the arrangement of labour for the execution of work on diff-erent dates.

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IMP → Factors in construction Management :-
There are many factors that involved in construction management for success of project. These are
→ Availability of skilled & cheap labour.
→ proper transportation facilities.

→ Availability of local or natural materials (sand, aggregate, water, soil etc) to reduce construction and transportation costs.
→ Rate of population growth & urbanization in that area.
→ Town planning & environmental conditions.
→ Availability of public utility services. expecially water, electricity & sewage disposal.
→ Contour of the land in relation to the building cost.
→ cost of land.
→ geographical and environmental nature of construction area.

2.6 Limitation Of Bar Charts :—
There are certain limitation of the bar chart
→ If the time scedule is changed, it is difficult to readjust length & position of bar.
→ Bar chart can only be applicable for small projects, but not suitable for large projects.
→ The bar chart does not show clearly the inter dependance among the various activities.
→ The bar chart does not show the actual progress of the work as it only represents the estimated time. So the actual progress of the work can't be monitored.
→ The critical activities of the project is not shown in bar chart.
→ The bar chart doesnot reflect the uncertainties of time in activity duration.
→ The bar chat gives no ideas about the financial aspects. It only gives the idea of the physical progress.

→ The bar chart gives no idea about the max progress necessary for it's completion. It gives the information only about the rate of progress.
→ It is difficult to find out the alternative course of action to complete the work in time in case of variation from planned programme.
→ As the bar chart is a static representation, it doesn't indicate the dynamic happening on the projects.
→ Obtaining of feedback from the bar chart is only approximate.
→ As various activities are shown by one chart, the sequence of operation is not clearly known.
→ The bar chart does not help the work of controlling, monitoing & updating the project.

⇒ Advantages of Bar-chart :—
→ Bar chart is simple to draw, easy to understand and can be drawn quickly.
→ Bar chart is widely used for scheduling.
→ There is not requirement of trained or skilled persons to draw this chart.
→ The actual progress of the work is expressed in the form of percentage.
→ The resources requirement for the construction work can be shown in the bar chart.
→ Bar chart is a graphical representation of each activities about there strating & ending time period.
→ The visual representation of the entire project is shown exactly in the bar chart.

Ex:- • Preparation of bar chart for construction of a residental buildings :—

Let us consider the construction of a residential building having following activities with estimated times as given below.

(1) Excavation - 10 days
(2) concrete work - 6 days
(3) masonary work - 20 days
(4) making door, frame - 10 days
(5) making window - 12 days
(6) Roofing - 14 days
(7) plastering - 15 days
(8) Flooring work - 8 days
(9) white washing - 10 days
(10) painting - 4 days
(11) cleaning - 6 days

Sl. NO	Activity description	Duration	Time in week
1.	Excavation	10	
2.	Concrete work	6	
3.	Masonary work	20	
4.	making door frame	10	
5.	making window frame	12	
6.	Roofing	14	
7.	Plastering	15	
8.	Flooring work	8	
9.	White washing	10	
10.	Painting	4	
11.	Cleaning	6	

2.5 → Finance for small works:—

→ The estimated amount of money, which the owner on contracton has to provide to finance the project can be obtained from construction schedule.

→ In most of the cases of construction contracts

it is specified that the owner will pay about 90% cost of the completed work during each month for each job to the contractor.

→ Construction scheduling by network techniques:-

→ Every project consists of certain activities and functions which are interrelated with each other in some manner or the other.

→ Of course, for completion of the project in time, all these activities and functions have to be completed well within time. But each and every project has one specific purpose i.e it should start at a specified time and finish by the stipulated period.

→ However, very often, it is observed that a projects over run in time & cost & the reason behind this over run may be due to lack of proper planning the outset of the projects.

→ Experience shows that conventional planning methods and control techniques of planning scheduling and monitoring are not satisfactory for large and complex projects.

→ The time estimates are made for execution of these individuals jobs.

→ The network techniques help in identifying those events which controls the completion of the project.

→ In recent past, PERT & CPM are two such powerful tools that have received universal acceptance.

→ PERT stands for programme evaluation & review technique that originated during the development of polaris missile programme, which was an R/S D project. As it was a new project & in fact never

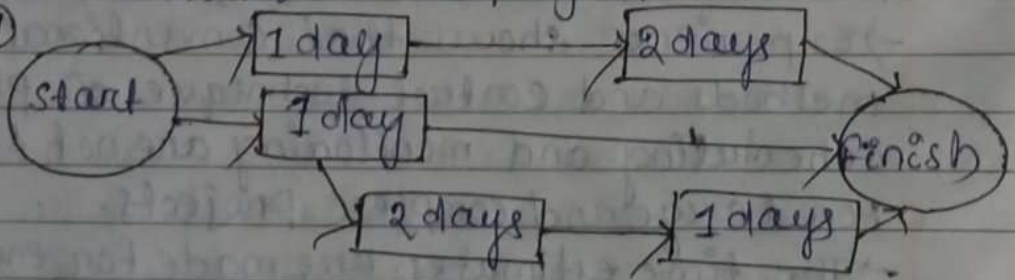
tried in the past, precise estimate of cost and time was not possible. Hence the completion time of the project had to be based on the probability.

→ Critical path Method (CPM) :-

→ The critical path method is a network technique most suitable for dealing with large and complex projects.

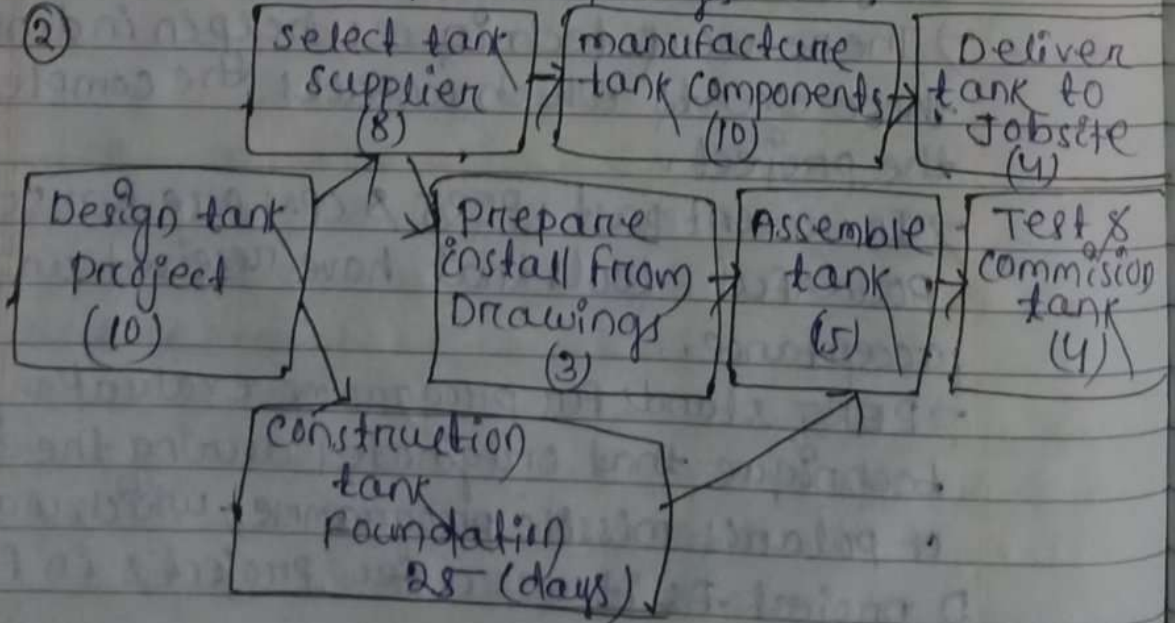
→ This method was developed in 1957 and has been found to be very useful to both civil engineering & mechanical engineering project, in respect of determining how best to reduce the time required for performing production, maintenance and construction, there by helping to minimize the direct and indirect cost of the project. With the help of CPM, a planning engineer comes to known the sequence to various activities of the project.

EX:-①



Critical path = 4 days.

②



- Different terms used in CPM :-

The following are the important technical terms that are to be understood clearly before we come to discuss the procedure for constructing the network.

① Activity :-

→ It is a part of the project denoted by an arrow on the network ; the tail of the arrow indicating the start of the activity & the head indicating the end of the activity.

→ Of course one and only one arrow is used to represent one activity of given duration. However, the arrows of the activities are not drawn to scale, but the duration of the activities are written along their arrows.

② Dummy activity :-

→ The activity which neither uses any resource nor any time for its completion but is required in the logical sequence of network is called a dummy activity.

→ It may be represented either by a dotted arrow or solid arrow with zero time duration.

③ Event :-

→ It is a stage or point in a network where all previous jobs merging in it are completed & the jobs originating out, are still to be completed.

→ Events are generally represented by circles or nodes at the junctions of arrows & are serially numbered in their sequential order.

④ Network :-

→ The flow diagram or the diagrammatic representation of the activities of the entire project is called network, on which various jobs of the

project are shown in the order in which they are required to be performed.

(5) Early start time (EST) :-
→ The earliest possible time at which an activity may start, is called its early start time.

(6) Early finish time (EFT) :-
→ The sum of the earliest start time of an activity and the time required for its completion, is called early finish time i.e [EST + t = EFT]

(7) Late start time (LST) :-
→ The latest possible time at which an activity may start without delaying the data of the project is called late start time.

(8) Late finish time (LFT) :-
→ The sum of the late start time of an activity and the time required for its completion, is called late finish time. i.e [LST + t = LFT]

(9) Total Float :-
→ The difference betn the max^m time allowed for an activity and its estimated duration is called total float.
→ It is the duration of time by which an activity can be started late without disturbing the total project schedule.

(10) Free Float :-
→ The duration of time by which the completion time of an activity can be delayed without affecting the start of the succeeding activity is called free float.

(11) Critical activities :-
→ The activities which have zero or no float are called critical activities which are required to be complete on schedule.

(12) Critical events :-
→ The start or end points of critical activities are called critical events.

(13) Critical path :-
→ The path in the network, joining the critical events along which there is no float is called the critical path of the network.

- Programme Evaluation & Review technique (PERT) :-
→ This method also uses the project network technique, critical path and the concept of float.
→ It assumes that the activities of project and their network relationships are well defined making allowance for uncertainties in activity durations.
→ Thus PERT technique is used for scheduling & controlling the projects whose activities posses considerable degree of uncertainties in their performance time.
→ It has different time estimates for each activity of the network such as optimistic time, most probable time, pessimistic time, expected time or average time etc.

- Different terms used in PERT :-
The most commonly used terms in the PERT analysis are the following :

(1) Event :-
The start or finish of an activity is called an event which neither consumes time or resources.

(2) Activity :-
→ The actual performance of a task is called an activity which consumes both the time and resources. It is usually represented by an arrow on a line.

(3) Optimistic time :-
→ The estimate of the min^m possible time which an activity requires for its completion under ideal conditions is called the optimistic time.
→ In other words, the shortest conceivable time for the completion of an activity is called optimistic time which does not include any type of delay at any stage. It is usually denoted by "to".

(4) Most probable time :-
→ The most realistic of the time which an activity may take for its completion under normal condition is called most probable time.
→ This estimate is generally obtained with the help of experien' engineer or foreman. However, it process of any project. It is generally denoted by one letter 'tm'.

(5) Pessimistic time :-
→ The estimate of the max^m time may that may be taken by an activity if there is delay at every stage except natural calamities is called pessimistic time.
→ It is the longest conceivable time for the completion of a activity and it denoted by the letter 'tp'.

(6) Expected time or average time :-
→ The average time taken by an activity if it is repeated a large number of times is called its expected time.
→ In PERT analysis, it is taken as the weighted average of the three estimates i.e estimates i.e optimistic time, most probable time and pessimistic time. However, while calculating

the weighted average, it is assumed that optimistic activity time (t_o) and the pessimistic activity time (t_m) has times weightage as compared to the other two.

→ mathmatically, the expected time may be obtained by the following formula. i.e (t_e).

$$t_e = \frac{t_o + 4t_m + t_p}{6}$$

(7) Earliest Expected time (TE) :-

→ The earliest expected completion time of the event is equal to the sum of the expected times of the proceeding activities.

(8) Latest allowable time (T_L) :-

→ The largest possible time an event can take without delaying the final completion date of the project is called the latest allowble time.

(9) Slack time :-

→ The difference between the latest allowable time & earliest expected time is called slack time i.e slack = $T_L - T_E$

(10) critical path :-

→ The path of the network of a project along which there is no slack is called critical path.

→ In other words, the longest duration path of a network is called critical path along which the sum of the expected times of all activities is maximum.

(11) Length of the project :-

→ The sum of the expected times of all the activities along the critical path of the network of a project is called the length of the project.

(12) variance of an activity :-

→ In PERT analysis the variance of an activity

calculated by the following formula.

$$\sigma_1 = \frac{(t_p - t_o)}{6}$$

(13) Standard deviation of an activity :-
→ In PERT analysis, the standard deviation of an activity is calculated by the following formula,

$$\sigma_1 = \frac{t_p - t_o}{6}$$

(14) variance of the project :-
→ The sum of the variance of all the activities along the critical path of the network of a project is called the variation of the project.

(15) Standard deviation of the project :-
→ The square root of the total variance of a project which is calculated along the critical path of its network is called the standard deviation of the project.

→ Network planning Techniques :-

PERT	CPM
Program Evaluation & Review technique	critical path method
→ project management technique that shows the time taken by each component of a project and the total time required for its completion	→ step by step project management technique for process planning that defines critical & non critical tasks with the goal of preventing time frame problems
→ PERT breaks down the project in to events & activities & lays down their proper sequence, relationships & duration in the form of a network.	→ ideally suited to projects consisting of numerous activities that interact in a complex manner.

IMP

CPM	PERT
→ CPM uses activity oriented network.	→ PERT uses event oriented network.
→ Duration of activity may be estimated with a fair degree of accuracy.	→ Estimate of time for activities are not so accurate and definite.
→ It is used extensively in construction projects.	→ It is used mostly in research and development projects, particularly projects of non-repetitive nature.
→ Deterministic concept is used.	→ Probabilistic model concept is used
→ CPM can control both time & cost when planning.	→ PERT is basically a tool for planning.
→ In CPM, cost optimization is given prime importance. The time for the completion of the project depends upon cost optimization. The cost is not directly proportioned to time. Thus, cost is the controlling factor.	→ In PERT it is assumed that cost varies directly with time. Attention is therefore given to minimize the time so that min^m cost results. Thus in PERT, time is the controlling factor.
→ It has the repeated nature of the job	→ It has non-repeated nature of the job.
→ It is built up of an activity oriented diagram.	→ It is built up of an event-oriented diagram.

Dt-07.05.24

① • Example - 1

If 6.8 and 12 days are optimistic time, most project time & pessimistic time estimates of an activity reprectively. calculate the following for the activity.

(a) Expected time (te)

(b) variance (Vt)

(c) standard deviation (St)

Ans:- to = 6, tm = 8, tp = 12

(a) Expected time (te) = $\boxed{\frac{to + 4tm + tp}{6}}$

$= \frac{6 + 4 \times 8 + 12}{6} = \frac{50}{6} = 8.33$ days.

(b) variance (Vt) = $\boxed{\left(\frac{tp - to}{6}\right)^2}$

$= \left(\frac{12-6}{6}\right)^2 = 1$ days

(c) standard deviation (St) = $\boxed{\frac{tp - to}{6}}$

$= \frac{12-6}{6} = 1$ days

② • Example - 2

The following information applies to a particular project event A is the initial event

Event A is initial event.
Event B is preceded by event A.
Event D is preceded by event B.
Event E is preceded by event D.
Event C is preceded by event B.
Event D is preceded by C and B.
Event E is preceded by D and B
Event F is preceded by event E.

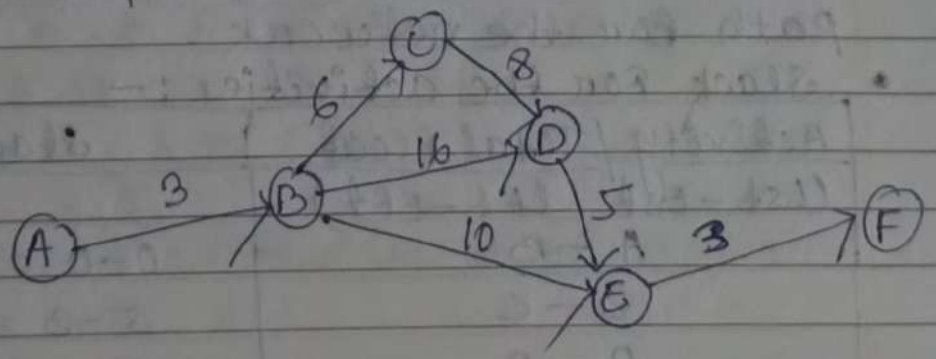
For the various activities of the project, the expected times are

Activity	A-B	B-D	B-C	C-D	B-E	D-E	E-F
duration	3	16	6	8	10	5	3

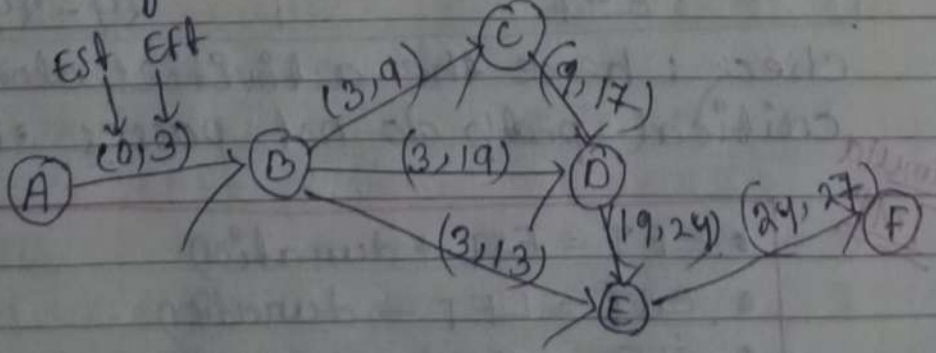
(1) Draw the network diagram of this project (PERT).

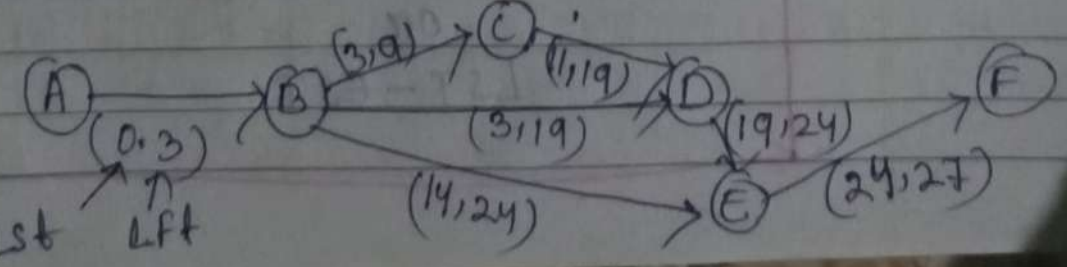
(2) If the scheduled completion data is equal to the earliest expected time tE for the end event, calculate the slack time for each event and identify the critical path.

Ans :- (1) The arrow diagram for the given project is shown in the figure below along with expected time duration.



(2) The earliest and latest occurrence time of the activities are shown in the following.





The Est and Eft written above the arrows where as the lst and lft are written below the respective activities.

- Location of critical path and determination of the expected duration of the given project:-

path (A-B-C-D-E-F)
$= 3+6+8+5+3 = 25$ days

path (A-B-D-E-F)
$= 3+16+5+3 = 27$ days

path (A-B-E-F)
$= 3+10+3 = 16$ days

As the maximum time duration on 2nd along the path (A-B-D-E-F) is the critical path for the network.

- Slack For the activities :-

Activity / Total Float (Lst - Est / LFt - EFt)	slack
A - B	0-0 = 0
B - C	5-3 = 2
B - D	3-3 = 0
B - E	14-3 = 11
C - D	11-9 = 2
D - E	19-19 = 0
E - F	24-24 = 0

check : here the activities along the critical path do not posses slack.

Formula Imp

- EFT = EST + duration
- EST = LFT - duration
- TF = LFT - EFT (Total Float)
  or
  LST - EST

③ • Example-3

The following table gives the activities in a construction project

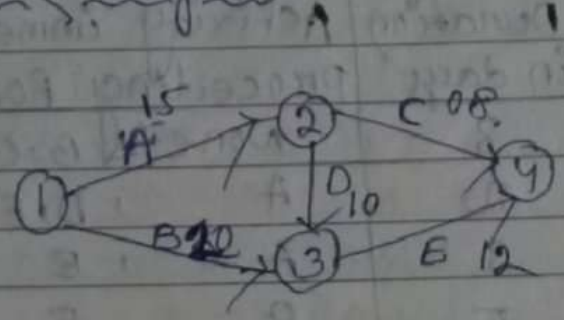
① Draw the network for the project

② Find the critical path

③ Find Free float and total float for each activity.

Activity	Event	Duration
A	1-2	15
B	1-3	20
C	2-4	08
D	2-3	10
E	3-4	12

Ans- ① Network diagram :-



② critical path :—

(1) 1-2-4 = 15 + 8 = 23 days

(2) 1-2-3-4 = 15 + 10 + 12 = 37 days.

(3) 1-3-4 = 20 + 12 = 32 days

The critical path is 1-2-3-4

③ Free float & Total float :-

Activity	Event	Duration	Est	EFT	LST	LFT
A	1-2	15	0	15	0	15
B	1-3	20	0	20	5	25
C	2-4	08	15	23	29	37
D	2-3	10	15	25	15	25
E	3-4	12	25	37	25	37

Total float :-

LST - EST

A = 0 - 0 = 0 days (critical)

B = 5 - 0 = 5 days

C = 29 - 15 = 14 days

D = 15 - 15 = 0 days (critical)

E = 25 - 25 = 0 days (critical)

(4)

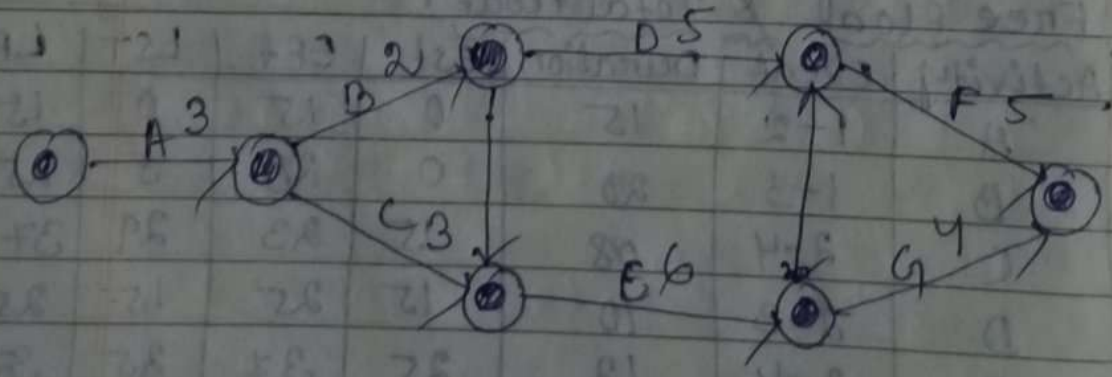
- Example - 4

From data of the table prepare the network diagram, decide the completion period and complete the critical path method schedule.

Activity item	Duration in days	Activity immediately Preceding	Following
A	3	None	B, C
B	2	A	D, E
C	3	A	E
D	5	B	F
E	6	B, C	F, G
F	5	D, E	None
G	4	E	None

Ans -

(1) Network diagram :-



② Free float :-

Activity	Duration	EST	EFT	LST	LFT
A	3	0	3	0	3
B	2	3	5	4	6
C	3	3	6	3	6
D	5	5	10	7	12
E	6	6	12	6	12
F	5	12	17	12	17
G	4	12	16	13	17

③ Critical path :-

(1) A - B - D - F = 3 + 2 + 5 + 5 = 15 days
(2) A - C - E - G = 3 + 3 + 6 + 4 = 16 days
(3) A - B - E - G = 3 + 2 + 6 + 4 = 15 days
(4) A - C - E - F = 3 + 3 + 6 + 5 = 17 days

④ Total Float :-

LST - EST

A = 0 - 0 = 0 days
B = 4 - 3 = 1 days
C = 3 - 3 = 0 days
D = 7 - 5 = 2 days
E = 6 - 6 = 0 days
F = 12 - 12 = 0 days
G = 13 - 12 = 1 days

⑤

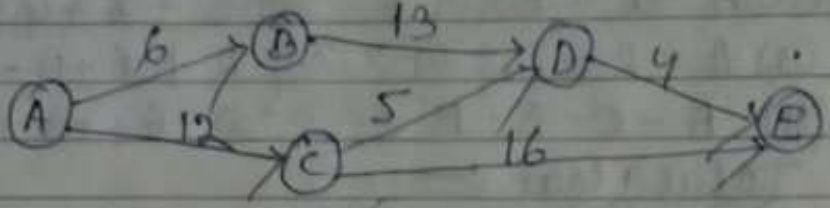
- Example - 5

The 3 time estimates to, tm & tp of each activities of a project are given below.

Activity	to (days)	tm (days)	tp (days)
A - B	2	5	14
A - C	3	12	21
B - D	5	14	17
C - D	2	5	8
D - E	1	4	7
C - E	6	15	30

① Draw the network diagram (CPM).
② Find the expected duration, variance and standard deviation of each activity.
③ Calculate the early & late occurrence times for each event.
④ Determine expected project duration.
⑤ Calculate the total float for each activity
⑥ Find the variance and standard deviation of the entire project.

Ans → ① network diagram :—



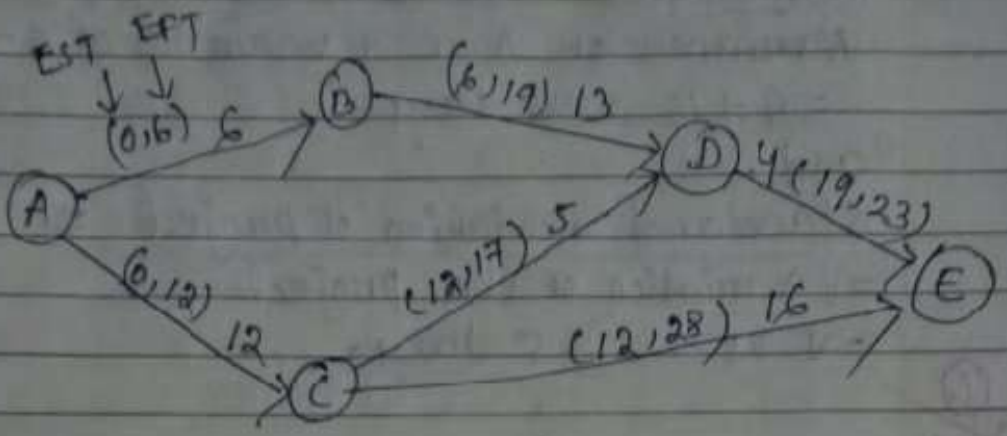
② Expected duration, variance & standard deviation :—

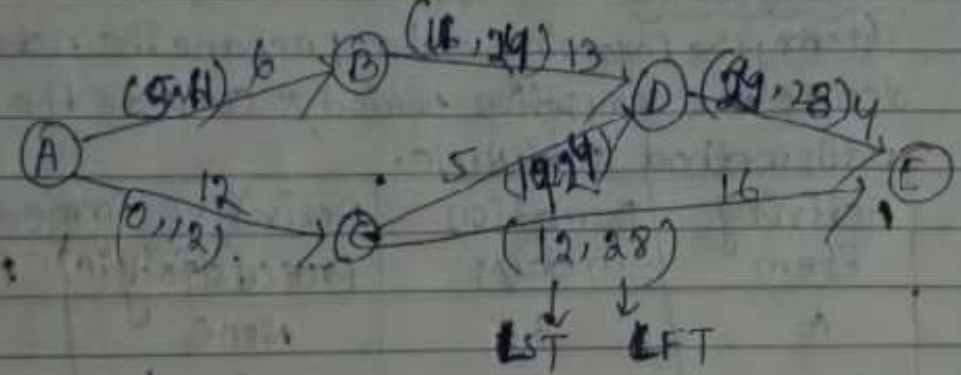
Activity	Expected duration	Variance	Standard deviation
A-B	$\frac{2+4\times5+14}{6} = 6$	$\left(\frac{14-2}{6}\right)^2 = 4$	$\frac{14-2}{6} = 2$
A-C	$\frac{3+4\times14+17}{6} = 12$	$\left(\frac{21-3}{6}\right)^2 = 9$	$\frac{21-3}{6} = 3$
B-D	$\frac{5+4\times14+17}{6} = 13$	$\left(\frac{17-5}{6}\right)^2 = 4$	$\frac{17-5}{6} = 2$
C-D	$\frac{2+4\times5+8}{6} = 5$	$\left(\frac{8-2}{6}\right)^2 = 1$	$\frac{8-2}{6} = 1$
D-E	$\frac{1+4\times4+7}{6} = 4$	$\left(\frac{7-1}{6}\right)^2 = 1$	$\frac{7-1}{6} = 1$
C-E	$\frac{6+4\times15+30}{6} = 16$	$\left(\frac{30-6}{6}\right)^2 = 16$	$\frac{30-6}{6} = 4$

Formula IMP

- Expected duration $(te) = \frac{to + 4tm + tp}{6}$
- variance $(ve) = \left(\frac{tp - to}{6}\right)^2$
- Standard deviation $(St) = \frac{tp - to}{6}$

③ Early & late occurrence time for each other :-





④ Project duration : — Expected

(1) A-B-D-E = 6 + 13 + 4 = 23 days
(2) A-C-D-E = 12 + 5 + 4 = 21 days
(3) A-C-E = 12 + 16 = 28 days

critical path 28 (3rd day)
The A-C-E take long duration to that is 28 days to complete the project so critical path is A-C-E

⑤ Total Float :-

LST - Est or LFT - EFT

Activity	Total Float
A-B	5-0 = 5 days
A-C	0-0 = 0 days
B-D	11-6 = 5 days
C-D	19-12 = 7 days
D-E	29-19 = 5 days
C-E	12-12 = 0 days

⑥ variance & standard deviation of entire Project :- (critical path [illegible])

Variance of A – C + variance of C – E

= 9 + 16 = 25 days

and,

standard deviation of project =

= √ variation of the project

= √25 = 5 days.

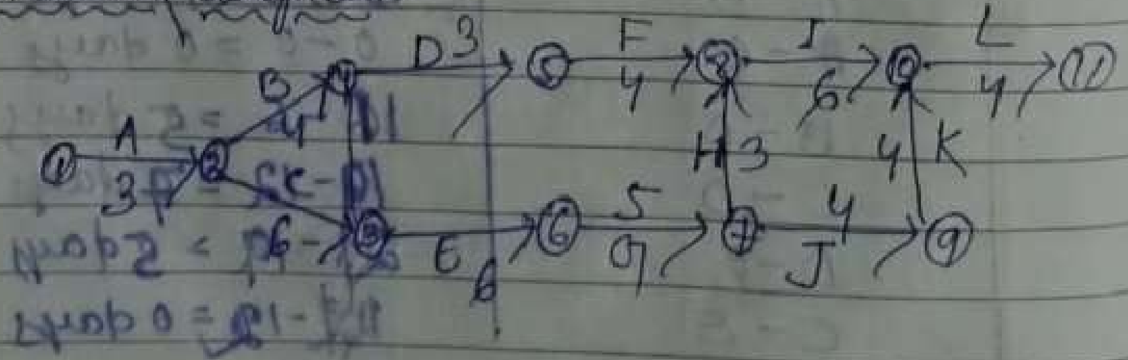
⑥

- Example - 6

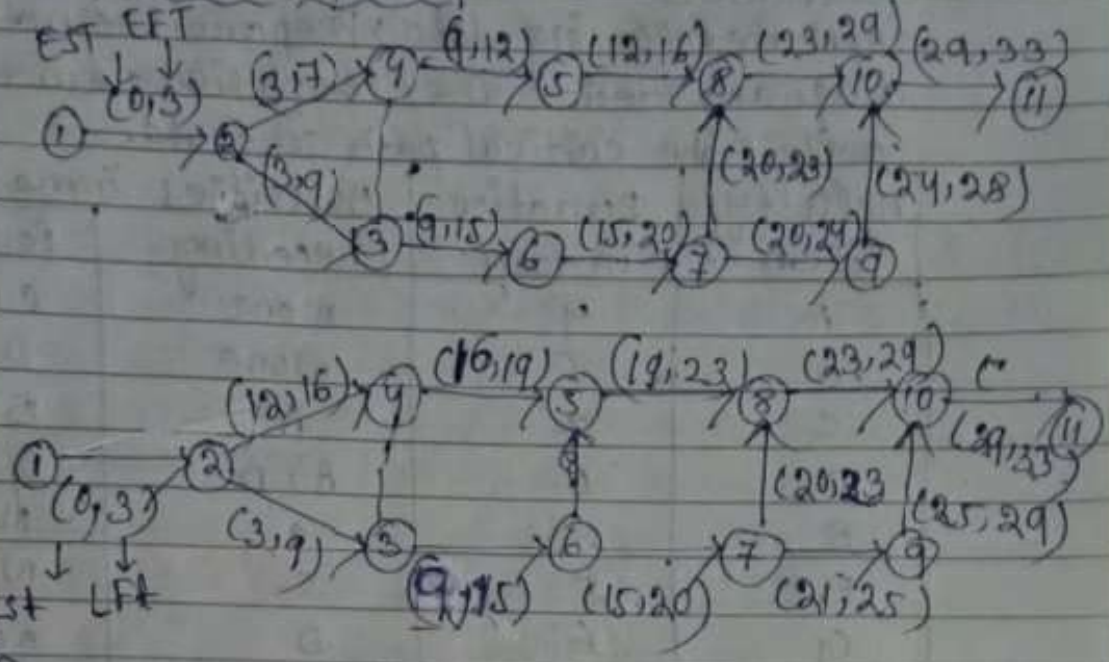
From the following data prepare the network diagram decide the completion period & complete the critical path method schedule.

Activity item	Duration in days	Activities immediately Preceding	Following
A	3	None	B, C
B	4	A	D
C	5	A	D, E
D	3	B, C	F
E	6	C	G
F	4	D	I
G	5	E	H, J
H	3	G	I
I	6	F, H	L
J	4	G	K
K	4	J	L
L	4	I, K	None

Ans → ① network diagram —



(2) Completion period –



(3) Expected project duration :–

(1) A-B-D-F-I-L = 3+4+3+4+6+4 = 24 days
(2) A-C-E-G-H-I-L = 3+6+6+5+3+6+4 = 33 day
(3) A-C-E-G-J-K-L = 3+6+6+5+4+4+4 = 32 day
(4) A-C-E-G-J = 3+6+6+5+4 = 24 days

The A-C-E-G-H-I-L take long duration to that 33 dy complete the project so the critical path is A-C-E-G-H-I-L.

(4) Total float :–

Lst-Est or LFt-EFt

Activity	Total Float:
A	0-0 = 0 days (Critical)
B	12-3 = 9 days
C	3-3 = 0 days (Critical)
D	16-9 = 7 days
E	9-9 = 0 day (Critial)
F	19-12 = 7 days
G	15-15 = 0 days (Critical)
H	20-20 = 0 days (Critical)
I	23-23 = 0 days (Critical)
J	21-20 = 1 days
K	25-24 = 1 days (Critical)

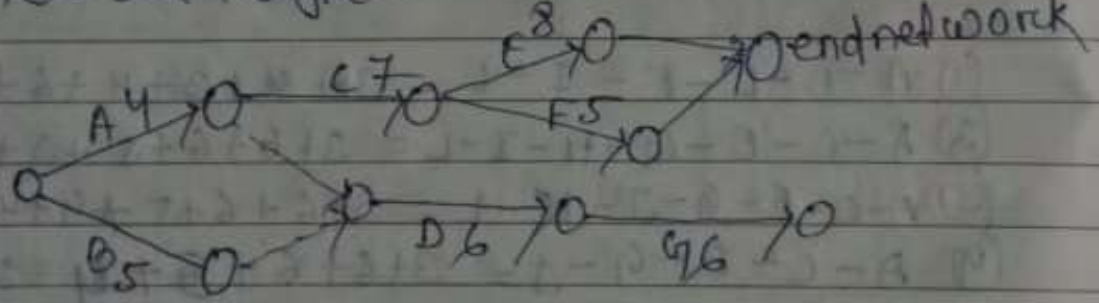
(7)

- Example -7

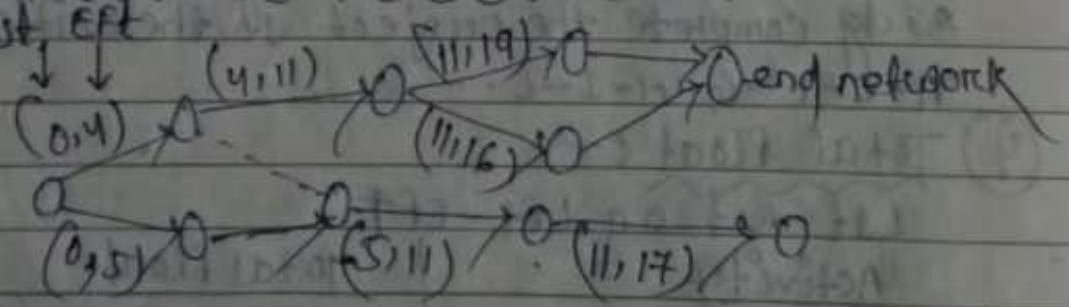
From the following data, Prepare the network diagram, decide the completion period & complete the critical path schedule.

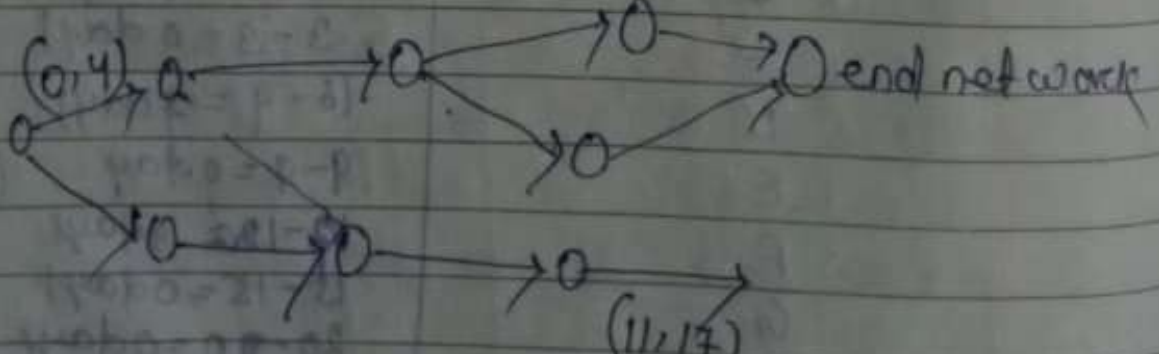
Activity item	Duration in days	Activities immediately	
		preceding	following
A	4	None	C, D
B	5	None	D
C	7	A	E, F
D	6	A, B	G
E	8	C	None
F	5	C	None
G	6	D	None

Ans → ① network diagram :-



② Decide the completion period :-





(3) Expected project duration :-

(1) A - C - E = 4 + 7 + 8 = 19 days

(2) A - C - F = 4 + 7 + 5 = 16 days

(3) B - D - G = 5 + 6 + 6 = 17 days

The A-C-E take long duration to that and 19 days complete the project so, the critical path is A-C-E.

(4) Total float :-

Activity	Total float
A	
B	
C	
D	
E	
F	
G	
H	

CH-3 # MATERIALS & STORES MANAGEMENT

Dt- 18.05.21

3.1 It is necessary to maintain a stores of various types of construction material at one or more places in a division, so that the execution of work will be efficient, before start of any work, materials should be arranged well in time.

→ The safe custody & proper distribution of store materials, are the responsibility of its divisional officer. stores are to be protected against deterioration, fire, damage & theft etc.

→ The materials in the store are kept at the divisonal head-quaters or it may be under the charg of sub-divisional officer & J.E who are responsible to the divisonal officer for maintaning the proper account & safe costody of stores.

→ usually the stores are responsibility of sectional officer who maintains initial records of all receipts & issue of various items of the store. But the divisional officer is the ultimately responsible for the stores for proper upkeep of all stores of his division.

→ The store is heavy, a storekeeper may be appointed with the proper sanction of the competent authority.

→ The store kepper is confined with duties for the safe custody, preservation & issue of store Also it is the responsibility of the store keeper to maintain proper record of the store.

→ under the his charge, the secational officer / J.E has the entire responsibility of the store.

→ Duties of storekeeper :-

→ The storekeeper receives the materials, goods & equipments & check them for identification.
→ The storekeeper records the receipt of goods.
→ The storekeeper connects the position of all the materials & supplies in the store.
→ The store keeper prevents any un-authorised persons to enter in to the store.
→ The store keeper keeps the store clean & in good orderly condition.
→ The store keeper checks out the bin card balance with the physical quantities in the bins.
→ The storekeeper issues the materials to the user only on the receipt of the authorised stores requisitions.
→ The storekeeper records & updates the receipts & then issues the materials.
→ The store keeper issues the materials promptly to the users.

→ Material management :-

→ A major part of the capital invested in an industrial concern is spent for materials, so there should be adequete management and control of materials. A small saving in material can reduce the production cost.
→ So material management is an integral function of different sections of the organisation material management deals with the supply of materials & other related activities & aims at minimum expenditure on materials.
→ material management deals with the overal activities of material such as type amount, movement, purchase, location, timing of various materials which are used in an industrial organisation.

→ objectives of material management :—
→ It increases the operational efficiency of the personnel in the field of material management.
→ It tries to modify the paper work procedure to minimize delay in procurring materials.
→ It minimizes the cost of production.
→ It develops high inventory turn over ration.
→ It minimizes the materials cost.
→ It helps to provide the desired quality of materials when required at the lowest possible cost.

→ function of material management :—
→ material planning
→ material purchasing & procurement.
→ storage & store - administration.
→ inventory control.
→ Internal & external transportation.

Dt - 19.05.21

→ classification of stores :—
stores can be divided in to 4 catagories according to public work department.
① stock
② Reserve stock limit
③ sub - heads of stock
④ materials charged directly to works.

① stock :—
→ The stock is the store which is required for general work & kept under suspense head & finally issued for the work.
→ The items which are in common use in the construction activity for the execution of different works are kept in stores. such materials of

general use such as cement, timber, bricks, steels, aggregates, paints etc are kept in store & are called as stock.

(2) Reserve stock limit :-

→ If the materials remain in stock for a unduly long period, there are changes of deterioration of quality of the material, so it is necessary to stock that materials which are likely to be consumed in the near future.

→ Therefore unnecessary collection of large quantity of materials should be avoided in the stock.

→ Thus every year the max^m limit of purchase of materials & keeping them in the stock of division is fixed & this is known as Reserve stock limits.

→ So in order to prevent loss on deterioration of material though long period of storage, only the limited quantity of materials should be stocked every year.

→ The reserve stock limit can be increased during the period of special urgency. This increased limit is termed as the temporary reserve limit.

(3) Sub-heads of stock :-

The various materials of similar nature grouped under different sub-heads to facilitate the proper maintenance of stock account are known as sub-heads of stock.

(i). Small stores
(ii) Building materials
(iii) Timber
(iv) Metal
(v) Fuel
(vi) Painter's store
(vii) House fittings
(viii) miscellaneous stores.
(x) storage.

2 → Issue of materials :-

→ The storekeeper can issue the materials to different departments upon the receipt of a withdrawal from with properly authority & it is called as material issue requisition form.

→ Depending upon the nature & amount of material to be withdrawn from stores the material requisition is prepared in duplicate by the manager.

→ Both the copies are sent to the store keeper who issue & records the materials distributed.

→ Then the copies are forwarded to material accounting division.

→ one copy of material requisition is retained by the stock ledge clerk for an entry in the issue section of the stock ledger account.

→ The second copy is send to the foreman of the department to use it for a charge in the appropriate production order. for which the material requistion is prepared

material Requistion

NO. ——

material requistion for ——

Department ——

Sl No.	Description	code no	Quantity: Demanded	Quantity: supplied	Rate	Amount	entered on store register page no.

Requisitioned by —— Approved by —— material issued by —— Received by ——

→ Issue of stock material :-
→ material is issued for use on work either departmentally or by the contractor.
→ Dispatch of stock materials to other divisions & sub divisions.
→ Dispatch to other departments.
→ For sale to the contractor or other local bodies.

→ Indent & Invoice :-
→ materials are issued from stock on demand in a proper form called ident from ident form consists in triplicate of counterfoil, indent & invoice.
→ The counter foil & indent parts of the ident form are filled by the indenting officer.
→ Then the ident & blank invoice form are sent to the issuing officer incharge of stock who issue the stores as per availability of stock.
→ Invoice is an indent having list of articles actually issued & giving prices particulars of the articles.
→ Then the issuing officer corrects the indent & fills up the invoice. The issuing officer sends it back to the indenting officer to sign the invoice & return it to issuing officer as an acknowledgement.

→ Rules for preparing indent & invoice :-
→ Indent is prepared on the prescribed form P.F.R - 26 which is in the ident book, each indent book consists of book no & have 100 leaves in triplicate. indent is prepared in triplicate while filling up indent, some points are to be taken also consideration.

(1) There should be a description of unit of supply & quantity of material indented written clearly.
(2) The cost of materials of the head of account should be specified.
(3) The name of the work should be given when the material is issued for carrying on the work.
(4) Full details of departments, divisions & any other person for which the materials is issued should be given.

The preparation of indent is done by indenting officer in triplicate with a carbon copy & duplicate & triplicate are forwarded to the supplying officer.

→ Bincard :-

→ Bin card maintains the details of quantities of each type of material received, issued & on hand each day.
→ The materials & other items are kept in appropriate bins, drawers or other receptacles
→ The storekeeper maintains the record on a bin card & the bincard shows the details the quantities of each type of material received and issued. A bin or shelf is attached to each bin card.
→ Bincards are made in duplicate. one is attached to bin & another is for the storekeeper.
→ Bin card contains the details of issue & receipt of materials
→ The store inspector checks out the bin card periodically about it's maintenance accurately also a bin card contains the information like the normal quantity of each material to be ordered
→ Placing of the orders of items in advance may be

included in the bin card so that the materials can be ordered & Procured in time.

Bin card

Bin no ____ max^m quantity ____
material ____ ordering level ____
code no. ____ min^m quantity ____

Date	Quantity Received	Quantity issued	Balance	Remarks

→ ordinary tools & plant :-

① The tools & plants which are required for the general use are general or ordinary tools & plants.

→ The expenditure on these tools & plants is debited to minor head.

② special tools & plants :- The tools & plants which are required for the special work known as special tools. The cost of these tools is debited to the concerned work. These tools include items like crane, tar-boiler, compaction machines etc. These are not use general work.

→ Account of tools & plants :- The numerical amount of all types of tools & plant is kept in each division or sub division as a whole.

→ until the competent authority writes the tools becomes unserviceable or they are actually old. The accounts of tools have to be maintained.

→ If the tools & plants are given on rent. it is essential to notice that the articles are returned without defects & with good condition.

→ For imperishable articles like type writers, furniture they are either charged to the head of account or receive free of cost.

⇒ physical verification & inspection of stores:

- Necessity :—

Inspection of stores and its physical verification is essential for fulfillment of following objectives:-

(1) To ensure the correctness of stock held by comparing them with the balance stone in the stone ledger or bin cards.
(2) To avoid shortage of materials in the stock
(3) To check losses in inventory due to pilferage, improper storage or misplacement deterioration etc.
(4) To correct & update stone records.
(5) To calculate the values of the stock carried for the balance sheet & profit a loss account.
(6) To calculate the rate of turn-over of an item.
(7) To ensure maximum economy in stock carrying.
(8) To effect insurance covers.

2 → Issue of materials :-

→ The storekeeper can issue the materials to different departments upon the receipt of a withdrawal from with properly authority & it is called as material issue requisition form.

→ Depending upon the nature & amount of material to be withdrawn from stores the material requisition is prepared in duplicate by the manager.

→ Both the copies are sent to the store keeper who issue & records the materials distributed.

→ Then the copies are forwarded to material accounting division.

→ one copy of material requisition is retained by the stock ledge clerk for an entry in the issue section of the stock ledger account.

→ The second copy is send to the foreman of the department to use it for a charge in the appropriate production order. For which the material requisition is prepared

Material Requisition

NO. ←

material requisition for _____

Department _____

Sl No.	Description	code no	Quantity: Demanded	Quantity: Supplied	Rate	Amount	entered on store register page no.

Requisitioned by _____ Approved by _____ material issued by _____ Received by _____

CH-4

CONSTRUCTION SITE MANAGEMENT

4.1 (Lamp) → Job layout :-

In general job layout is drawing the prepared plan of the construction site by the site engineers in charge of the project.

→ Before starting the construction work, job lay out plan of the project at any site is prepared.

→ Job layout plan is prepared inorder to facilitate the construction work smoothly & orderly.

→ Generally construction projects are carried out in the form of camps.

→ JOB lay out is otherwisely known as site layout

→ The construction camps should be made with proper arrangement. The arrangements made at the construction sites & the area around is known as job layout.

⇒ Objective of preparing job layout :-

→ It saves time in delivering the construction materials at the site

→ The best method of working may be adopted.

→ It helps to complete the work within the minimum use of equipments.

→ The maxm output from labours machines can be taken

→ It provides safety to the workers.

→ It helps to damage to the nearby properties due to construction work.

→ It plays for the construction materials to be placed as near as possible to the work site

⇒ Review Plans :-

Before preparing a job lay out, the details of different plans for the execution of the work

should be studied carefully.
① site plans.
② working drawing / building plans.
③ specifications.

D-1 - 21.05.21

① Site plans :—
→ The boundaries of the site.
→ The adjacent area of the boundaries of the construction site belonging to the owner.
→ It indicates the name & width of the adjacent road in relation to the position of the site.
→ space left around the building to secure verification of free air condition.
→ location of any existing building standing near site.
→ space left around the building for cleaning & admission of light.
→ The site plan also shows the north line direction relative to the building plan.
→ The existing building's size, location which are proposed to be demolished.
→ It also shows the position of any existing water mains, sewers, electric lines.
→ position of any natural drains, rivers, wells located near the site.
→ Indicating the distance of building work from the road adjacent to the building.
→ Any other information which are considered to be necessary.

② working drawing :—
The working drawings consists of the buildings plans & other works to be constructed at the site. The working drawings include

→ Floor plans of the building with covered area, size of the room, openenings of doors & windows, structural members, stair cases, ramps & lift if any.
→ Elevation of all sides are shown.
→ Indication of direction of north line in the plan of building.
→ Indication of terrace plan which includs the drainage & slope of the roof.
→ Location exactly of the esential service like water closet, sink, bath etc.
→ Indication of projected portions beyond the permissible building line.
→ Showing the sectional details, drawings of footing, thickness of basement walls, wall construction, floor slabs with their materials.
→ Indicating the height of building, rooms & also the height of the parapet.

(3) Specification :-
→ Specification indicates the detail of the type and grade of the material to be used in construction work, which are signed duly by the authority or engineer & shall be available at the working place before start of any work.
→ construction specification can be define as the details of construction work in the form of written instruction to be undertaken in the construction work.
→ specification is an important document in the construction Industry which helps the designer to communicate his thoughts & ideas to the other construction team members.
→ specification serves to guide the supervisor

, guide to bidders are written to supplement information shown on drawings.

⇒ Types of specification :—

(a) standard specification.
(b) out line specification.
(c) project specification.
(d) Guide specification.
(e) Manufacturer's specification.

(a) standard specification :—
The specification prepared for the general use of trade e.g. indian standard specification.

(b) out line specification :—
These are the specification used at the time of bidding & prepand usually to company the preliminary drawings of the work.
→ It provides the basic information about the type/grade of the materials to be used for the construction work.

(c) project specification :—
These are the specification which are prepared for a perticular project taking into account for the special requirement.

(d) Guide specification :—
These are the specification prepared to guide the specification which is prepared the project originally.

) Manufacturer's specification :—
These are the specification which are prepared by the manufacture to specify the quality of the products manufactured by them.

⇒ use of specification :-
→ specification is an important document of any work.
→ specification are generally useful for the contractors to prepare the estimate for submission tender.
→ Also it is useful for the contractor to order the materials for executing the work.
→ It is a contract document bet^n the owner & the contractor.

⇒ Factors influencing selection, Design & layout at construction :-
Job layout facilitates the construction work smoothly and also shows the exact location for placing the resources of construction work at construction site & the area around it.
The following factors influencing selection, design & job layout of a construction site.

① Nature of the project :-
→ The nature of the project plays an important role in it's layout process. The camp layout depends on the nature & type of project.
→ Ex :- The layout of camp for a highway construction project will differ from that of a building.

② Location of project :-
→ Location of the project also plays an important in the job layout plans.
→ The location of project should be properly chosen such that there will be no difficulty for any type of climatic situation or transportation.
→ Transportation facility to the construction site is an important factor facility for transportation of materials & equipments to construction site, will

affect the job layout.

(3) Services :-
There should be proper service of water supply, sanitation & electricity.
→ If these services are not available, then it will badly affect the job layout.

(4) Availability of materials & equipments :-
There should be sufficient available of material & equipments at the construction site.
→ If the materials & equipments are not available locally, then it will create problem in storage which will affect the shape of job layout.

(5) Availability of man power :-
manpower is an important resources in any construction site.
→ The arrangement of manpower at construction site should be made locally, otherwise it will be a greate difficulty for their shelter if arranged from out side.
→ So labour is to be arranged locally at the construction site otherwise it will effect the layout for their shelter.

(6) Medical facility :-
→ If the project is for a long time, it is essential to have a field medical facility for the workers.

(7) Availability of space :-
→ If there is less space available at a construction site, then it will be difficult for job layout because the storage should have to be located nearest to the working site such that the regular suply of materials & equipment is possible as required.

(8) Other miscellaneous factors :-
There should be availability of education facilities like schooling for the children of labour & staff, daily necessities of life & other welfare facilities for the worker.
→ If these facilities are not available, then it will also tend to change the layout of the project.

→ Principles of storing materials at site :-
The materials should be stored in proper manner at the construction site.
(1) materials should be stored at construction site so as to prevent mixing of foreign matter.
(2) materials should be stored in such a manner as to protect it from any weathering agent like rain, sun & wind.
(3) materials which are suspended to get fire easily should be prevented from fire hazards. The products like petroleum & explosives should be stored properly.
(4) precast beams, pieces of timber & slabs which are likely to be affected by the subsidence of soil or support should be stored with properly adopted measures.
(5) materials like cement bags which are easily affected by the contact of the moisture are to be stored with special precautions.
(6) The materials which are regularly used are to be placed relatively nearer to the place of use.
(7) The materials which arrived freshly should not be placed on those materials which arrived earlier. There are the perishable materials which deteriotates during storing. They should be kept by replacing old materials with fresh materials.
(8) There should be proper arrangement of fire extinguishers & fire buckets wherever necessary for the safety measure.

Dt - 25.05.21

2 → Location of equipment :-

→ As there is a increased cost of labour, the use of more & more mechanical equipments becomes necessary for construction work very often the available manpower is not sufficient for the completion of construction work with in stipulated time, so it is essential to use mechanical equipment along with the available manpower for the construction activity.

→ so, there should be a careful consideration for correct choosing at right equipment.

→ For a construction project to be completed with in the scheduled time economically, it is essential to choose the correct & well operated equipments

→ Taking in to consideration of limited resources, it is not possible for any owner or contractor to purchase all types of equipments which are needed for the job. so the owner or contractor may purchase some of the equipments & some other they will hire.

For the location of equipment, following points are to be considered.

(1) Equipment should be nearer to the construction work.

(2) Equipment should be near to the material.

(3) The owned equipments may be provided near the entrance so that there will be no requirement of any aditional guard.

(4) The hired equipments should be placed in suitable places & the vacant place may be left where it can be accomodated.

(5) There should be provision for the repair of the equipments.

→ Layout of Equipments :-

These are some of the points which are to be considered at the time of preparing layout of equipments.

(1) The equipments should be placed as near as to the place of materials.

(2) The maintainance, reparing & fuel filling of equipments should be arranged at the construction site.

(3) There should be arrangement of security staff for the safety of mechinery.

(4) For removal & shifting of equipments to the work place, there should be availablity of sufficient space.

(5) There should be adequate space available for parking of the transport vehicles.

(6) Temporary sheds should be provided to safe guard the costly equipments from any type of weather condition.

(7) The main entrance of the project work & the main office of the establishment should be nearer to eachother, so that no visitors have to cross the work site.

(8) No material can pass out of the project work without the proper check by the security check posts.

(9) There should be provision of adequate safety measured & fire prevention equipments at in the work site.

→ Organising labour at site :-

→ organising labour properly at the working site is an important responsibility of the supervisory staffs.

→ The labours are divided into different groups

by the supervision under the guidance of a effective leader who has the quality to control the labourers.

→ In any construction work, the labours are divided into groups with the instruction for different works.

→ So labour organising should be done by the supervison in such a way that there will be no wastage of man power. The work will be completed efficiently with in the stipulated time period.

- Suppose ten labourers & one supervision are put for beam casting. The division of labour may be

(1) For bringing the aggregates, 3 labourers are put.

(2) For mixing the ingredients one labour is put.

(3) Four labourers are put on some other work

(4) For compaction purposes 2 labourers are put.

- There are some points which are to be considered while organising labour at construction site

(1) Rehandling of materials unnecessarily should be avoided.

(2) supply of material should be sufficient as per requirement of labour.

(3) The material should be taken once for the whole day from the godown. It reduces the frequent movement of labour.

(4) Labour supply should be uninterrupted.

(5) There should be some permanent labours as it is economical.

(6) Increasing & decreasing of labour should be done as per necessity.

(7) To avoid wastage of time of labours, drinking water facility should be made available at the site.

(8) A record should be maintained about the progress of the labour.

(9) Record maintain once will help to compare the progress of work with the completion of work at right time.

→ The job layout is the arrangement made for the smooth execution of the project.

→ The layout is a predrawing of the construction site in which all the features of the construction such as entry & exit points, storage room, office room, equipment keeping space & labour housing are mentioned.

→ In any construction project, men, materials and machines are the 3 basic input which must be properly available & controlled at the site.

→ The materials are stored as neat as possible to the site.

→ similarly the machines are to be positioned properly. The accomodation must be available for the workers.

Preparation of job layout :—

→ The construction plans, specifications, contract, documents & other available material describing the job should be studied carefully in order to get the idea of the nature & extent of the work & a scaled drawing with a scale of 1 in 100 should be prepared showing the out line of the work or job to be constructed.

→ also the position of entry & exit points as well

as the area of temporary facilities should be marked on it.

→ moreover, following information should be collected from the above study.

(1) Area needed for accomodation: This area includes the area required for office, stores, residental accomodation for officers, staff & labour.

(2) Area required for machines, sheds, repair shops & work shopes etc.

(3) Area for security & fire fighting facilities.

(4) Area required for construction work.

(5) Area for miscellaneous amenities such as canteen, toilets, dispensary etc.

(6) length of period for which area may be available.

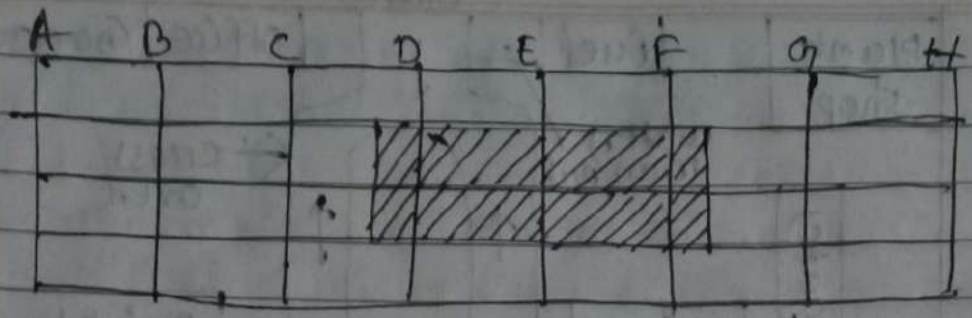
→ while deciding the location of each area, the principle of storage of materials and equipment as well as the factors which affect the job layout should be kept in mind.

→ The problem of allocating the space for men, materials and machines has to be tackled separately for each site.

→ Thus a plain is prepard from the data collected.

→ on this plan, natural features such as rivers, drainages & other such obstacles should be marked.

→ Also different requirements of spaces as discussed above should be marked in the from of the grid on the same plan as shown in fig.



Existing boundry wall

Toilet | wash | Brick & tile | Labour house | aggrigate storage

Road 60m

Steel bar bending | Building under construction | mixer | Road | Reinforcing steel

Road 65m

Entrance

security

Brick & tile | aggrigate storage | cement store | Other store | site office

G.I sheeting

Road 95m

Surplus top soil for grading | from work stone | cement concrete | sand | Stone chips | Brick

Toilet

Exit

Labour Camp

R.C.C framed Building under Construction

mixing & Batching plant

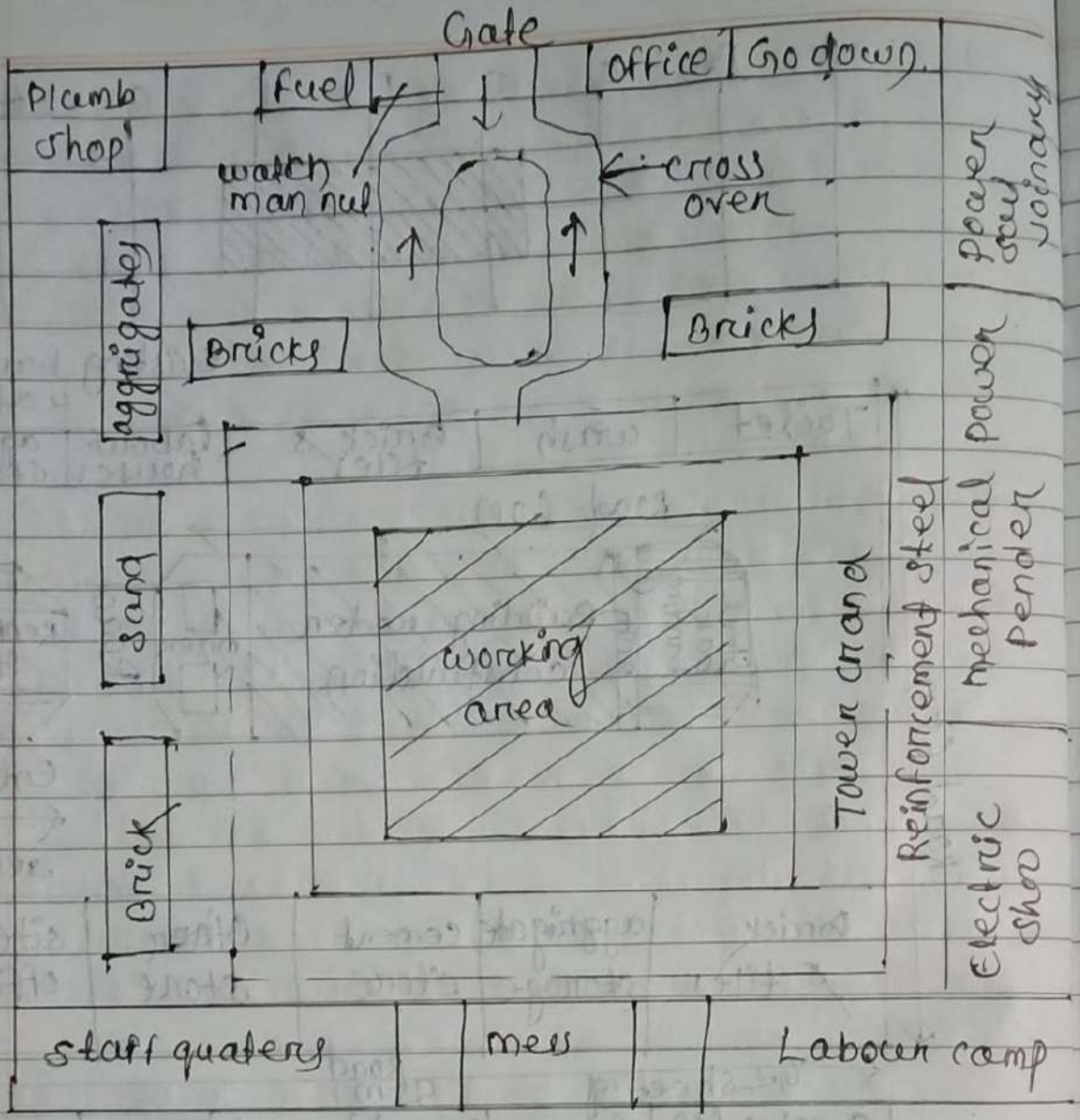
checkpost | first aid | watchmass

Entry

Office (Engg) | canteen

cycle stand

Electric shop & power house | Plumber & pump house | contractor office | work shop | TOOLS plants & machineries



⇒ Advantages of good job layout :-

→ proper safety of working in the project can be possible by a good job layout.

→ Completion of project in time is possible by a good job layout.

→ material wastage & deteriation can be reduced by a good job layout.

→ An acconomical & speedy transportation of materials can be possible by the proper job layout.

→ A smooth working of project can only be provided by a good job layout.

→ The out put of man & machinery can be increased by a good job layout.

CH-5 CONSTRUCTION ORGANISATION

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5.1 Organisation :-

→ organisation is the foundation upon which the whole business management is dependant.
→ organisation is a large group of human association united together for the attainment of common business objective.
→ man, material & mechinary are the 3 elimen which have importance for every business.
→ An organisation maintains co-ordination betn man, material and mechinary so that maxm output is achieved.
→ So an organisation is imperative for the successful performance of every business.
→ it is one of the major tasks of the chief exutives to build an organisation & also to fit the right person in the right place so that it will help the organisation to achieve the goal efficiently & economically.
→ organisation establishes the relationship of one with another.
→ organisation is the process of deligating responsibility & authority & maintaining relationship among people to work more efficiently & effectively together to achive objectives.

→ Characteristics of organisation :-

→ The organisation should have a common business objective.
→ It is a group of small or large number of people.
→ It should be executed by a proper leadership manner.
→ It should be flexible by nature.
→ It should have a clear cut show of responsibilities & duties for the people associated with it.

→ It maintains relationship bet' the administration & management.
→ It should have a definite & fixed boundary of fination of duties & responsibilities among employees.
→ The organizational structure should be clear to have a coordination bet' different departments in it.
→ organisation should have a central co-ordination system of imposing collective decisions.

⇒ Structure of an organisation :-
→ organisation structure specifies the various job tasks & shows how job tasks are formally devided, grouped & co-ordinate.
→ It provides an appropriate frame work for intra-relationship & also indicates the hierarchy or authority & the reporting relationship.
→ So organisational structure co-ordinates the relationship bet' the various positions in the organization objectives.

- There are some elements, with which each member of the organisation should be similar with following are the main elements.
(1) members of the organisation should understand about the well defined goal of the organisation
(2) They should be conversant with the rules, regulations polices procedures of the organisation.
(3) They should know with whom they have to work.
(4) They should understand their duties and

responsibilies towards the organisation.
(5) They should understand the delegation of authority and responsibility.

→ Importance of organisation :—
→ For a successful business a sound organisation is highly important.
→ organisation enbles a large group of people, working effectively together for a common goal.
→ only a sound & well designed organisation can maintain the co-ordination bet? the management & administration.
→ organisational diversification or expansion of organisation can only be possible by a well-planned & well-designed organisation.
→ Effective use of man power can also be possible by a sound organisation.
→ A sound organisation makes an optimum use of raw materials & resources.
→ wastage & expenditure is less in a sound organisation.
→ A sound organisation always stimulates the people for better, creative & innovative ideas
→ more & moral training & development of the workers can be facilitated by a sound and well-designed organisation.

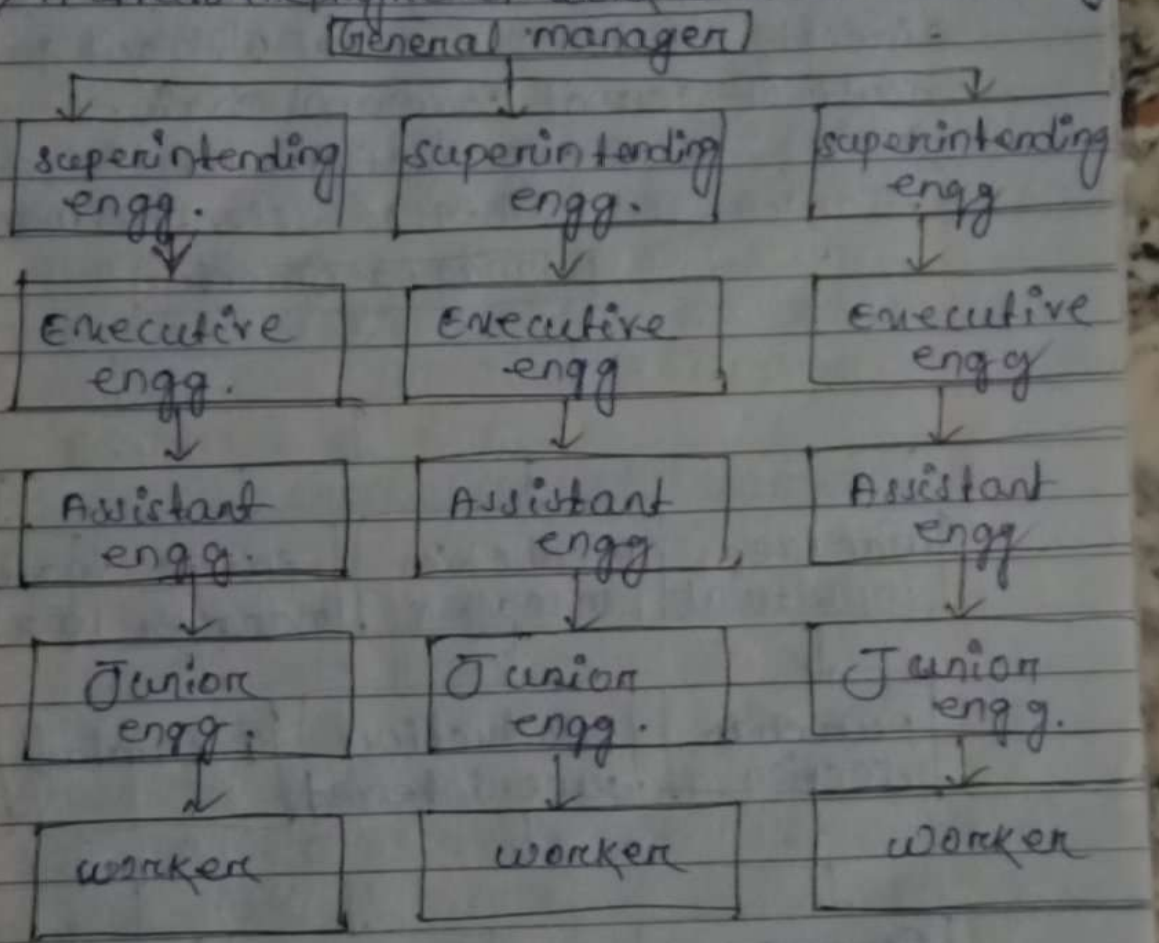
5.2 → Types of organisation :—
structure of an organisation depends upon the size of the organization, nature of the manufactured product, from the view point of distribution of authority & responsibility among the members of the organisation.
(1) Line or military organisation
(2) Functional organisation
(3) Line & staff organisation.
(4) matrix organisation.

① Line or military organisation :—
→ Line organisation is the simplest and earliest form of organisation.
→ It is also known as scalar organisation or military type of organisation .. superior delegates authority to another subordinate & so on, forming a line from the very top to the bottom of the organisation structure
→ line organization approaches the vertical flow of the relationship.
→ In line organisation, authority flow from the top to the bottom. It is also known as the chain of command or scalar principal

• Advantage of line organisation :—
→ This is one of the simplest form of organisational structure.
→ It is simple to work effectively & economically.
→ In this structure of organisation, discipline is easily maintained.
→ It facilitates decision making & execution.
→ Also quick decision making & action are premitted to one individuals.
→ performance of duties in a perfect manner can be fixed upon certain individuals.
→ An effective co-ordination is maintained with in each department of organisation.
→ In this structure of organisation, due to the flexibility of the system, one person can be moved from one position to another without any difficulty.

• Disadvantages :—
→ sometimes, the top executives are over loaded with work.
→ persons with specialistation are neglected by this arrangement.

→ Due to neglect, loss of capable person may affect badly the entire organisation.
→ During to loss of specialisation, it may cause more vestage of materials & man power.
→ The major disadvantage is that if any wrong dicission is made at the top level the same is carried out simply without any objection down the line.
→ It affects the progress of work as a whole not partly



- Applications :—
→ This is suitable for small & medium size factories free form all complexities.
→ It is also suitable where continuous process industries such as paper, sugar, textile, spinning and weaving mills etc.
→ It is more suitable where automatic plants are used.

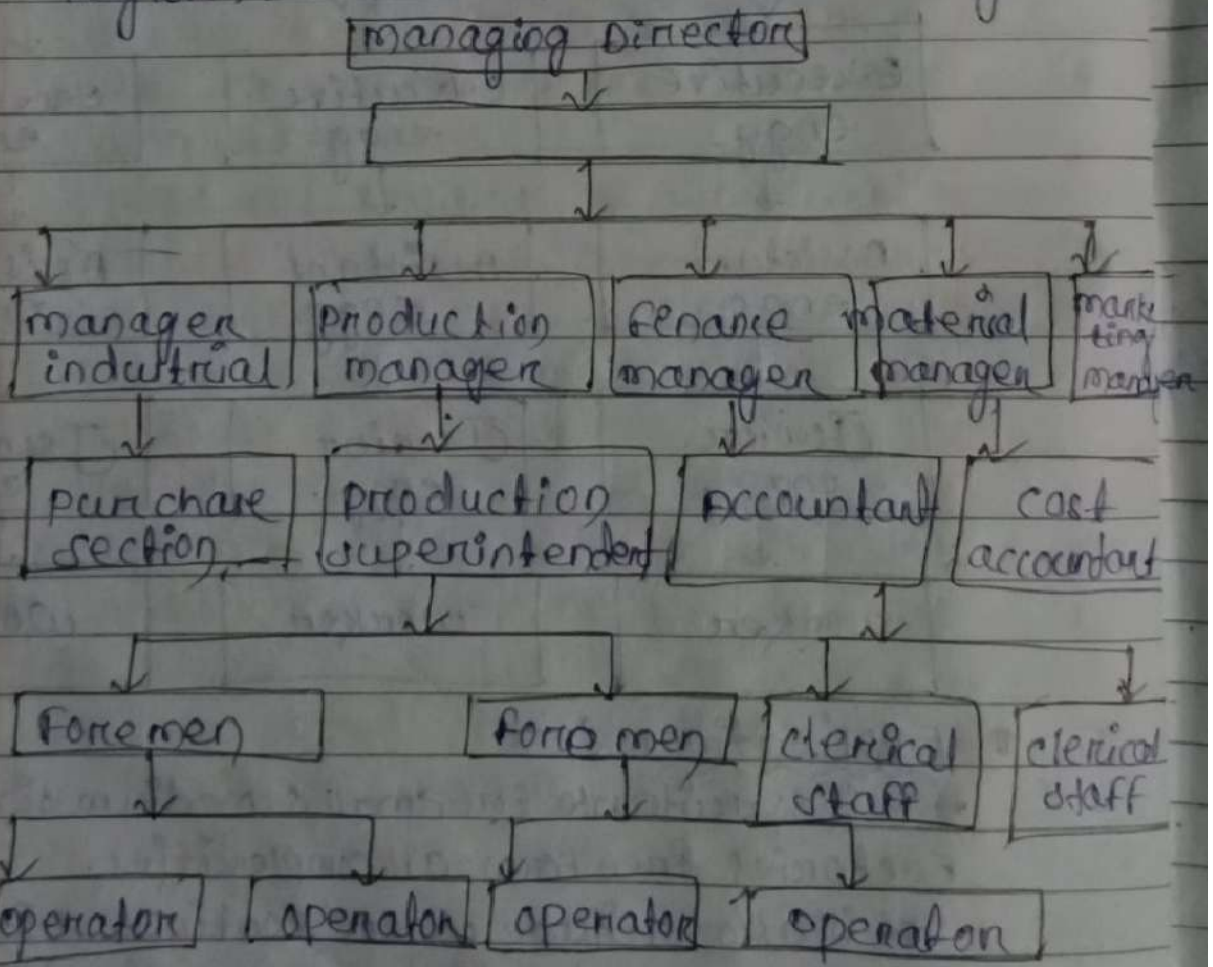
② Functional organisation :-

→ A Functional organization is a common type of organizational structure in which the organization is divided in to smaller groups based on specialized functional areas, such as IT, finance or marketing.

→ A Functional organization is one in which work is organize on the basis of specialization.

→ Thus expert staff personnel pass instructions directly to line personnel without taking the route of formal command chain.

→ This form of organisation was divised by F.W. Taylor, the father of scientific management.



- Advantage :-

→ Because of its simple logic & commonsense appeal, this type of organisation is most

widely used.
→ On the basis of functional specialisation the whole work of the organisation is divided.
→ due to functional specialisation, the efficiency increases as each person has to perform limited number of function.
→ It makes use of specialists to give expert advice to workers.
→ also the number of accidents & wastages of material can be reduced by expert guidances.
→ By grouping people together on the basis of their specialist expertise, organisation can prosper.
→ Functional grouping also provides opportunities for promotion & career development.

- Disadvantages :—
→ Is that creat conflict because of the growth of any sectional interest.
→ There is no clear cut line of authority.
→ It is difficult to fix responsibility.
→ It is difficult to maintain discipline in the organisation.
→ It makes the complex industrial relationship.
→ It is difficult to know who is the 'boss' of whom.

- Applications :—
→ Functional structure is best suitable to the small to medium organisations which produces one or a few products.
→ Also this pattern is followed in all goverment and private concerns such as chemical plants, steel plants, electricity board where much complicated operations are involved.

Dt - 28.05.21

(3) Line and staff organisation :-

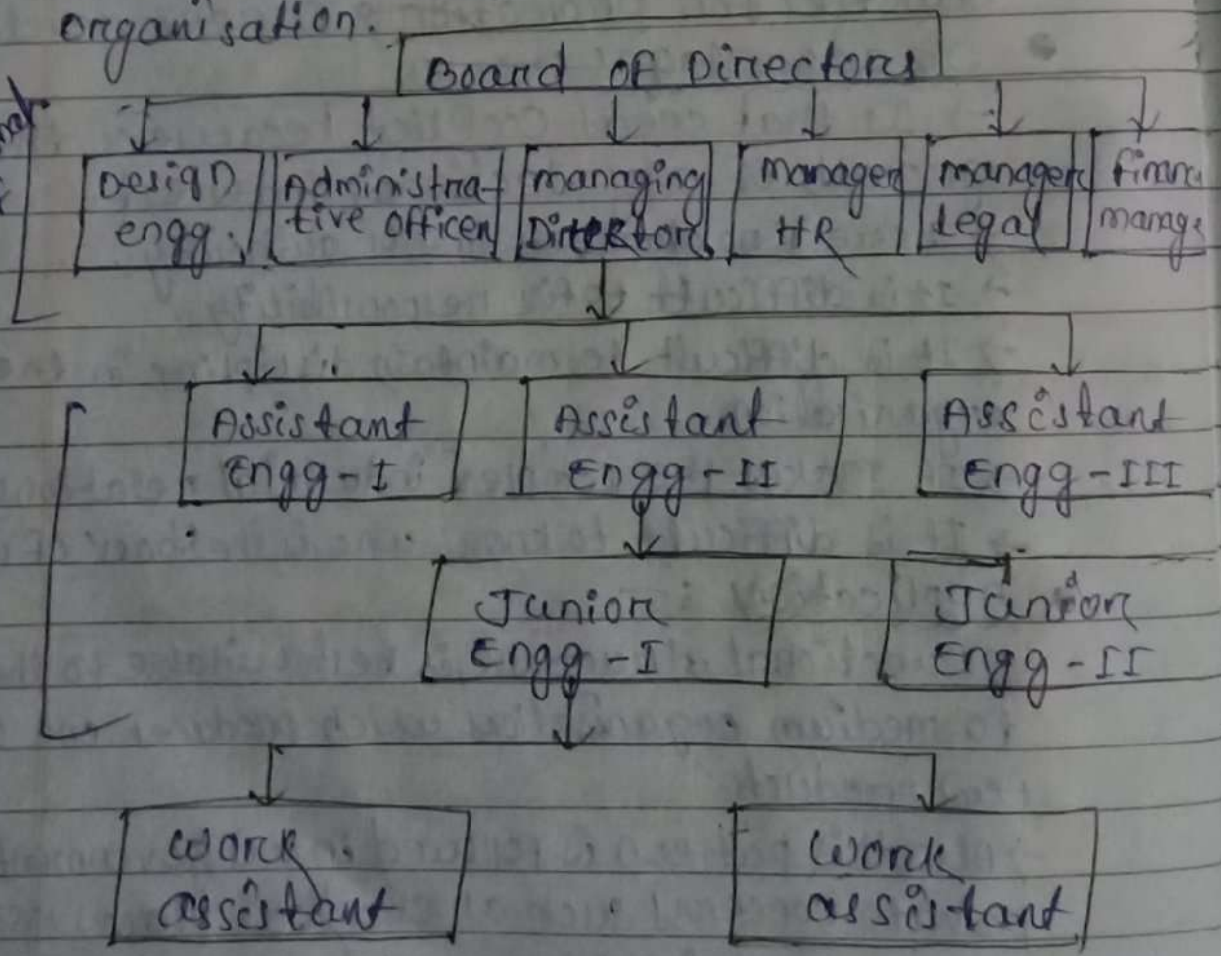
→ Line staff organization in management approach in which authorities (e.g. managers) establish goals & directives that are then fulfilled by staff and other workers.

→ A line staff organizational structure attempts to render a large and complex enterprise more flexible without sacrificing managerial authority.

→ Line & staff organization is a modification of line organization & it is more complex than line organization.

→ This type of structure is not followed in very small organisation.

→ As the name suggest this type of organisation is the combination of the line and functional organisation.



- Advantage :-
→ Line & staff organisation possess all the advantages of the line & functional organisation
→ Discipline is maintained by the line authority.
→ It improves quality of product.
→ Expert advice from specialist staff executives is available. so it is a planned & specialised system.
→ line executives get sufficient time to devote more to achieve organisational objectives.
→ It enables availability a greater variety of jobs
- Dis-advantage :-
→ Due to high salaries of the staff executives the product cost will increase.
→ There may develop jealousy bet^n the line & staff executives.
→ If the duties & responsibilities are not clear it may create confusion between line & staff organisation
→ staff personal do not have direct authority to enforce their decisions & Implement their ideas.
→ Due to lack of authority, the staff organisation may be ineffective to work.
→ sickness of any one section will affect the whole system, which may creat indiscipline among the workers due to lack of responsibility.
- Application :-
This type of organisation is best suitable for medium & large scale industries. line & staff organisations can be applied to automobile & other intermittent industries depending upon their internal structure.

(4) Matrix organisation :-

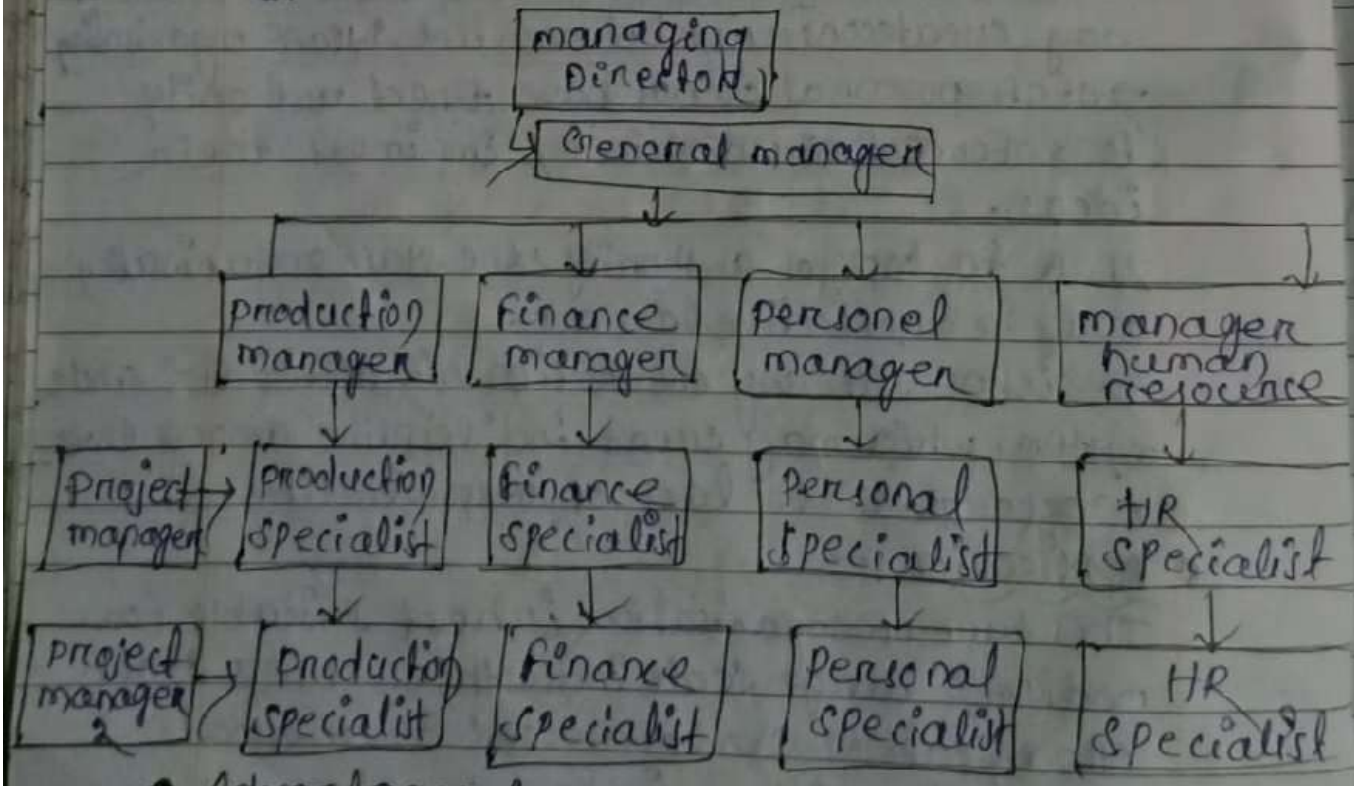
→ matrix management is an organizational structure in which some individuals report more than one supervisor or leader, relationships described as solid line or dotted line reporting.

→ The matrix organisation structure is complex but helps in achieving the ultimate goal i.e reaching higher productivity.

→ It has various benefits. This type of structure is used in organisations which have diverse product lines & services

→ It breaks the monotony & gives more flexibility to the organisation.

→ Employees work with colleagues of different departments who have their expertise in different functions.



- Advantages :-

→ The cases, where the project authority and functional is well defined, this concept is best

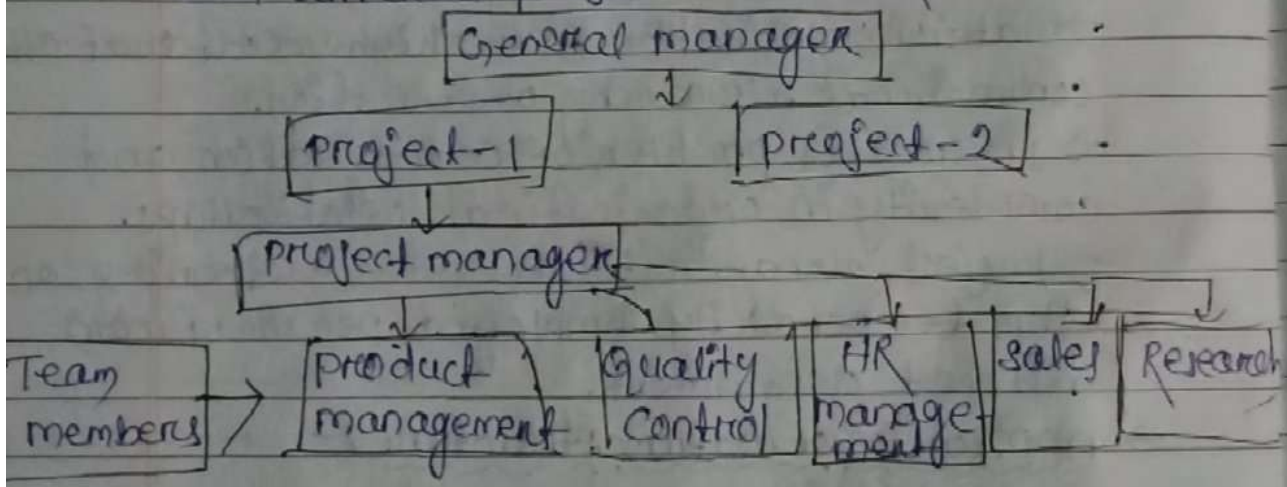
suited.
→ It ensures the effective utilisation of the services of the people with highly specialised skills.
→ communication improves by direct contact with the different functional specialised.
→ In ensures flexibilitity by the freqeuent contact of the functional specialists.

● Disadvantages :-
→ Reporting to one boss introduces role of conflict and ambiguity among workers.
→ The struggle bet? project manager & functional manager creates conflict for sharing of same set of resources.
→ matrix organisation encurs higher cost that other conventional hierarchy organisation.
→ In creates problem of coordination and complexity in organisational relationships.
→ project manager doesnot have authority on the temperarily employed persons from different department.

→ Application of matrix structure :-
(1) Advertising agencies.
(2) Aerospace firms.
(3) Research & Development laboratories.
(4) Construction companies.
(5) Hospital, insurance, banking.
(6) Government agencies.
(7) management consulting firms.
(8) Entertainment Companies.

→ Project organisation :-
→ when an organisation faces difficulty with a big project or a number of small projects it

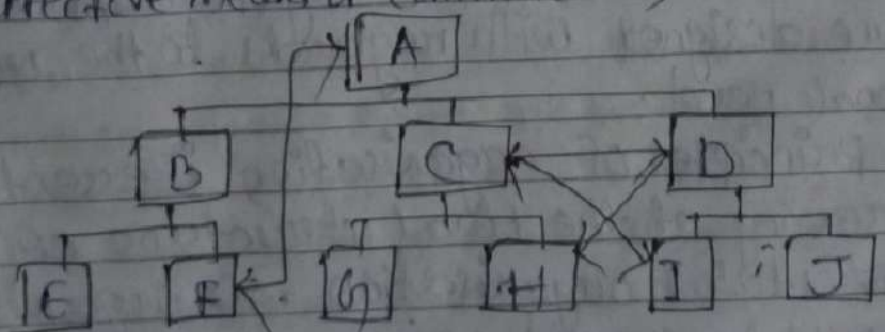
creats project organisation or it lanches a project organisation for the completion of the same.
→ when the project size is big & subject to high standard of performance, the project organisation is formed because the existing functional structure of the organisation may not be suitable to complete the project with in limited time.
→ Every project orgnisation consists of a team of specialist from different department of the company or from outside which is headed by a project manager.
→ In every project team size of group may change with different phases of the work.



- Advantages:-
→ project organisation is the way of bringing the participating specialists of the project team together & they also get an opportunity for the effective accomplishment of the goals of the project. This is a motivation to the specialists
→ It enables flexibility in handling various tasks.
→ It provides a communication betn project manager and the team members.
→ project organisation is separate from the existing project before.

- Dis-advantage :—
→ If the project manager fails to control the activities of the project properly, the entire project becomes meaningless.
→ The role of the project manager becomes challenging & very difficult because he has to deal with different specialists from different department.
→ It is difficult to take any decision with specialist from diverse fields.
→ conflicts may arise among the specialists
→ As the project work is temporary & time is limited, the job of the specialist remains under quite uncertainty & insecurity.

→ Informal organisation :—
→ In informal organisation, there may develop many informal relationships b/n the lower employee with the higher employee due to a number of reason.
→ The primary function of informal organizations is basically to maintain cultural values of people. another function of informal organisations is to provide social satisfaction to members.
→ Finally an informal organisation also provides an effective means of communication to its members.



- advantages :-
→ Result is obtain quickly & more efficiently due to informal relationship.
→ The social activities of the employees are fulfilled by such relationships.
→ The workers are diverted from their work pressure.
→ The dispute or misunderstanding among the employees may be minimised for a natural leader of the employees.
- Dis-advantages :-
→ Due to informal relationship, it may create favouritism detrimental to employee relations.
→ It may break down respect for superiors.
→ Some secret or confidential information may have the chances of leakage from top level to lower level.
→ Due to informal relationship, the rumours may spread in the organisation very fast.

⇒ Principles of organisation :-
→ Principle means general rules & regulation which can be applied under similar conditions.
→ For a succesful organisational relationship & achieving the basic objectives of the organisation, there are many principles which are designed with regards to the organisational need.
→ Principles of organisation is essential for arriving at the final structure of an industrial organisation. So organisations should be based on some principles.

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(1) Principle of objective.
(2) Principle of division & distribution of work.
(3) Principle of co-ordination.
(4) Principle of efficiency.
(5) Principle of deligation.
(6) Principle of authority & responsibility
(7) Principle of span of control.
(8) Principle of balance.
(9) Principle of communication
(10) Principle of basic component of the organisation
(11) Principle of definiteness
(12) Principle of unity of command.
(13) Principle of scalar chain.

(1) Principle of objective :-
→ In an organisation different employees perform different work.
→ Every employee works for achieving objectives of the organisation because it has an important bearing an organisation structure.

(2) Principal of division & distribution of work :-
→ The main work of the organisation should be divided into many subparts, jobs, bits etc.
→ After dividing the work scientifically, the similar activities should be grouped together for better distribution among the employees.

(3) Principle of co-ordination :-
→ In an organisation, the different employees perform different work according to their capacity.
→ For this reason, the main work is divided in to sub-parts & each sub-parts is grouped and are distributed to different employees.

④ Principles of efficiency :-
→ Achievement of efficiency is an important principle of the organisation.
→ The efficiency at all the levels of work can be achieved under one condition that there is optimum utilisation of the available resources.

⑤ Principles of effective deligation :-
→ For a sound organisation, effective deligation of duties & responsibility is essential.
→ with the help of deligation, the executive gets his work done through his sub-ordinates.
→ By paising down the work of executive to the sub-ordinates, they can be able to take decision themselves to perform efficiently.

⑥ Principle of authority & Responsibility :-
→ The necessary of authority & responsibility is high for getting the works done through deligation.
→ So for a smooth functioning of an organisation both authority & responsibility are the two components that have high importance in the organisation.
→ Through the deligation process, the authority & the responsibility can be transfered.
→ It is important that the authority should be equal to the responsibility because a person with out authority can't be held responsible.

⑦ Principle of span of control :-
→ An executive or superior can't supervise the work directly when he has a large number of subordinates for guidance. so an executive or a supervison can supervise the work directly of many six numbers of sub ordinates.

(8) Principles of balance :-
→ According to this principles, a perfect balance should be maintained among power, authority & responsibility.
→ Excessive centralisation & excessive decentralisation of power in the organisation should be avoided so as to maintain perfect balance between both.

(9) principle of communication :-
→ communication is a process through which different parts of an organisation can be tied up together.
→ Communication in organisation is essential because though it the information & instructions are transmitted within or outside of the organisation.
→ Through communication, a smooth flow of information & understanding can be ensured among the individuals, departments & section of the organisation.

(10) Principle of definiteness :-
→ Different employee perform different type of work in an organisation.
→ Due to division of main work, there should be link or relation among the employees or the grp. of the organisation.

(11) Principal of unity of command :-
→ According to this principal, for every individual employee there should have a single boss or superior.
→ Every employee hould perform their work under the guidance of a single supervicer and he can ordered only by him to take the responsibility.
→ any order or instruction should be channel only through his superion.

(12) Principal of scalar chain :-
→ There should be a link among all the persons

working in the organisation with one another just like the different bids of chain.
→ As a result, the authority's command can flow properly from top to bottom of the management
→ The chain should be continuous, instead of longer chains.

→ Authority :-
→ Literarily, authority is the right to give orders & the power to enact obedience.
→ It would be defined as the right or power assigned to an executive or a manager in order to achieve certain organizational objectives.
→ Thus authority is the principle at the root of organisation & so important that it is impossible to conceive of an organization at all unless some person or persons are in a position to requin action of others.
→ Authority in project management is the power that gives a project manager the ability to act in the name of the project sponsor executive or on behalf of the organization.

● meaning & significance of authority :-
→ Authority means the right enjoyed by any individual to make a subordinate to do the work.
→ In an organisation every body possess some authority from top to bottom of the management
→ Authority is the right of a person which influence the sub ordinates to get the work done through them.
→ Authority may be in the form of punishment

on rewards to the subordinates.
→ Authority is used as per the rules, regulations, policies & norms of the organisation.
→ authority can also be defined as the power of a individual is a particular post or position.
→ There is direct flow of authority from superior or subordinates ie authority can flow from higher level to lower level of the management of the organisation.
→ Authority can be deligated which individual doesn't possess.

● Characteristics of Authority :—
→ Authority is a legal power or legitimate tool because it is provided by the institution or organisation.
→ The limit of the authority is specified by the organisation, so it is limited.
→ There may be centralised or decentralised authority.
→ Authority is provided to a particular position in the organisation not to position holder.
→ Authority must be equal with responsibility.
→ Authority must be utilised for awarding punishment to the disobedient subordinates.
→ Authority must be utilised for the rewards to the effective and efficient workers.

Dt - 2.06.21

→ Responsibility :—
→ Responsibility indicates the duty assigned to a person. If a person holding any position has to perform certain the duty assigned to him/her, then it is his/her responsibility.
→ The term responsibity is often referred to as an obiligation to perform a particular task assigned to a subordinate.

→ In an organization responsibility is the duty as per the guidelines issued.

- **Meaning & significance of Responsibility :-**

→ when an individual performs the duty which is assigned to him due to his position, it is the obligation of individual to the discharge duty entrusted to him.
→ Through this obligation, an individual may be able to achieve his desired objective.
→ Responsibility is not a burden but an obligation to carry out the activity of an individual.
→ Basically the responsibility is form the superior - subordinate relationship.
→ The superior gives the responsibility to the subordinates to complete the assignment.

- **Characteristics of Responsibility :-**

→ obligation of the subordinate in the performance of the duty assigned.
→ Has the origin is in the superior-subordinates relationship.
→ Normally, responsibility moves upwards whereas the authority flows down words.
→ Responsibility is in the form of a continuing obligation.
→ Responsibility cannot be delegated.
→ The person accepting responsibility is accountable for the performance of assigned duties.
→ It is hard to conceive responsibility without authority.

⇒ Accountability :-
→ It is the obligation of an individual to report formally his superior about the work he has done to discharge the responsibility.
→ Every employee / manager is accountable for the job assigned to him.
→ He is supposed to complete the job as per the expectation & inform his superior accordingly.
→ Accountability is the liability created for the use of authority.
→ It is the answerability for performance of the assigned duties.
→ When authority is delegated to a subordinate, the person is accountable to the superior for performance in relation to assigned duties.

⇒ Leadership :-
→ Leadership is the ability of a manager to build up confidence & zeal among the subordinates.
→ Leadership is a process of influence in a group in a specific set up circumstances which encourages workers to work willingly to achieve organisational objective.
→ Leadership style changes from circumstance to circumstances, leadership is a personal quality where there is no followers. The leader must be able to influence the behaviour, attitude & beliefs of his followers or subordinates. It exists only for the realisation of common goals.
→ Leadership is an important element of management of each & every organisation.

→ when a group of people are working in an organisation towards the fulfillment of a common goal or objective, then some sort of leadership is essential there.
→ Leadership is an ability to build up confidence among the employees & to create a confidence in them to be led towards a certain goal and objective.
Of course, leadership is the process of directing & influencing the task related activities of group members, the definition encompasses 3 implications viz.
① Leadership involves other people those may be sub-ordinate or followers who willingly accept directions from the leader. Group members help to define the status of the leader.
② Leadership involves unequal distribution of power bet^n leaders & followers. Here power implies the ability to exert influence i.e to change the attitudes or behaviours of individuals or groups.
③ Leadership involves the ability to use the different forms of influence the behaviour of followers.
⇒ necessity or importance of leadership in management :-
Where there is an of organisation people working towards a common goal & objective, there becomes a necessity of leadership, because the sucess of any organisation depends to a great extent on the, effective leadership.
→ under the guidance, help & advice of an efficient leader, an organisation can set a certain objective.

The important of leadership can be highlighed as follows.

→ Proper effective leadership can improve the morale & motivation of their subordinates.

→ It implies a motive power to group efforts

→ It leads the group to a higher level of performance.

→ It influences the behaviour of the subordinates towards achievement of organisational goal.

→ Leadership acts as an aid to authority by influencing, inspiring & taking action.

→ Leadership plays a vital roal at all levels of management because the management can't achieve the goal with out the presence of effective leadership.

→ Effective leadership creats a better understanding bet^n the subordinates & the management & improves co-operative bet^n them.

→ Style of leadership :—

The consistent behavioural pattern, as perceived by people, exhibited by a leader is known as leadership style.

→ leadership style is the philosophy, personality & experience of the leader.

→ Every leader has different Leadership style & he maintains a certain pattern for handling his subordinates or followers in various situation. According to their attitude & behaviours patterns are classified as the following.

(1) Autocratic or authoritarian style leader
(2) Laisez-faire or free rein style leader.
(3) Democratic or participative style leader.
(4) paternalistic style leader.

① Autocratic style leader :—
→ In other words is called as authoritarian leader because this type of leader yields the absolute power with himself.
→ Here the sub ordinates are completely obedient to the leader & the leader also centralises all the powers decision making in himself.
→ Autocratic leadership is a management style where in one person controls all the decisions & takes very little inputs from other group members.
→ Autocratic leaders make choices on decision based on their own beliefs & do not involve others for their suggestion for advice
→ This type of leadership style is seen mostly in business which are relatively small with fewer employees.
→ This type of leadership style is only effective in organizations where the nature of work requires quick decision-making.

② Laissez-faire style leader :—
→ This type of leadership maintains a good relationship bet' sub ordinates & leader because under this type of leadership the subordinates are allowed their more freedom.
→ They are given the capacity to decide there policies & programmes with their own style, and to take their indipendent decisions.
→ Laisser-Fair leadership is the direct opposite of autocratic leadership.
→ Instead of a single leader making all decision for an organization, group or team,

laissez-faire leaders make few decisions and allow their staff to choose appropriate workplace solution.
→ This type of leadership creates a self-confidence & encouragement among the subordinate & also creates an opportunity to develop their talents. But it is not possible to work under all situations with all types of workers.

③ Democratic style :-
→ This style of leadership is the exactly middle every positions betn two extremes of the autocratic & laissez-faire or free-rain style of leader.
→ It may be implied as a compromise betn there two types of leadership.
→ The democratic leader is charged with deciding who is in the group and who gets to contribute to the decisions that are made.
→ Researchers have found that the democratic leadership style is one of the most effective types and leads to higher productivity, better contributions from group member & increased group morale.
→ This type of leadership can apply to any organization, from private business to school to government.

④ Paternalistic style :-
→ Under this style of leadership, the sub-ordinates become dependent upon the leader.
→ Here the sentiments & emotions are given more priority & this style of leadership is based upon sentiments & emotions.

→ Here a leader looks after his sub-ordinates like a father looks after his children & family.
→ A paternalistic leader is considered as the father or his subordinates.
→ He is supposed to help, guides protect his subordinates but there is no chance of growth indivisional. The subordinates depend on the leader completely.

⇒ Role or function of a leader :-

① setting goals :-
→ It is important for a leader as a functional head to layout goals & polices & also to induce the subordinates to work with confidence and zeal.

② Charity of goals :-
→ An effective leader should have clarity about the goal, vision & knowledge of what is to be done and directs the organisation with an idea of sustainability.

③ organisation :-
This is an important function of a leader to creat and shape the organisation such that it can assign roles appropriate to individuals ability to operate towards the achievement of organisational goal.

④ Clarity about role :-
→ It is important for a leader to identify & clarify an effective role for focussing the future for his subordinates.
→ The leader himself should have the patience to wait & watch mentally about identifying & clarifying an effective role.

(5) Link bet^n the management & the workers :-
→ An effective leader maintain a better link bet^n the management & the subordinates.
→ A leader interpretes the programmes & policies of the management before subordinates.
→ Then he represents the feed back of subordinates before management. In this way he wins true faith of this subordinates.

(6) Creativity & innovativeness :-
→ It is an important function of a leader to develop new ideas, models, application of technology, so that it can differentiate the organisation & help it stand apart.

(7) Achieving the task :-
→ Leader processes clear idea about his task & understands how it fits in to the objectives of the organization.
→ He effectively plans to accomplish these tasks.
→ He identies the resources need & provides them

(8) Keeping group morale high :-
→ The leader regularly briefs the group, provides genuine consultation whenever needed & makes effective the grievance redressal procedure.

(9) Getting the best out of each members :-
→ A leader sees that each person gets a sense of personal achievement in his job.
→ He informs the members of the group having unsatisfactory performance & helps them to improve.
→ He makes every member to feel that his capabilities matches with his responsibilities.

(10) Team building :-
→ He is to establish crear aims, guard against over ambitious targets at the start & also without false expectations.
→ He prepares a realistic time board programme & ensures that everyone agrees to the programme.

Dt - 08.06.21

→ Human Relation :-
→ It refers to the study of the behavior of the people in groups in particular work place & in fields such as industry & organization.
→ Human relations covers all types of interactions among people - their conflicts, co-operation efforts & group relationship.
→ It is the study of the reasons for beliefs, attitudes & behaviors of persons sometimes causing inter-personal conflicts in personal lives & work related situations.
→ human relations is the relationship betn groups of people, especially betn different workers in an organization or business.
→ It is important in a work place for reducing employees turnover, increasing productivity & fostering creativity.
→ A human relation is the relationship betn human resources of the organization.
→ It incorporates management - employees, employees-employees relationship.
→ It also consists of relationship betn the organization's human resource & outsiders (such as clients, suppliers).

→ Human resource is one of the important assets of an organization
→ Hence, healthy human relations lead to increased productivity & efficiency.
→ It also plays crucial role in growth & success of the organization.

→ • peers :-
→ The 1st catagory will always be peers because we respond & reciprocate to them very easily & very firstly.
→ They are typically the same level as us either in intelligent quotient or status or family structure or in any other way at per with us.
→ we normally tend to be comfortable with them in terms of talking & interacting.
→ one more reason of a person being comfortable with peers is they have similar problems and they empathize very well with each other.
ex:→ colleagues in office, friends, cousins, acquaintances, social circles, etc.

• superiors :-
→ The 2nd category is superiors. The teachers, mentors, bosses, family etc generally fall in this category.
→ They are the ones who are higher than us as far as the knowledge or experience or intellect quotient or relationship goes.
→ They expect a certain kind of respectful treatment from us, while we deal with them.
→ we normally tend to take time to interact with them directly more so, particularly because they also have an expectation barrier to break first with us.
→ They are the ones from whom you learn effortlessly because we know that they know more

than us.

Ex:→ uncles, aunts, bosses, bosses of bosses, mentors, aged consultants, senior positions in any way etc.

- Subordinates :—

→ The 3rd category opens up the scope of being a mentor to others, as well as taking work from them or helping them to cope up.

→ They are lesser either by age, experience knowledge or relationship, that's why we feel good dealing with them & sometimes even show them off our seniority.

→ They are the ones who need our recipr-rocation for their growth but still our responses to them are important, if we have to take work from them or they are in our social circles OF fall in as a team to achieve targets in professional fronts.

→ Three golden rules to these 3 catagories are:

- Be a good peer :— only then you will be in a position to build up long term relationships for coming days.

→ A good peer is one who values opinion of another peer helps him out when the other one needs & be a good pal who is genuinely interested in other person's growth.

- Be a good superior :—

→ only then you will be respected to what you do, by your juniors & appreciated as a team leader.

→ A good superior takes a team to a new height & thereby take the organization & family to highs & achieve targets which are very difficult

• Be a good subordinate :-
→ only then you can enhance the credit of your bosses, mentors which in turn will add to lot of credit to your standing.
→ A good subordinates is one on whom the boss or family can rely on for whatever is given to finish & who gives unbiased opinions & is helpful in decision making with his genuine interest of his superior's progress.

Dt- 09.06.21

⇒ conflict :-
→ conflict is a state of discord caused by the actual or perceived opposition of needs, values and interests.
→ A conflict can be internal or external (betⁿ 2 or more individuals).
→ conflict arises "when 2 or more parties, with perceived incompatible goals seek to undermine each other's goal seeking capability".
→ organisational conflict is disagreement betⁿ 2 or more organisational members or groups arising from the fact that they must share scarce resource or work activities & or form the fact that they have different statuses, goals, values or perceptions.

→ Features of conflict :-
→ It arises when 2 or more individuals or groups think differently.
→ It is caused by different perceptions that different individuals hold about the same object or goal.
→ It usually arises because of scarcity of resources. when people complete for scarce resources, they hold different views about how best they can utilise those resources to

achieve the organizational groups.
→ conflict is not unidimensional.
→ conflict is inevitable.
→ conflict is a process.
→ conflict is a normal part of life.
→ Interdependence & interaction.

⇒ Types of conflict :-
→ There are 4 types.

① Individual conflict :-
→ Individual conflict may also arise with in an individual.
→ This happens when a person cannot reconcile amongst his compeling goals or when his behaviour is different from what is expected.
a. Goal Conflict
b. Role conflict.

② Interpersonal conflict :-
→ When conflict arises among people of different levels or functional areas, it is called interpersonal conflict.
a. vertical conflict
b. Horizontal conflict

③ Intergroup conflict :-
→ when conflict arises amongst different groups in the organisation, it results in intergroup conflict.
→ It refers to disagreements that exist bet'n 2 or more groups & their respective members.

④ Interpersonal :- Sometimes the individual may disagree with the group methods but he/she may want to remain in the group for social needs.

→ Interagroup conflict involves conflict b/t the individual & the group.
→ As there are more than 2 persons in a group & they have the interaction with eachother, they usually have a well defind structure of the rule & regulations for the smooth maintainace of the group.
→ When a group faces a new problem, interpersonal conflict may arise, intra-group conflict is like an interpersonal conflict.

→ Resolving conflict :-
There are 2 types.

(1) Preventive measures :-
These are some preventive measure which the management can take to resolve the organisational conflicts.

(a) Establishing common goal :-
→ In compatible goal may be a major reason for the development of conflict.
→ The main strategy of reducing the conflict should be to find common goal upon which the group can agree & establish valid communication b/t the groups.

(b) Reduction in interdependance :-
→ Interdependance may be the main reason for inter group conflict among the line & staff managers.
→ The less is the Interdependance, the less will be amount of conflict among them.

(c) Trust and communication :-
→ When the trust among the employees increase, then there will be more open & honest communication.
→ The trust makes the individuals & groups

to communicate openly with each other so that the misunderstanding can be removed
→ They are encouraged to understand & help each other.

(d) Co-ordination :-
→ Co-ordination is an important step for reducing the conflict & also it is the next step after communication.
→ A proper co-ordinating activity can reduce the conflict.
→ If there is a good co-ordination among the employees, then they will be able to solve the problems themselves and help each other.

(e) Use of superior authority :-
→ When the conflict can't be resolved by 2 organisational members or by 2 groups, it should be referred to a common superior who will resolve the conflict by giving a decision & also such decisions will be accepted because he is the superior authority.

(f) Development of effective leadership :-
→ Development effective leaders is an important step for reducing conflict in the organisation.
→ A perfect & effective to a common superior who will resolve the conflict by giving a decision & also such decisions the employees which causes less conflict.

(2) Curative measures :-
→ At first full details of conflict should be drawn out & the stages of conflict is pointed out.

→ There are two stages of conflict - prilimi-nary & advanced. If the conflict is in advance stage, then there is requirement of more efforts to resolve it.
→ They may be causes of conflict such as facts, goals, methods & values. There should be proper analysis about the issues involved in the conflict & it should be understood clearly.
→ Discussion by the management or mu-tually by the parties involved in conflict may be done for problem solving.
→ management may attempt to sweep out & smoothen the affairs like bargaining & politics.

→ causes OF conflicts :-
There are 3 categories are follows :-

(a) communicational aspect :-
→ Lack of proper communication may be a cause for conflict situation.
→ If partial or misunderstood information is passed from sender to receiver due to poor communication it may be create a conflict situation.
→ conflict can arise dere to too much or too little communication bet^n sender & reciever.
→ when the information is passed through many levels or many channels, the amount of information is functional upto a point, after that it becomes a sources of conflict.
→ problems of noise may become a source of conflict.
→ so there should bea adequate, complete & correctly understood communication for

reducing the of conflict.

(b) Behavioural Aspect :—

→ The behavioural aspect of conflict arise due to human thoughts, feelings, emotions, attitudes, values, perceptions & personality.

→ This type of conflict can arise on the personal basis regarding religion, race, sex etc.

→ some of these conflicts can be due to familiar enemity for generations.

→ Differing view points about various issues may give rise to such conflict.

(c) structural aspect :—

→ This type of conflict aries due to defect in structural design of the organisations.

→ when the size of the organisation is very more large, then there will be more chances of creation of conflict.

→ The distinction bet the line & staff units with in the organisation may be one of the frequently mentioned & continuous source of conflict.

→ one of the cause of conflict is the lack of participation of the subordinates in the decision making proces.

→ Because if the subordinates are not allowed to participate, they will show resentment which will cause conflict. on the other hand if the subordinates participates in decision making, then the participants will creat awareness about individual differences which will higher the level of conflict.

→ A poorly designed work flow structure & poorly planned coordination may cause primary source of creating conflict.
→ There may be causes for conflict among the people due to the scarcity of resources like capital, facilities, staff assistances etc. The scarcity may bring conflict among groups

Dt - 11.06.21

⇒ Group Behavior :-
→ In a group, work performance typically depends on the work of individuals while in a team. It depends on both individual contribution & collective efforts of team members.
→ In a group it is individual performance & then leader is accountable. While in a team the entire team is accountable.
→ Group members may share a common goal, but team members share a common commitment to purpose.
⇒ Characteristic of group behavior :-
Of course, the groups in organizations are more than collections of individual employees effective groups could be distinguished in terms of role structures, norms, cohesiveness, leadership, status, task & size.
→ These characteristics are responsible for understanding why some groups perform better than others.

1. Role structures :-
→ each person in a group is normally assigned with a role or a pattern of expected behaviors associated with a certain position in the group
→ each group member's role can be thought of as a part of the group's overall role

structure, that is the set of roles & relationship among roles that has been defined & accepted by group members.
→ Roles develop through a combination of group process & individual process.
(a) Group members have an expected role for each individual.
(b) Though verbal & behavioral messages, group members communicate their expectation.
(c) The individual group members perception of these communication results in a perceived role.
(d) The group members response outlining out the perceived role is the enacted role.

2. Norms :—
→ The standards that a work group uses to evaluate the behavior of its members are its norms of behaviors.
→ These norms may be written or unwritten, verbalized or not verbalized, implicit or explicit.
→ So long as individual members of the group should do, or they may specify what members of a group should not do.
→ norms may exist in any aspect of work group life.
→ They may evolve informally or unconsciously with in a groups or they may arise in response to challenges. Norms reflect the culture of the particular group, so they vary from one group to another.

• Individual adjustment :—
→ The degree to which the group members accept norms is called individual adjustment.
→ The impact of individual adjustment on the groups depend on whether norms

are pivotal or eripheral.
(a) Acceptance of both kinds of norms in 'conformity' to the group.
(b) Rejection of both kinds of results in 'open revolucation'.
(c) Accepting only pivotal norms amounts to 'creative individualism'.
(d) Accepting only peripheral norms amounts to subversive rebellion.

- Enforcement of norms :-

(a) The group may increase communication with a non-conforming member.
(b) In case that does not work, the group may ignore the non-conforming member, exclude him or her from activities.
(c) In extreme case the group members may resort to physical coercion or expulsion.

3. cohesiveness :-

→ The commitment of members to a group and the strength of there desire to remain in the group constituted the group's cohesiveness. It is the 'interpersonal glue' that makes the members of a group stick together. is known as group cohesion.
→ Group cohesive may enhance job satisfaction for members, improve organizational productivity.
→ Highly cohesive groups at work may not have many interpersonal exchanges away from the work place.

- Factors :-

→ The group's goals are clear, compatible with member goal.
→ The group has a charismatic leader.

(c) The group has a reputation for successfully accomplishing its task.
(d) The group is small enough that members can air their opinions & have them evaluated
(e) The members support one another & help each other overcome barriers to growth and development.

4. Leadership :→
→ A key role in determining the success of the group is the role of the leader.
→ Effective leadership can shape a group in to a powerful force for accomplishing what individual members could not or would not do alone.
→ organisations needs to cultivate effective group leaders whose goals support the organization's objectives.

5. Status :—
→ status is the degree of worth and respect that other members of the group accord individual group members.
→ status may arise from the person's job or behavior in the group.
→ often a group member's status is linked to the person's position in the organisation
→ someone near the top of the organization hierarchy has a higher status.
→ The status OF group members based on age, gender, education level, seniority, race etc.

Tasks :—
→ The productivity & satisfaction of group members also depend on the kinds of tasks the group carries out.

→major ways to describe group tasks are interms of type & performance requirements.

(a) Task type :-

(1) Production tasks :-

→Tasks requiring the group to produce & present ideas, images on arrangement.

(2) Discussion tasks :-

→Tasks requiring the group to evaluate issues.

(3) Problem Solving tasks :-

→Tasks requiring the group to decide on a course of action for resolving a particular problem.

(b) performing requirements :-

(1) Disjuctive tasks :-

→task that can be completed through individual efforts of group members.

(2) convective tasks :-

→These are tasks where each persons efforts are tightly linked to the efforts of other. Group members are highly inter dependant.

(3) Additive tasks :-

→Are tasks where productivity is measured by adding together the output of each group member.

DI - 16.06.21

→ Absenteeism :-

→Absenteeism refers to workers's absense from his regular work when he is normally scheduled to work.

→According to labour Bureau, simla defines absenteeism as the failure of the workers to report for work when he is scheduled to work.

→Fillipo defines absenteeism as a condition that exists when a person fails to come to work when he is properly scheduled to work.

→ Measures to Absenteeism :-
→ Proper selection & proper orientation.
→ Better working condition
→ Provision of transport & housing facility.
→ Incentive bonus for regular employees.
→ Disciplinary actions.
→ Effective supervision.
→ Employee counseling.

→ Effects of Absenteeism :-
→ normal work-flow is disturbed.
→ Difficulty is faced in executing the orders in time.
→ casual workers may have to employed to deliver orders in time.
→ Extra pressure on employees who are present for the work, may disappoint them.
→ Loss of wages for unauthorized absence from work.

→ mob psychology :-
→ Crowd psychology also known as mob psychology, is a branch of social psychology.
→ Social psychologist have developed several theories for explaining the way in which the psychology of a crowd differs from & interacts with that of the individual with in it.
→ This field relates to the behaviors & the thought process of both the individual crowd members & the crowd as an entity.
→ Crowd behavior is heavily influenced by the loss of responsibility of the individual & the increase of contagion ability of behaviors both of which increase with the size of the crowd.
→ A mob is one of the most influential & also oldest forces in changing people's behavior

→ mob psychology is a phenomenon that is understood to be part of the broader study of social psychology.

⇒ cause of absenteeism :-

→ The rate of absenteeism in indian industries is very high & cannot be dismissed.

→ statistical study of absenteeism of indian labour reveals that the basic cause of absenteeism is that the industrial worker is still a part time peasant & they consider their employement as insecure.

→ The cause high rate of absenteeism in the industrial sector, following cause are :-

① Child care :-

→ nearly 80% of women with children bet^n the age of six & thirteen work outside the home.

→ This means that when a child is ill or when normal child care arrangement fails for any reason one of the parents may have to call in sick to look after their child.

② Accident :-

→ Accident are inevitable in an industrial environment and every workplace has its own share to accidents.

→ The injuries could be work related or home related or may be sporting ones.

→ also the injury may cause short-term / temporary or long term / permanent damage due to which the employee remains absent from the work.

→ Industrial accident depends upon the nature of work to be performed by the worker and his ability for doing that work.

(3) sickness & low vitality :-
→ sickness is the most important cause of absenteeism in the industrial sector.
→ Epidemics like cholera, small pox & malaria often break out in most industrial area.
→ The low viality of the indian workers make them easy prey to such epidemics & bad housing or in-sanitary conditions of living aggravate the trouble.
→ The major cause of sickness absence today are stress & muscular-skeletal disorders

(4) Bullying :-
→ It is one of the most worrying workplace phenomena & it costs employer in terms of loss of working days.
→ It is due to harassment policy and is unwanted, aggressive, behavior towards employees that involves a real and percieved power imbalance. Such behavior is repeated to have the potential to be repeated over time.

(5) Lack of flexibility :-
→ A good balance bet work and life seems an unattainable goal.
→ Lack of consideration towards flexible work practices, like holiday banking or flexible working hours etc leads to absenteeism.
→ There should be same paid duvet days or mental health days per year for the employees.

(6) Poor leaders :-
→ poor leadership leads to lack of any real commitment of workers to their jobs.
→ If an organization has a manager that is not receptive, there is no question of motivation to come to the work.

→ Poor management leads to disengagement of employees. Disaffected employees miss more working days through absenteeism compared to other employees.

(7) Bereavement :-

→ When people suffer a protracted bereavement, reaction problem arises.

→ Bereavement reaction goes through four separate stages - disbelief, anger depression & reconciliation.

→ When depression phase becomes protracted. it may be lead to prolonged sickness absence.

→ However dealing with bereavement is never easy but organizations that offer counselling services stand a better chance of helping employees through a rough time.

(8) Change :-

→ A changing work environment caused by merger or acquisition, poor economic climate an unforeseen circumstances, can make employees feeling insecure & stressed, leading to absence.

→ This can be averted by through and regular forms of communication such as intranet news letters & frequent meetings to keep the employees motivated.

(9) means of transport :-

→ The transport facilities also play very important role in contributing to the absenteeism of workers in the industries.

→ Of course, the rate of absenteeism is higher in the industries not having good transport is so unreliable that it can prevent employees getting to work as opposed to taking them there.

(10) Ergonomics :-
→ Lack of good ergonomics design of workplace may lead to illness and consequent absenteeism
→ provision of open plan offices, for space & team building reasons, causes a lot of ambient noise & concentration problems besides the ventilation problems.

→ Other factors causing absenteeism :-

(1) Hours of work :-
→ The long hours of work also affects the worker's efficiency & consequently their sickness rate and the absenteeism rate are increased.

(2) Night shift :-
→ It is a fact that there is greater % of absenteeism during night shifts than in the day shifts, owing to greater discomforts of work during night time.

(3) Rural exodus :-
→ The most predominant cause of absenteeism is the frequent urge of rural exodus.
→ It is observed that the workers go back to their villages at the time of harvesting & sowing the crops. It increases the rate of absenteeism in factories.

(4) Social & religious function :-
→ It is a fact that workers absent from their duty on the occasion of social & religious functions.
→ As the workers like to join their families on such occasions, it leads to absenteeism.

(5) Drinking & absenteeism :-
→ It has been noticed that drinking & amusements are also responsible for absenteeism.
→ Sometimes, the drinking & amusement in the

late hours of night make it difficult for the workers to reach in time on their duty the next morning.
→ In this situation, they prefer to be absent rather than being late.

(6) After pay-day :-
→ The level of absenteeism is comparatively high immediately after the pay day.
→ It is because after getting their wages, they want to make purchases or engage in enjoyment and so the absenteeism is high after they got paid

(7) Nature of work :-
→ The rate of absenteeism is also affected by the natures of work.
→ The absenteeism prevails because the workers may not be accustomed to the factory life or disciplined or uncomfortable nature of work.
→ However there could be other factors which causes absenteeism in the industrial sector namely
(a) Personal factors
(b) work place factors.

(a) personal factors :-
(i) Attitude :-
→ Attitude of the employees vary from person to person and the employees with strong work force ethics will respect their work and appreciate the contribution they make to their companies.
→ such employees normally do not engage themselves in taking unscheduled off.

(ii) Age :-
→ The younger employees are often restless and want to spend time with their friends & have fun, rather than being tied down with work

responsibility.
→ with age people gain experience and maturity, which makes them focussed & responsible.

(iii) Seniority :-
→ The employees who have been with the company for a long time are well adjusted with the working culture & the job. therefore they find no reason to be absent without permission.
→ on the other hand, new hires are more prone to taking adhoc breaks to unwind themselves.

(iv) Gender :-
→ women generally do a balancing act by shuffling their time betn home & work.
→ Family being their foremost priority, they do not think twice before taking a step towards absenteeism.

(b) workplace factors :-

(i) Stress :-
→ The pressure at work sometimes takes a toll on the employees.
→ This results in increased level of stress & the employees then resort to excuses that can help them to stay away from the work.

(ii) work routin :-
→ Doing the same job repeatatively over a period of time can get monotonous & the employees may find the job function boring, so they rather choose time off to do some thing interesting than come to work.

(iii) Job satisfaction :-
→ If the employees do not find their job challenging, dissatisfaction creeps in, that leads to

more absenteeism in the work place.

→ methods to remedy absenteeism :-

→ Explore flexible schedules & promote work,
→ Introduce a return to-work interview routine,
→ improve employee & work place well-being.
→ Provide balance, rewards & recognition.
→ set disciplinary procedures & consequences
→ use robust absence management tools.

Dt - 18.06.21

→ Definition of Grievance :-

→ Prof. Pigors & Meyers define grievance as dissatisfaction. According to them, dissatisfaction of an employee is anything that disturbs the employee, whether expressed or not.
→ Dale Yoder defines it as "a written complaint filed by an employee & claiming unfair treatment".
→ The national commission of labour states that complaints affecting one or more individual workers in respect of their wage payments, overtime, leave, transfer, promotion, seniority, work assignment & discharges would constitute grievance.
→ A grievance can be defined as any sort of dissatisfaction which needs to be redressed in order to bring about the smooth functioning of the individual in the organization.
→ Broadly, a grievance can be defines as any discontent of dissatisfaction with any aspect of the organization.
→ It can be real or imaginary, legitimate or ridiculous, stated or unvoiced, written or oral, it must however, find expression in some form of the other.

reducing the of conflict.

(b) Behavioural Aspect :—

→ The behavioural aspect of conflict arise due to human thoughts, feelings, emotions, attitudes, values, perceptions & personality.

→ This type of conflict can arise on the personal basis regarding religion, race, sex etc.

→ some of these conflicts can be due to familiar enemity for generations.

→ Differing view points about various issues may give rise to such conflict.

(c) structural aspect :—

→ This type of conflict aries due to defect in structural design of the organisations.

→ when the size of the organisation is very more large, then there will be more chances of creation of conflict.

→ The distinction bet the line & staff units with in the organisation may be one of the frequently mentioned & continuous source of conflict.

→ one of the cause of conflict is the lack of participation of the subordinates in the decision making proces.

→ Because if the subordinates are not allowed to participate, they will show resentment which will cause conflict. on the other hand if the subordinates participates in decision making, then the participants will creat awareness about individual differences which will higher the level of conflict.

→ Effect of grivances :-
a. Loss of interst in work & consequent lack of moral & commitment.
b. Poor quality of production.
c. Low productivity
d. Increase in wattage & costs.
e. Increase in employee turnover
f. Increase in the incidence of accidents
g. Indiscipline.
h. unrest etc.

→ Grievance procedure :-
Guidelines for handling grievances -
→ Treat each case as important and get the grievance in writing.
→ Talk to the employee directly.
→ Discuss in private place.
→ Handle each case within a time frame
→ Examine company provisions on each case
→ Get all relevant facts.
→ Control your emotions
→ maintain proper records.
→ Be proactive, if possible.

→ Labour welfare :-
→ Labour welfare work is work for improving the health, safety & general well being & the industrial efficiency of the workers beyound the minimum standard laid down by labour legislation.

• Concept :-
→ Robert Owen was the Father of labour welfare administration.
→ welfare includes anything that is done for the comfort & improvement of employees & is provided over and above the wages.

→ welfare helps in keeping the morale & motivation of the employees high so as to retain the employees for longer duration.
→ The welfare measures need not be in monetary terms only but in any kind / forms.
→ labour welfare includes monitoring of working conditions, creation of industrial harmony through infrastructure for health, industrial relations and insurance against disease, accident and unemployment for the workers and their families, services, facilities & amenities like canteens, rest & recreational facilities, sanitary and medical facilities, arrangements for travel to and from place of work, accommodation of workers etc enabling the persons employed to perform their work in healthy, congenial surroundings and conducive to good health.

- labour welfare has the following objectives :-
→ To provide better life & health to the workers.
→ To make the workers happy & satisfied.
→ To relieve workers form industrial fatigue and to improve intellectual, cultural and material conditions of living of the workers.

- objectives :-
→ To enable the workers to enjoy a fuller and richer life.
→ To improve the efficiency of the workers.
→ To develop a sense of responsibilities & dignity among the workers & thus makes them worthy citizens of the nation.
→ To clear the disparity bet^n the employees.
→ To clear individual & family problems of a employees.
→ To ensure his health conditions.
→ To help the employee for his personal growth.

- Purpose :-
→ Enables workers to have richer & more satisfying life.
→ Raises the standard of living of the workers by directly reducing the burden on their pocket.
→ Absorbs the shocks injected by industrialization & urbanization on workers.
→ promotes a sense of belonging among workers, preventing them from resorting to unhealthy practices like absenteeism, labour turnover, strikes etc.
→ Prevents social evils like drinking, gambling prostitution etc by improving the material, social & cultural conditions of work.

CH-6

CONSTRUCTION LABOUR AND LABOUR MANAGEMENT

Dt - 22.6.21

→ construction industry is one of the largest industry in india, where about 40 crores of workers are employed & most of them are unskilled labourers.
→ In general, construction labourers are classified as unskilled, semi-skilled & skilled persons.
→ The labourers employed in construction industry are paid wages on daily basis as the construction work is temporary.
→ Hence the job in construction industry is also temporary & workers have no job security.
→ Therefore, construction labours can easily be shifted from one place to another.

→ Types of construction labour :-
2 types:
1. Daily labour 2. Regular established labour

① Daily labour :-
→ Labours employed daily or casually are called daily labours, i.e labourers are employed as & when required.
→ The payment made to daily labour is generally referred to as wages.
→ Their payment is fully time-rated, it can be rate per day or per hour.
→ Their payment is made for the no of days or hours actually they worked.
→ They have no provision of any other facilities that are provided to other employees.

② Regular established labour :-
→ This type of labour includes supervisory & managerial staffs. The large construction companies engage supervisory & managerial staff on regular basis, so these staffs are paid periodically i.e their payment is made monthly

→ This type of labourers have the provision of leave & have to provided all the benefits of the company. In this type, there may be permanent or temporary labour, but the permanent workers being provided with more facilities & security of service than that of temporary labours.

⇒ wages payment to labour :—

→ Payment made to labour is generally referred to as wages.

→ It can be time rated or piece rated, it can be rate per hour, per day, per week, per month or per year.

→ This is the renumeration paid to the workers for the actual work they do.

→ The wages can be paid to ordinary skilled, unskilled or semiskilled workers as daily basis or weekly basis.

→ The wages are both monetary and non-monitary.

→ The monitary wages are money paid to workers as wage. And non-monetary payment may or known as fringe-benefits.

→ money paid periodically to employees whose output can't be easily measured such as clerical staff as well as supervisory and mangerial staffs is generally referred to as salaries.

⇒ Types of wages :—

2 types

1. Time wages.
2. Real wages.

① Time wages :-
→ When payment of wages made to labour is in the form of money for the work done on the basis of per hour, per day, per week, per month or per year, it is often called as time wages.

② Real wages :-
→ After satisfying the basic needs of a worker and for improving the standard of living of a worker, wages given in the form of luxury, comfort or extra security, is often known as Real wages.
→ The Real wages sepcify the amount of goods & services that the money wages will buy.

⇒ Methods of wage payment :-
→ wages can be calculated on the basis of the out put irrespective of the time taken in completing it.
→ Efficiency may be a factor which varies from individual to individual.
→ The efficient worker may creat more out put than other, so wages can be calculated on the basis of the work irrespective of the time.
There are 2 methods mainly
(1) Time or day rate system
(2) Piece work or piece rate system.

① Time or day rate system :-
→ In this method of wage payment, the worker is paid a fixed remuneration as per his unit of time which can be rate per hour, per day, per week, per month, per year.
→ This is one of the oldest method of wage payment adopted in india. As in this method, workers don't get extra benefits accept their weekly leave, they have no special intrest to work hard for the optimum profit of the organization.

- Merits :-
→ This method is suitable when words can be measured directly.
→ By this method of wage payment, worker ensures regular employment & greater security of service.
→ Here skilled, unskilled and semi skilled all workers get the same wages of one class.
→ The calculation of wage can be done easily by this method.
→ where measurement of output is not feasible this method is specially useful.
→ As workers have no tendency to show increased output the quality of work is good
→ Also this method can be understood by all class of workers easily.

- Demerits :-
→ As the workers don't get extra benefits except their weekly leave, they have no such interst to work hard for the organization.
→ There is no inspiration of competition among the workers & hence there is no chance of earning profit.
→ By this method a skilled employee becomes listless to produce more than the unskilled workers.
→ A regular supervision is required for the work to extract work from the labours.
→ The workers are assured of their wages so their output is low.
→ Cost control can't be ensured effectively due to varying production.

② Piece work :—

→ In this system, according to the worker's output their payment is decided. of course, payment is made at the agreed rate.
→ In this method an efficient worker can earn more money by increasing his output.
→ Here payment is purely based on production or output of workers.
→ payment is decided at the actual quantum of work done by the worker.

- Advantages :—

→ suitable incentives are given to efficient workers in proportion of their output or production.
→ There exists a healthy atmosphere among the employer & employees.
→ Higher wages are given to worker with higher output or production;
→ Less supervision is required;
→ In this system, a good worker can make more money by increasing his output.
→ By this method, inefficient & unskilled employees are pointed out.

- Dis-advantages :—

→ workers are not careful about the quality of work. They have to any how increase the output of the organization.
→ overtime work causes sickness to worker's health.
→ sometimes no work no pay situation arises because during the period of sickness or absence, there will be no payment as the output will not be there.
→ It causes a competitive & jealous atmosphere among the workers of organization.

Dt-23.06.21

(3) ⇒ Management without micromanagement :-
→ The pool of employees does need to be managed, provided direction & given assistance. But side by side, they must also be trusted, give freedom to operate in their own style & adopt measures which they think are the best to deliver results.
→ This freedom to act as they deem fit helps to keep them encouraged motivated & happy is the belief that they are trusted.
→ micromanagement is a human tendency, it is detrimental to achievement since it makes man puppets out of employees, who are expected to be the bass line and not think for themselves.

(4) Encourage, motivate reward & recognize :-
→ The employees must ensure that on his part he always has the words of encouragement for his staff.
→ It helps them more forward and do even better & make the worker feel happy.
→ Innovative ways of motivating them spurs them even more.
→ In fact rewarding, the hard work put in by the employees make their continue to work in the same fashion and if the employee feels that his work is not appreciated in words or in material terms, he may gradually stop doing so, since he may feel that others working less are being given same too so he need not work more.
→ rewards & other ways of keeping the employees happy makes them feel that their effort is being recognised & that are needed greener pastures & new jobs.

(5) Reach out to employee by seeking them out :-
→ Every employee loves to feel he has the ears of the management who will recognize him and listen to what he says.
→ Display of interpersonal skills in which the boss appears humane and one of them, rather than a larger than life figure, helps to have employees warm up to him & feel happy working for him.
→ A bit of effort to reach out helps them all do better. If this extends beyond the workplace, it may prove to be even more encouraging to increase employee productivity.

(6) Demand realistic targets :-
→ Employees need to set realistic goal that are with in the limits of achievement.
→ While an aggressive employer may want his people to out stretch themselves to achieve far fetched goals, it may also burn them out.

(7) Team work :-
→ Teamwork always helps in increasing workplace productivity since there is more input in the from of more ideas minds at work.
→ working along is not always the happiest situation either, especially in the field.
→ successful team building & working together is bound to bring out the best out of the employees who may also then complete with each other ensuring the business is the winner.

(8) Ensure that people enjoy their work :-
→ The best performing & the happy employee and employer has to find ways of making his people happy. Busider working conditions & the work culture implemented, he has to devise ways of making the work seem challenging &

interesting rather than mundane and boring.

(9) Break and monotony & rotate :-
→ while employers assign tasks according to an employee's core competences, even with the task they are best at can make an employee bored and his work seem monotonous.
→ This monotony can be broken, he has to devise ways of making the seem challenging and interesting rather than mundane & boring.

(10) course & improvement options :-
→ Employees are delighted when they can enhance their skills & get additional learning opportunities sponsored by the employer.
→ This helps them learn, feel indebted for the money being spent on them, which also adds to their resume & are obliged to perform better by applying all the knowledge gained in these course.

(11) Spend less time on meetings and more on action :-
→ The current trend to have more meetings and discussion rather than spending more time in working to achieve results, leads to inefficiencies & productive time loss.
→ meeting for reviews & sharing of ideas can be limited & kept short. Employees should have more time to show results.

(12) Tools & equipments to raise productivity :-
→ The workplace should have the best of machinery, devices & equipments that yield error free results in the min possible time.
→ Efficient electronic equipment with no connectivity issues and breakdowns will help in saving precious time.

→ They should take the place of paper work and yield fast results.
→ These devices help to reduce the response time improve customer service and cutting costs, all imperative for work place productivity.

→ **motivation :-**
→ motivation is an important factor which encourages persons to give their best performance & help them in reaching the enterprise goals.
→ motivation is one of the most important factor affecting human behaviour.
→ It helps the individual towards the fulfillment of durable objectives.
→ It is a complex force that is responsible for starting and keeping a person at work in an organization.

→ **Defination :-**
→ motivation is an inspiration that impels a person to expand energy to achieve a goal or reward.
→ motivation acts as a driving force by which the human being achieve their goal.
→ motive is an emotion or desire which simulates an individual to take a certain course of action.
→ The ability of a worker directly depends upon motivation, so the productivity of any organisation also directly depends on motivation.

→ **Types of motivation :-**
When a manager wants to get more work from his sub-ordinates then he will have to motivate them for improving their performance.
(1) Internal motivation.
(2) External motivation.

① Internal motivation :-

→ Internal motivation motivates people internally and it refers to motivation by interest or enjoyment in doing the task it self.

→ Internal motivation exists within the individual rather than any external influence.

→ Need to get an accomplishment of good job. and the illusion of self determination and freedom are the examples of this motivation

② External motivation :-

→ External motivation comes from outside of the individual.

→ common external motivations are rewards like money, grades, pay, incentives, threat of punishment or praise.

→ It encourages the performer to win and achieve the goal or reward.

(a) positive motivation :-

→ positive motivation is achieved by the co-operation of the employees, they have a feelings of happiness.

→ positive motivations are responsible for good placement, high standard of performance adequetly of information, effective self-control and practicipation of the workers as a responsible citizens in the organization.

(b) Negative motivation :-

→ negative motivation is based on force or fear

→ fear causes the employees to do certain job

→ If they dont do accordingly, then they may be punished with demotions or lay-offs. This types of motivation causes anger and Furstration because the employees

do not work willingly, rather they want to avoid the punishment.
→ Nagative motivation influences the individual through a threat or fear of losing ones present job, reduced wages etc.

→ Importance of motivation :-
→ management tries for optimum utilisation of all the resources of production in a best possible manner. Therefore efforts should be made to motivate the employees for contributing their max^m efforts.

(a) High performance :-
→ motivated employees will put max^m efforts for achieving organisation goals.
→ The better performance also results in higher productivity.
→ If the employee is properly motivated along with his ability, then this motivation will inspire him to act as a simulation for improving the performance of the employees.

(b) Low employee turn over & absenteeism :-
→ If the employees are not satisfied with his job, then they may leave the job at any time whenever they get an alternative offers.
→ so that more absenteeism & turnover occurs due to the job dissatisfaction among the employees. But when they are satisfied with their job & they are properly motivated by their superiors & are offered with financial and nonfinancial benefits, they do not leave the job or absenteeism decrease.

* motivation — success, idea, Reward, new goals, Good habits, positive, focus, capacity.

→ Labour schedule :-

→ A labour schedule can be prepared from the construction schedule and the objective of this schedule is to decide the no. of skilled and unskilled labour required labour can be arranged well in time.

→ It is difficult & costly to arrange skilled labour at and when required.

→ It helps in reducing the labour cost.

→ Essential steps for optimum labour output:

→ Labour output is a major concern for employers & it is desirable to have higher level of productivity in any organization.

→ A few factors that help to improve the employee Productivity or labour output at the work place are :-

(1) Accountability :-

→ Every employee needs to be well aware that he is accountability for his actions and decision and he can neither pass the bulk or pass the blame to someone else.

→ This will help him to work more meticulously take cautious rather than reckless decision and not take advantage of his place, position or relationship with his superiors.

(2) Follow up :-

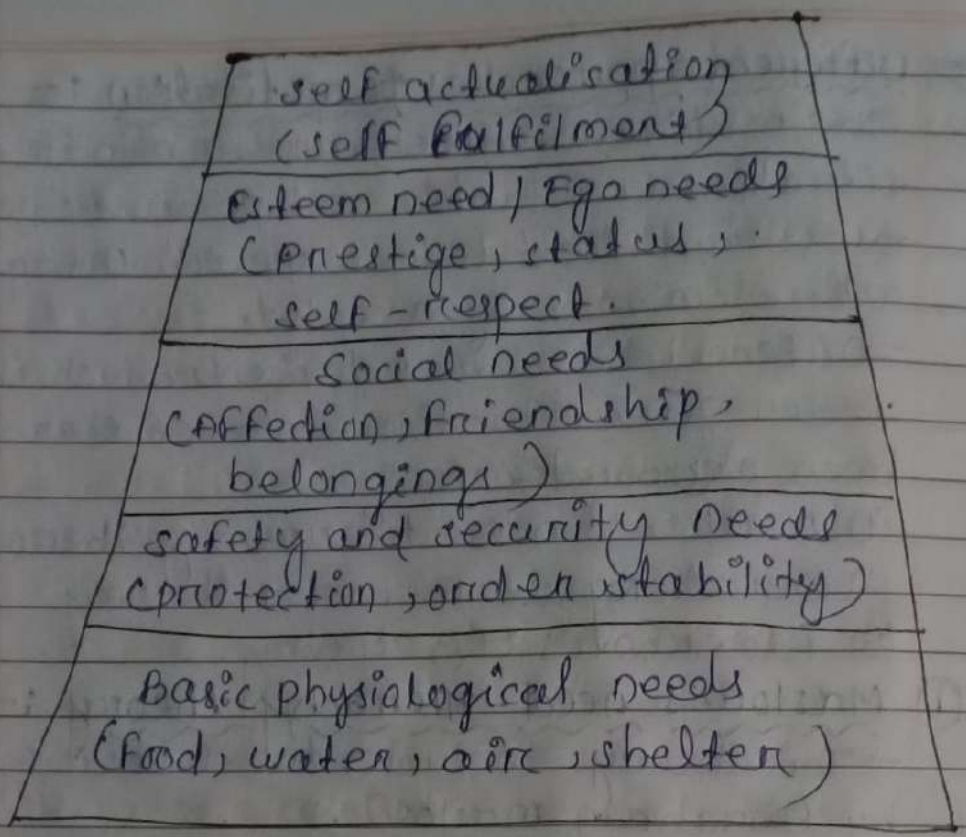
→ Every target or milestone set needs to be followed up as well, to see if the progress is sufficient and if not, whether any interim measures can be taken before it is too late to salvage a situation.

Dt - 26.06.21

⇒ Different approaches to motivation :-
The motivation differ from time to time place situation to situation and person to person.
→ Sact is difficut to set a specific theory which will be universally accepted.
→ Different have been devised, which hold good under given situations. some of them have been discussed below-
(1) Maslow's need hierarchy theory
(2) Herzberg's two-Factor theory.
(3) Alderfer's ERG theory.

① Maslow's need-Hierachy theory :-
→ This theory includes the hierarchy of need by Abraham maslow.
→ maslow's theory is one of the most widly discussed theories of motivations.
→ motivation is influenced by the needs of a person.
→ A.H maslow an American social scientist has developed the hierarchy of needs conisting of 5 hierachic classes.
→ It says that first of all the basic requirements have to be satisfied & subsequently the requirement of next step come into existance.
maslow categorised human needs into 5 catagories

(a) Basic physiological needs :-
→ These needs are most essential for the survival & maintenance of human life.
→ Human being first try to acquire these basic necessities of life.
→ These needs include satisfaction of needs of hunger & shelter, drinking water, clothing, rest etc.
→ If these physiological needs are not satisfied, no other needs can satisfy the individual.
→ once these needs are satisfied, this will cease to motivate him & he will want to satisfy the other needs



(b) Safety needs:-

→ once physiological needs are satisfied, the human being want the assurance of maintaining a given economic level.

→ There are the needs to be free from physical danger & fear of loss job, property, shelter etc.

→ Every person would like to be free from worries like loss of job, sickness, old age pension, physical safety like accident and fire.

→ organisation can meet safety needs by installing safety devices at work place & can start pension scheme, insurance plan etc.

(c) Social needs:-

→ once the individual is satisfied with social needs, they are concerned about the next level.

→ Being a social being people belong to be accepted by others.

→ There forte the man is intrested in conversation, sociability, exchange of feelings and

grievances, companionship & belongingness.
→ In the other words these needs satisfy a person a sence of kinship with or belongingness to others and he feels an integral part of the work group with emotional factor of friendship, warmth & and affection.

(d) Esteem or Ego needs :-
→ These needs are concerned with self-respect, self-confidence, feeling of being unique, recognition etc.
→ satisfaction of these needs brings confidence, power, control & prestige, achievement, independance competence, knowledge etc.
→ The individual have to learn or acquire these needs through interference
are concerned with prestige, status & others respect and punishment
→ some of the social problems have their roots in the fulfillment of these needs.

(e) Self-actualisation :-
→ self-actualisation need is the need for self-fulfillment of wants of a person considered to be mission of his life.
→ self fulfilment is the highest need in maslow's hierarchy
→ These needs which helps an individual to develop his potentialities.
→ self fulfillment needs give satisfaction to the person concerned & gives a tendency of capability of doing of self development.
→ After a person's other needs are fulfilled, he has a desire for personal achivement & wants to have some challenging achievement.

(2) Herzberg's two factor theory :-
→ This theory was developed by Frederick Herzberg in 1959. Herzberg's two factor theory is also known as motivation - hygiene theory of motivation.

→ Herzberg and his associates conducted a study of need satisfaction of 200 engineers & accountains in an organisation.
→ These person were asked to describe a few previous job experiences in which they felt exceptionally good or exceptionally bad about the jobs.
→ The satisfaction of some needs may not have positive effect on motivation but their non-satisfaction may act as a negative factor.
→ So for finding out the answer of what type of needs are important for improveing the motivation.
→ Herzberg concluded that there were two sets of conditions - The first type of condition described as maintenance or hygiene factors is don't motivate employees by their presence but their absence dissatisfies them.
→ The other condition is called motivational factors.
→ These factors operate to build strong motivation & high job satisfaction and their absence affects both satisfaction & motivation.

(a) Hygiene factors :-
→ These factors are responsible for reasonable level of satisfaction and are called maintenance or hygiene factor.
→ The hygiene factor is just like hygiene. The presence will not make the employee healthy but its absence cause a deterioration of health.
→ There are factors concerned with the company policy & administration, technical supervision, inter personal relation with supervisor etc.

(b) Motivation factors :-
→ These factors create high motivation & job satisfaction in their presence.
→ However the absence of these factors do not cause dissatisfaction.
→ According to Herzberg, there are six factors which give positive satisfaction.
→ These six factors are recognition, advancement, work itself, possibility of personal growth, achievement & responsibility.
→ It is essential to increase these factors for increasing the motivation of employees.

(3) ERG Theory :-
→ This theory was introduced by Alderfer.
→ Alderfer's ERG theory is the expanded form of Maslow's hierarchy of need theory & Herzberg's 2 factor theory of motivation.
→ He found some over-lapping bet^n physiological need, security need & social needs.
So, Alderfer modified maslow's need hierarchy theory.
These are 3 category.
(a) Existence needs.
(b) Relatedness needs.
(c) Growth needs.

(a) Existence needs :-
→ This need of ERG theory includes both physiological & safety needs of an individual in maslow model.
→ These needs include the basic survival needs of human beings like food, clothing, shelter & drinking water.
→ These are the primary needs human being try to fulfil this.

→ According to safety needs of maslow's model, human being needs safety or security & stability of his life.
→ so combining these two needs of maslow's model, existence needs is formulated.

(b) Relatedness needs :-
→ This need of ERG theory is the combination of the social need & esteem need of maslow's model.
→ These needs are emotional needs of the human being for love, affection, warmth & friendship.
→ But self-esteem needs are concerned with self respect, self confidence, recognition & control.
→ These needs give human being ego satisfaction so combining these 2 needs of maslow's relatedness need is derived.

(c) Growth needs :-
→ These needs are same as the maslow's self actualisation needs.
→ These needs satisfy the human being for his personal development & achievement.
→ when the individual wants to do something challenging, the sense of achievement gives him a satisfaction.
→ This need satisfies all desires of the individual to increase & develop his potential

Dt - 30.06.21

⇒ Morale :-
→ morale is a mental condition or an attitude of mind of a single individual or group.
→ morale can be explained by various terms from different point of view
→ From military point view, morale means

enthusiasm to accomplish a certain task sonstively.
→ Here morale mean self-confidence of a team.
→ similarly in business morale is associated with the desire to achieve to goals, it may be the eagerness or willingness with which an individual or a group work for an organisation.
→ Definition :- moral is an attitude of mind and an emotional force associated with a desire to work for the organisation to achieve the organisation goal.
⇒ Types of moral :-
→ It exists when the employees attitudes are favourable to the total situation of a group.
→ High moral denotes team spirit.
→ High morale keeps the high degree of employee's interest in their job.
→ The high morale forces the employees to feel about pride of the organisation.
→ The high morale forms a good discribe to maintaining rule, regulations & order.
→ stable quality of employees in the organisation denotes high morale.
→ enthusiasm & willingness improves the high morale among employees.
→ If the organisation has to satisfy it's objective, it must possess a high morale.
• Low moral :-
→ The condition of low morale implies the employee's lack of co-operative spirit.
→ Small no. of real executive in the organisation denotes low morale.
→ Low morale also implies wrong & improper selection of employees.
→ So many foremen or supervisors are required due to low morale.

→ Low morale result in a high rate of absenteism & labour turn over.
→ It also cause a jealous & quarrel some atmosphere among employees.

→ Factor affecting morale:-

(1) The organisation :- This is the 1st factor which affects the employee's morale towards organisation it self. The marked or public reputation of an organisation may build up of the workers high or low morale.

(2) Employee's educational level :- There exists an inverse relationship bet" the employee's educational level and his morale. An employee's job satisfaction depends upon his educational level.

(3) Employee's occupational level :- It is an important factor which influences a high or low level of morale of an employee. The higher the employee's level in the organisational hierarchy. The higher will be his morale.

(4) Worker's perception of Reward system:-
→ Workers perception of past reward & future opportunity for rewards affects their morale.
→ If the worker regards rewards then his morale will tend to be higher.

(5) The Personal Factors:- There are some personal factors which are somehow responsible for the high & lower feelings of morale of the employee. These factors such as intelligence, training, experience, proficiency & back ground sex as well as mental & emotional conditions of the employee.

(6) The level of satisfaction :- The level of satisfaction is another determinant of the high or low morale feeling of the employee.

→ Cause of morale (low) :-
→ managers that treat employees poorly.
→ missing the goalpost.
→ unclear expectation.
→ lack of communication.
→ not feeling recognized for hard work
→ lack of trust to complete the work.
→ An unreasonable workload.

→ methods of improving morale :-
→ To build up a high morale is an important aspect for an organisation. The management should make efforts to improve the morale of the employees.
→ It is more important to improve morale on group basis than individual basis, because group morale can easily be improved by the management. once the group morale is improved, it influences the understanding automatically to achieve the individual morale.

① Two way communication :-
→ An effective 2 way communication helps in improving the morale of the employees.
→ All programmes & policies should be explained to the employees & their feeling & reaction should reach the management so that their feed-back will help the management to change or modify the programme or policies.

② Welfare schemes :- proper welfare schemes for the employees imbibed high morale among the employees.
→ Adequate welfare schemes should be there for the workers & their families like housing, medical facilites etc. so that their positive attitude towards the management develops & it creates a high morale among them.

(3) Workers's paticipation in management :— There should be paticipation of employees in managemen & decision making bodies. The Feed back of the employees For making any changes should be implemented.

(4) Periodic conferences :— There should be periodic conferences betn the workers & the management. The feelings & reactions should regularly reach to the management about the change & modification of the policies & programmes of the management.

(5) Human Relations approch :— According to this approach, employees should be considered as resources of the organisation. They should be given importance to their feelings & emotion

(6) Improvement of workers training programme :-
→ If a worker is not satisfied with a job or he is dificient for working on a job, it brings frustration & tension to him. The workers should given proper taining so that they can improve their efficiency & performance in jobs better.

(7) Proper recognition & incentive system :-
→ There should be proper status recognition & proper incentive benefits to employees.
→ It may be in the form of monetary and non-monitary benefit for the employees.
→ Proper promotional evenness & suitable incentives should be offered to the efficient workers.

Unit 3

EQUIPMENT MANAGEMENT

Dt - 02.07.21

→ The aim of the equipment management is to reduce down time, achieve optimum equipment utilization & increase production at minimum cost. There is a need for a rational planning, proper selection & judicious deployement of equipments so as to achieve optimum utilization. of course, the equipment management integrates & continuously interacts with human, technical, financial & production system in order to achieve top efficiency & cost effectiveness.

→ preparing equipment schedule :-

→ The equipment use schedule has to be prepare before the start of the project in order to decide the type, no and date on which a particular equipment will be needed so that it is arranged well in advance & brought to the site as & when required

→ The aim of this schedule is to derive more advantage of the equipment when at site & remove it from the site when its jobs is over. This is most likely to result in economy. Usually following information is sent to the owner

1. cost of the equipment
2. Efficiency of each equipment or machine
3. Record of their repair
4. Details of expenditure on repairs
5. Duration of effective use of the equipment
6. Details of fuel consumption by the equipment
7. Details of servicing of the equipment

→ selection of equipment :-

→ Identification & selection of proper equipment is of paramount important for the speedy & economical completion of a construction project

→ The problem of selection of a particular equipment or identification of different alternative equipments is a difficult task because of availability of variety of equipment in the market by different manufacture

① Suitability for job condition :-
→ The equipment selected or identified must satisfy the requirements of work, climatic and working conditions.

② Size of the equipment :- The size of the equipment should be such as to be compatible with other matching units. If the chosen equipment is of larger size it is likely to remain idle for most of the time or shall work on part loads leading to rise in the cost of production / work.

Dt - 06.07.21

③ Standardisation :- It is desirable to have the same type & size of the equipment in a project which will ensure lesser spare parts reserve, better interchangeability of parts, easy understanding of operations, efficient maintenance & repair as the mechanics becomes adept by handling the same type of equipment.

④ Ease of availability in the market :-
→ The equipment selected should be easily available in the market but side by side it is also to be ensured that the equipment is of reputed company and likely to be continued to be manufactured in future also.

⑤ Availability of spare parts :- The availability of spare parts at reasonable price throughout the working life of the equipment is all the more important while selecting a particular type or make of the equipment.

⑥ Versatility of know how :- There are certain type of equipment that are not fully utilized for a particular function. In that case they should be capable of performing more than one function so that it is not layed idle & may multi purpose use.

(7) Possibility of use in future projects :- when selecting an equipment that completes only a part of their useful life in a project, its use in future projects should be kept in view before it becomes obsolete.

(8) Economic aspect :- while selecting any equipment, it should be ensured that the cost of unit production is minimum.

(9) Reliability & support service :- The equipment selected for the project must be reliable one.
→ In addition, support service should be available in the area of project where the equipment is to be used.

(10) Operating equipment :- The equipment selected should be easy for operation & maintenance, user friendly to the operator & should have lower fuel consumption.

(11) satisfactory past Performance :- while procuring an equipment of new make & model, it is desirable to enquire about its satisfactory Performance from other users who are using the make & model for quite some time.

⇒ Owning & operating costs :-
Economics of construction equipment mainly deals with the study of working of the equipment & computation of the unit cost of production, which comprise of the following components.

(a) Owning cost (b) operating cost

→ The cost of possession of an equipment is called the cost of owning while the cost of fuel & lubricants for running the equipment is known as operating cost.

→ There 2 combined together when estimated on hourly basis represent the amount by which an equipment should be hired

The following factors affect the owning & operating cost.

1. Initial cost of the equipment & its delivery.
2. Severity of the conditions under which it is used.
3. No of hours it is used per year
4. The care with which it is maintained & repaired
5. The salvage value of the equipment after its useful period
6. Useful life or service period of the equipment in years.

The following cost constitute the cost of owning & operating.

1. Investment cost (including interest, insurance)
2. maintenance & repair cost.
3. Depreciation cost
4. Fuel or energy consumption cost
5. cost of lubrication.

(1) Investment cost :— The owner has to invest money in order to own an equipment. This is a kind of Fixed cost & is incurred, whether the equipment is used or not. Investment cost comprises of the following.

(a) interest on the money invested in the procurement of the equipment
(b) various taxes on the equipment
(c) Insurance expenses
(d) The cost of storage

(2) maintenance & repair cost :— The annual cost of maintenance & repair is based on the experience obtained from the operation of the equipment under average condition. The actual cost varies with the conditions under which it is used & the care with which it is handled. Of course it varies with the type & quality of equipment.

→ The annual cost of maintenance & repair may be expressed as % of the annual cost of depreciation or it may be expressed independent of depreciation.

Dt-07.07.21

(3) Depreciation cost :- Depreciation is the loss in value of the equipment resulting from wear, tear or obsolescence. The owner of the equipment must recover the loss in value of the equipment during its useful life by way of depreciation. There are different methods of determining the cost of depreciation.

$$\text{Annual depreciation} = \frac{\text{Initial value} - \text{salvage value}}{\text{useful life of the equipment (in years)}}$$

(4) Fuel or energy consumption cost :-

→ construction equipments require fuel in the form of gasoline oil, diesel, electrical energy & lubricating oil, which is considered as operating cost.

→ Although the amount consumed depends upon the type of equipment, it rated horse power, location, temp., atmospheric pressure &.

$$\text{Operating factor} = \frac{\text{Initial value} - \text{salvage value}}{\text{useful life of the equipment (in yrs)}}$$

(5) Cost of lubrication :-

→ An engine requires lubricating oil for its smooth functioning & getting more output at minimum loss on account of frictional force in the machine.

→ The quantity depends upon the size of the engine, the capacity of the crank case, the condition of piston rings & the no. of hours between oil changes. However, it is common practice to change the oil every 100 to 200 hrs.

⇒ Inspection & testing of equipment :-

→ Inspection is taken to mean observation of work environment, work practices, equipment used, work posture on repeated hazards which may be generic or it may specific to assess particular risk, task or part of occupational health & safety management system. Testing means use of standardised tests to check the equipments, plant operation, process control, performance & effectiveness. The equipments should be inspected by competent persons who has sufficient knowledge & experience of it, of course, the necessary level of competence will vary for inspections according to the type of equipment & hazard where it is used. Agencies who conduct the testing of equipment must have required competency and certification in this regard.

⇒ EQUIPMENT maintenance :-

→ maintenance of an equipment is the operation of keeping it various components in their original form as far as possible with a view to ensure this safety as well as production in operation do not deteriorate.

The objectives of maintenance are

(1) To maximize the availability of machinery needed for smooth production.

(2) To minimize down time due to break down of machinery.

(3) To ensure longevity of the machinery to avoid high rate of depreciation of capital

⇒ Types of maintenance :-

→ Reactive maintenance / Break down maintenance / Corrective.

(b) Predictive maintenance / Reliability centered maintenance.
(c) preventive maintenance / schedule maintenance
(d) pro-active maintenance.

→ Reactive maintenance :-
→ Reactive maintenance is based on the principle of circuit till 'it breaks' mode of maintenance.
→ no efforts are made or no actions are taken to maintain the equipment as intended by the designer, either to prevent failure or to ensure that the designed life of the equipment is attained

• Advantage :-
→ It has lower initial costs
→ It requires fewer maintenance staff.

• Disadvantage :-
→ cost escalation due to unplanned down time of the equipment.
→ Increased labour cost especially towards over time for untimely repairs and replacement
→ Increase in cost associated with sudden requirement of repair or replacement of equipments.
→ may result in possible secondary equipment or process damage from equipment failures.
→ Leads to inefficient use of staff resources

→ predictive maintenance :- The predictive maintenance approach aims at detecting the onset of equipment degradation and addressing the problem as soon as they are identified.
→ The allows stressors stressors to be eliminated or controlled prior to any significant deterioration in the Physical state of the component or equipment.

→ It leads to both current & future functional capabilities.

- Major diagnostic tools in predictive maintenance programme :-
  → oil & wear particle analysis
  → vibration analysis.
  → Infrared thermography
  → Electrical testing
  → ultrasonic / acoustic
  → process variables / inspections / non-destructive
- Advantage :- Increased component operational life & availability
  → allowance for pre-emptive corrective actions
  → Decrease in equipment & on process downtime
  → Lowering of cost for parts & labour
  → Better product quality.
  → Improvement of worker & environmental safety.
  → Rise in morale of the workers.
  → Increase in energy saving.
- Dis-advantages :-
  → Increase of investment in diagnostic equipment
  → Increase in investment of staff training
  → non-availability of immediate savings potential by the management.

→ preventive maintenance :- It refers to series of actions that are performed on either a fixed based schedule or an schedule based on that of machine runtime. These actions are designed to detect, preclude or mitigate degradation of a system.
→ The goal of preventive maintenance approach is to minimize system & component degradation.

Dt-09.07.21

→ Application of preventive maintenance technology :-
(a) Lubrication (d) Inspection
(b) cleaning
(c) Replacement

- advantages :- cost effectiveness in capital intensive processes and equipment.
→ Flexibility in the adjustment of maintenance periodicity.
→ Increase in component life cycle.
→ Generation of energy savings.
→ Reduction in equipment and / or process failures
→ cost saving (around 15%) over that found in a reactive maintenance programme.

- disadvantages :-
→ Inability to eliminate catastrophic failures.
→ more labour intensive.

⇒ proactive maintenance :-
→ Although predictive maintenance uses online condition monitoring to help predict the occurence of failure, it often fails to identify the root causes of failure.
→ That is where the proactive maintenance is called for
→ of course, proactive maintenance relies on information provided by predictive methods to identify problems and isolate the source of failure.
→ Proactive maintenance methods have been able to save quite sizable amount on machine maintenance every year in various industries and construction organizations. Infact, in many companies, it often exceeds annual net profit

→ Equipments maintenance plan :-
→ The maintenance plan necessary embodies the quality of maintenance work. An important aspect of maintenance activity is the difficulty in accessing the quality of work done. A poorly executed maintenance work may lead to a breakdown. Because of the intervening time lag. it becomes very difficult to judge wheather

the breakdown was attributable to maintenance errors or defective parts. In other words, the ~~breakdown~~ quality of maintenance must ensure the quality of work itself.

The following are the benefits of adopting maintenance plan.

(i) The no. of operational steps can be repeatedly utilized.

(ii) Advance planning of human resources can be made for availability of required personnel.

(iii) Prevention of errors in procurement of material

(v) Schedules can be set so that work detail plans

(vi) Repair cycles can be set so that work detail plans are coordinated with production plans

(vii) Repair cycles can be identified to take measures in a timely fashion.

(viii) standardization pattern of repair work can be adopted enabling the work to be done efficiently.

(ix) makes possible simultaneous devising of repair plans.

(x) peoples sense of responsibility are encouraged

(xi) Large volume of work can be handled more efficiently

⇒ Precautionary measures for maintenance :—

(A) Before carrying out maintenance :—

(1) It must be cleaned before inspection & maintenance

(2) The work place must be kept clean and tidy.

(3) care must be taken to stop the engine before carrying out inspection & maintenance.

(4) Establishment of fire fighting arrangement and prevention of smoking must be ensured.

(5) warning tags indicating not to operate must be tied to the equipment to avoid inadvertment use.

(B) During maintenance :—

→ only authorized persons should carry out the maintenance of equipment.

→ Attachements are to be stored in safe custody & access of unauthorized persons are to be restricted.
→ The equipment must be placed on the firm level ground while working under the machine.
→ Care must be taken to see that no tools are left as it is inside the machine by mistake.
→ Repair should be under taken immediately as soon as abnormality is reported.

→ General guidelines for maintenance :-

Do's :- keep the equipment clean and dry.
→ Be familar with operation & maintenance manual of the equipment & be through with manufacturers instruction.
→ pay particular attention to lubrication.
→ keep all the nuts & bolts tight.
→ use only genuine spares.
→ check the level of engine oil & radiator water regularly / daily before starting the equipment.
→ Attened periodic preventive maintenance.
→ Take step to keep all meter & safety devices functional.

Do not's :- Avoid over Loading the engine & equipment.
→ Don't run the engine in case black smoke is coming out of the exhaust.
→ while cleaning parts avoid using cotton waste
→ Don't mix different brands of oils.
→ Avoid storing fuel, oil in galvanized containers
→ Avoid observe economy only in the cost of maintenance
→ Don't

CH-8 QUALITY CONTROL Dt - 13.07.21

→ Quality control in its simplest term, is ensuring quality aspect during manufacturing or production process. The aim of quality control is to ensure construction or production of items for their intended use without defects & variations from prescribed standars with in allowable tolerance limits.

→ Quality control also aims at avoiding wastage of time, money & materials by highlighting the bottlenecks that leads to defects.

→ In the current concept of quality control, the meaning of quality is closely associated with cost and customer needs on performance standards. so quality may simple be defined as fitness of purpose at lowest cost & highest performance level

→ Concept of quality construction :-

① Quality characteristics :- The properties that define the nature of a product for quality control viz. strength, colour, dimension and temp. etc are called quality characteristics.

→ Eg - cement concrete which is a common construction material now-a-days, the compressive strength, size of aggregate, slump, surface finish etc.

② Design quality :- It is a fact that no design can produce absolutely perfect results, whatsoever good design may be. It

→ Thus the desired standards for characteristics such as strength, dimention etc. that define a product as well as the tolerance level for acceptable variations from the prescribed standard should be specified.

③ Quality of conformance :- The degree of quality of work found in actual construction work is known as quality of conformance.

→ As in the case of design quality, the degree to which

the quality is to be enforced in the field has to be considered along with the cost necessary for quality control.

→ Factors affecting quality of conformance:-

(a) construction method in the field:- The quality of material used, skill of the workers & efficiency of machinery & equipments affects the quality of conformance.

(b) field supervision level:- The managerial control exercised in directing the workers to conform to the plans & specifications & the level of supervision enforced affects the quality of conformance.

(c) Inspection & quality control procedure:- The inspection & the quality control procedure adopted also greatly influence the quality of conformance

Dt - 14.07.21

→ Quality control in various construction activities:-

(1) concrete works:- concrete is a very important construction material possessing high compressive strength whose quality is influenced to a great extent by its constituent materials, water-cement ratio, size of aggregate & their grading, rate of loading & curing condition etc.

→ Therefore, to obtain concrete of uniform quality constant supervision should be well versed with the properties of concrete.

(2) steel work:- steel is a costly items constitutes a major item of expenditure in most of the civil works.

→ In RCC structures, it is used as reinforcement to take up tensile stress.

→ Hence its tensile strength, proper binding, bending & placing etc.

(3) Form work:- The shape & finished surface of concrete depends upon the form work.

→ The form work must have smooth surface so that the finished concrete may require min amount of rendering.

→ In addition, the form work must be true from work should be such as to be give a pleasant look.

(4) masonry work :- The brick to be used in masonry work should be of specified quality & grade having requisite strength and water absorption capacity within permissible limits.
→ Also the bond in the masonry should be properly maintained. The dimensions & vertically of masonry works are very important & care should be taken to maintain it.
(5) water proofing :- provision of damp proof courses at plinth level and water proofing of roof and expansion joints etc. are all the more important.
→ Hence proper care should be taken to have them properly installed.
(6) joinery & timber work :- For wood work, timber of specified quality should be used.
→ The workmanship of wood work should be properly checked and maintained as per specification.
→ These are important aspect from the quality control point of view.
(7) service work :- water supply, electric fitting sanitary air conditioning etc. are classified under this category. proper control should be exercised on the execution of these works as these are very important from customer's comfort point of view.
→ Therefore, the works need special attention of quality control.

→ Quality control methods :-
(1) Inspection :- Inspection is the function to judge the quality of a product. To be more precise, it is the process of measuring the quality of a product or service in terms of established standards.
→ Each stage of work completed be inspected before the start of the next stage.
→ any defect noticed must be got notified before proceeding to the next stage of construction.

(2) Testing :— Testing is the examination of the material or product to check its conformance to the specified standards.
→ The testing may be either destructive or non-destructive & can be performed at site or in the laboratory.

(3) Sampling :— The process of determining the quality of a large group by examining a part of the group that will be statistically representative to the whole group is called sampling.
→ The reliability of the test results of the sample is determined by the reliability no.
→ It is calculated in terms of standard deviation & coefficient of variation.

(a) Reliability number :—
→ The reliability no. is taken as the reliability of the test result of the sample, it is expressed as 'R' :

$$R = 100 - \left[\frac{\text{no. of defective units}}{\text{no. of units tested}} \times 100 \right]$$

(b) Standard deviation :—
→ It is the root mean square of the deviation of all the results and is calculated as follows.

$$\sigma = \sqrt{\frac{\Sigma (x - \bar{x})^2}{N-1}}$$

where, N = no. of specimens used
x = particular value of strength
$\bar{x}$ = mean strength of specimen.

(c) Coefficient of variation :—
→ This is an alternative method of expressing variation of results & is a non-dimensional measure of variation.
→ It is obtained by dividing the standard deviation by the arithmetic mean value.

$\nu = \delta/\alpha \times 100$

Dt - 17.07.21

→ Destructive test :-
→ Destructive testing is undertaken in order to understand a specimen's performance or material behavior, these procedures are carried out to the test specimen's failure.
→ Destructive testing procedures can either follow specific standards or can be tailored to reproduce set service conditions.
→ This methods are commonly used for materials characterisation, fabrication validation, failure investigation, and can form a key part of engineering critical assessments, which also involves non-destructive testing techniques such as digital radiography.

⇒ Types of destructive testing :-

① Aggressive environment testing :- This includes fracture & fatigue testing in sour (H_2S), sweet (CO_2) and other corrosive environments, at a range of temp. and ~~environ~~ pressures.
→ These test allow industry to assess the the impact of these condition on materials & performance.

② Corrosion testing :- This covers non-toxic, small-scale, aqueous corrosion testing in a variety to different environments including fresh, seed water

③ Fracture & mechanical testing :- This includes different type of destructive testing methods such as tension tests, bend tests, charpy impact tests, Pellini drop weight testing, peel tests, crush testing, pressure & fracture testing.
→ As well as the testing of metals, fracture and mechanical tests can be carried out on different materials, such as welded polymers including plastic pipes.

④ Fatigue testing :- Performed in air or sea water environment, these tests are used to test parent materials & the endurance of welded joints under constant or variable amplitude loading.

→ This destructive testing method can also be used for fatigue crack growth testing of welds; base metals; and heat affected zones.

(5) Hydrogen testing :— This type of testing covers material that have a risk of corrosion fatigue exposure to hydrogen. These tests can be carried out at a variety of different temperatures & strain rates.

→ Residual stress measurement :-
→ Residual stresses are those that remain in a solid material after the original causes of any stresses have been removed.
→ These can be interfacial which can lead to premature failure of a structure.
→ measurement of residual stresses allows for designers & engineers to determine factors like near surface & through-thickness residual stress distribution, which can be used in engineering critical assessment.

→ Non-destructive methods of quality control :-
→ The quality control tests on services conducted on a structure without causing slightest damage to whole or part of it are known as non-destructive methods.
various stages of testing & monitoring are as under :-

(1) Load testing :— It is done to test the structure or part there of by external loading to evaluate its behaviour or properties or to certain its load bearing capacity.

(2) Inspection :— one site non-destructive examination may be done to establish the present conditions of the structures.

(3) monitoring :— It is an act of acquiring processing & communicating information about a structure under operational conditions over a period of time with a high level of automation.
→ monitoring of structures is done continuously & frequently for observing or measurements of structural conditions.

(1) Surface hardness test :- These are of indentation type; include the William's testing pistol & Impact hammers & are used only for estimation of concrete strength.

(2) Rebound test :- The rebound hammer test measures the plastic rebound of concrete & is primarily used for the estimation of concrete strength as well as for comparative investigations.

(3) Penetration & pull out tests :- These include the use of simbi hammer, split pins, the windsor probe & the pull out test.
→ They measure the penetration and pull out resistance of concrete & primarily used for strength estimations. However, they can also be used for comparative studies.

(4) Dynamic or vibration tests :- These include resonant frequency & mechanical sonic & ultrasonic pulse velocity methods.
→ These are mainly used to evaluate the durability & uniformity of concrete including estimation of stiffness & elastic properties.

(5) Combined methods :- The combined methods involving ultrasonic pulse velocity & rebound hammer may be effectively used to estimate the strength of concrete

(6) Radiactive & nuclear method :- These include the X-Ray and Gamma-Ray penetration tests for measurement of density & thickness of concrete.
→ Also the neutron scattering & neutron activation method are used for moisture & cement content determination.

(7) Magnetic & electrical methods :- The magnetic methods are primarily concerned with determination of the cover thickness of reinforcement in concretes whereas the electrical methods, including, the micro cwave absorption technique, have been used to measure moisture content & thickness of concrete.

(8) Acoustic emission technique :- These techniques are mostly used to study the initiation & growth of

cracks in concrete.

→ Difference between destructive and non-destructive test :-

non destructive test	Destructive cost
→ used for finding out defects of materials. → load is not applied on the material. → no load application, so no chance for material damage. → No requirement of special equipment → non expensive. → Less skill → eg : dye penetrate test, ultrasonic, radiography etc.	→ used for finding out the properties of the material. → Load is applied on the material. → due to load application, material gets damage. → special equipments are required. → Expensive. → skill is required → e.g. tensile test, compression test, hardness test etc.

CH-9 MONITORING PROGRESS Dt- 23.04.21

→ progress means to extent of achievement obtained at regular intervals of time & compared to the planned of work.
→ planning of programme & the progress of actual work is not checked with the passage of time is called monetoring
→ monitoring is managerial function that used for actual achievement with the planned target of work at each & every style of construction & taking necessary action of the planned goal ensure the attainment of the planned goal
→ monitoring or controlling of a construction work is generall done in three aspect.
① control / monitoring progress
② control of quality
③ control of cost of the work
→ In a construction work progress reports are prepare on regular intervals of time to have better control of progress.

⇒ Objective of progress control :-
→ All construction work there are many type of uncertainties & various going that causes to every often the progress achieved is less than that is planned.
→ Therefore to bring the work progress on the track some corrective measure are required. If timely corrective action are not taken then the work may not be proper completed in scheduled & the overall cost may increase than that is estimated.
→ monitoring process is also useful in case of dispute with the contractor. more over contractor take extra time for completion of a certain job that cause the work has been delayed due to the reason beyond his control such as delay of supply of material or checking of measurement by the department etc. In such situation proper monitoring progress is essential to settle the dispute.
→ Progress record also gives an idea of the payment to be made.
→ Thus the propose of the progress control are :-
① Provides information to the planner weather the work is going as per schedule.

② helps to take corrective action in time to bring back the work in track.
③ Progress record forms the basis of payments to be made from time to time.
④ Give assurance to the owner regarding the extent of profit or loss.

⇒ Methods of recording progress of work :-

→ The methods of recording progress depends upon the size & type of work as well as on the manner in which it is executed.

① By maintaining job diary :-

→ Jobdairy is a very important document for any construction job, in which all important matters related to work is meticulously recorded.
→ The attendance of workers, details of payments made, no. of labourers employed, receipt & receipt & issue of materials to the work, maintenance of log book, inspection reports etc.

② By maintaining the register of instruction :-

→ The register serves as a communication link b/w the engineer in charge & the contractor.
→ The site engineer records his observations regarding the quality & progress of the work in this register.

③ By maintaining the progress report :-

→ The site engineer prepares the progress report charts at regular interval to keep the owner and head office fully informed.
→ The reports may be submitted daily, weekly, fort-nightly or monthly as decided or agreed upon.

④ By keeping construction record :-

→ The daily record of material use and progress of work are entered in a standard form.
→ Also the test results of specimen tested in the field laboratory and the inspection note about the work are recorded in this register on regular basis.

(5) By keeping abstract of quantities & cost :-
→ The quantities of various item of work executed are recorded from time to time by the engineer & the payments to the contractors are made on the basis of these detailed measurement of different subheads of work entered in the measurement book.
→ The work abstract also reflects the expenditure of work including the material issued to the work. Thus it provides an independent check on the progress of work.

Dt- 27.07.21

→ Analysis of progress :-
→ Analysis of progress of work is imperative for large projects that are executed departmentally.
→ This is accomplished by establishment of a work study cell.
In order to achieve this goal the analysis of progress of work is done at different stages as follows.

(1) Material account :-
→ This keeps proper account of material purchased & consumed on the work as per material schedule.
→ In case of deviation in the consumption of materials its possible causes are investigated and corrective measures taken.

(2) Labour record :-
→ This document records the member of labourers employed, payment made to them and their out put which is compared with the labour schedule.
→ In case any excess is noticed, corrective action is initiate by the competent authority.

(3) Equipment record :-
→ It is intended to record the deployment of equipment and machinery for comparison with the equipment schedule.
→ The out turn of plant & machinery deployed is worked out and compared for any fall.

(4) Execution of work :-
→ Here the progress of construction is compared with the construction schedule and if the work is running behind the schedule its causes must be investigated.

→ possible causes could be lack of proper supervision, late arrival of construction material & equipment at site or inddequate arrangements for maintenance of equipment etc.

→ Corrective measures :-

→ The analysis of progress of work exposes the draw backs & inherent defects in the system. The site engineer is required to take the corrective measures promptly to bring the progress to track.

① Procurement of stores well in advance :-

→ Important construction material must be procured well ahead of requirement, but not in such advance as to result in the deterioration of quality of material during long storage period or much loss due to pilferage.

→ If the supply is not received in time, remainders must be issued immediately to the party concerned under intimation to the head office if required.

② Alternative arrangement & readiness of plants, equipments & machinery :-

→ In any essential machinery is not received in time, its alternative arrangement should be made promptly from other sources.

→ on no account the construction equipments, whether defective or in working condition should be kept idle due to any reason.

③ Proper watch & ward arrangement :-

→ To eliminate the chances of pilferage of construction material & equipment, proper arrangement of watch & ward should be made at the site.

④ Provision of incentives :-

→ some sord of incentive schemes should be introduced for achieving higher out puts & better efficiency.

→ However the aforesaid steps are board guide lines only and the site engineer may adopt his own decisions as per site conditions.

⇒ Productivity & methods of increasing productivity:-

→ Productivity means output of work in relation to its inputs.

→ productivity can be increase if maximum utilization of resource (ie manpower, equipment & materials)

→ productivity different from the term production because production means out put only without reference to the input.

→ production is measured in terms of quality of work done. thus the production can be increased by increasing the manpower or machinery.

→ but productivity is measured of efficiency or quality of work & it can only be increased by the optimum utilization of resources.

→ in construction industry the productivity of men & machineries is most important & that is why these two factors demand proper attention of construction management.

→ In construction works many items such as masonry or concrete work etc. are improve by modifying the working method, proper sequencing of operation adoption rational methods of gauging labour & & machinery.

→ All the above also minimizing the idleness of men

→ productivity also increase staff or worker skill, knowledge, responsibility it also create motivation among themself.

→ productivity is closely linked with the psychological factors of workers & it plays a vital role in their working capacity.

→ motivation also very important for worker to motive them & it help to create suitable environment & it also create suitable environment where the willing & sincere workers are benefited.

⇒ productivity analysis & work study:-

→ work study is a major tool of productivity analysis by which productivity can be increased by eliminating factors responsible for inefficiency & wastage is by adopting better technique for improving efficiency work study comprises of 2 method

① motion or method study
② time study or work measurement

① motion study :- It is technique which can be applied for making optimum use of resources for the fulfill of the job.
→ The scientific study of motions of workers with a view to simplify & minimize the effort to be used to increase the productivity of worker is known as motion study
→ motion study is done for increasing the productivity & reducing costs by making the tasks easier, safer & less time consuming.
→ motion study is essentially concerned with finding better ways of doing things.

① selecting :- The job which requires improvement is selected after which the workers are encouraged to adopt such techniques as to improve the productivity
→ This could be achieved by announcing some incentive schemes for the workers

② Recording :- All relevant information about each and every operation in the existing systems are recorded.
→ for simplifying the work.

③ Analysis :- All the facts recorded are analyzed to decide whether each operation in the work is necessary or they can be operated by alternative methods more easily eliminated & replaced by other operation or method.

④ Development :—
→ From the study of existing methods & available alternatives, new method which might be simpler & easier to adopt is involved leading to higher productivity.

⑤ Adoption :— After approval of the management, the new technique is adopted. This may not be an easy task as usually the workers are found reluctant to accept the changes in methods or techniques they are used to working.

⑥ Adherence :— new method must be adhered to have it accepted & adopted. Regular checking & thorough inspection at site are necessary so that it may not slip back to the old ways.

(2) Time study :- Time study is defined as a techni-
que of observation & analysis of mode of perfor-
mance of an operation by measurement & evaluation
of time required for the performance of operation
and subsequent establishment of fair & equitable
standards.

Following steps are involved in time study :-
→ selection of particular job to be studied & improved
→ Recording complete breakup of the operation into
various elements.
→ comparing observed time in with the permissible
time for each operation.
→ converting the observed time into standard time
→ recording time taken to complete each elements
of the operation.

Dt- 28.07.21

→ Accidents :-
→ Accident is an unplanned & unexpected occurance which
cause the loss in production & progress of work and
resulting in injury to the person. It may cause
damage to plants & equipment of the construction
proje

→ cause & effect of accident :-
1. physical
2. physiological
3. Psychological.

① physical cause :-

(a) cause relating to machines :-
→ due to obstruction free movement of mags machine
is not possible & there may be inadequate working
space for the machines.
→ Due to improper placing or adjusting of machines.
→ Accident may be caused due to unsuitable machines
being used for the job.
→ Accident may be caused due to improperly
guarded machines.
→ Accident may be caused due to improperly
insulated electric motor on the machine.

(2) causes Relating to tools & equipments :-
→ Accident may be caused due to constant use of tools, which has been blunt & worn out
→ Tools used for the job is being too small.
→ The tools having handle too short or loose
→ use of unsuitable tools for the work may be a cause for accident.
→ sometimes due to brittle nature of tools, it breaks suddenly, accident may be caused.

(3) causes relating to materials :-
→ Accident may be caused due to careless handling of explosives, petrolium products & brittle materials
→ At the time of use of road material there should be careful handling of too hot materials like tar or bitumen.
→ Accident may be caused due to use of materials being poisonous & dangerous as acid & some salt.

(4) causes relating to uniform :-
→ The uniform should not be loose.
→ the slippery, loose shoes may be used during the work time.
→ while working on welding job, no protective devices are being used.
→ sleeves of the shirt being out of buttons.

(5) causes relating to environment :-
→ poor lighting arrangement at the working site
→ poor ventilation & unhygienic conditions at the working place.
→ loose electric cables & live conductors carelessly.
→ obstacles in the working area.
→ floors being slippery
→ use of unsafe & unsafe ladders.
→ Improper discipline among workers.
→ Use of unsafe buildings.

2) Physiological causes :-
① Poor eye sight :- proper eyesight is a very important factor for every worker.

(2) over work :- when over work is loaded on a tired worker over his limbs, then he may meet with an accident
(3) poor health :- Due to poor health, a worker may not control his load of work & he may meet an accident.
(4) old age :- ~~due to poor health, a worker may not control~~ Due to poor eye sight & poor hearing power of an old man, he may meet an accident easily.
(5) Intoxication :- A worker loses control over his limbs & becomes prone to accident under the influence of intoxication.
(6) physical handicapness :- A physical handicapness person can easily have a chance of meeting with an accident

(3) psychological factor :-

(1) mental tension :- Due to mental tension, a worker can lose control over his mind & he may meet with an accident.
(2) Emotional attitude :- A highly emotional man can loses balance of mind easily.
(3) impulsiveness :- when a workers acts under impulse without proper thinking the changes of accident are more.
(4) nervousness :- when a worker gets nervous, loses control over his limbs quickly, he has more chances of meeting with an accident.
(5) over confidence :- Over confidence may sometimes lead to accident.
(6) carelessness :- A worker when in careless mind may have the more chances for accident.
(7) Fear :- when a worker gets feared & loses control over his mind, he may have the chances of meeting with an accident.

→ Importance of safety :-

→ Social concern & efforts are being made to adopt safety measures by creating safety conciousness among the workers.
→ Form a survey of occupational injury and illness

accident it is found that up to 14.5% workers suffer from injuries.
→ so sufficient care & enough preventive measures should be taken for these injuries, accidents of any sort during the construction period can be avoided to some extent.
→ Accident prevention should be more essential for all construction site.
→ A construction industry which engages the largest labour so safety measures should be more important before for these industries.
→ There are 3 reasons.
① Humanitarian Reason
② Economic Reason
③ Organizational image Reason.

① Humanitarian Reason :- In this Reasons the injured worker along with his family suffers difficulty in economic terms. so accident should be prevented more on humanitarian consideration.

② Economic Reason :- In this Reasons injured worker faces difficulty owing to medical expenses for the injury. It also causes the slow down in progress of work & decreases in productivity loss of confidence & logs of administrative work due to accident.

③ Organisational / Image Reason :-
→ In this Reasons show the points of view of good safety measure which is help to measures enhance the public image of the organisation. because it strengthens the moral of the workers resulting in higher productivity & better loyalty of the workers to the organisation.

Dt - 30.07.21