LECTURE NOTES ON CONSTRUCTION MANAGEMENT

FOR DIPLOMA 6TH SEMESTER (TH-2) AS PER LATEST SCTEVT SYLLABUS

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Th 2. CONSTRUCTION MANAGEMENT

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4P/week	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE

The course aims to prepare students to be an effective team member in a construction organization setup. This necessitates managerial skills in managing materials, time and human resources. Also, the course helps the students to build concepts of disasters and explore about manmade disasters at national as well as international level with quality measuring indices and vulnerability atlas of India.. The course has been designed to cater to these needs.

B. COURSE OBJECTIVES

On completion of the course students will be able to-

1. Develop schedules for construction project
2. Realize significance of organizational behavior towards successful functioning
3. Explain the important terminology related to materials management, site management, equipment management and labor management
4. Understand construction quality indicators and their measurement
5. Apply methods to measure and monitor progress of work
6. Realize significance of safety requirement and regulations at workplace
7. Understand the importance and usage of the Vulnerability Atlas of India in construction Projects.

C. TOPIC WISE DISTRIBUTION

Chapter	Name of topics	Hours
1	Introduction To Construction Management	04
2	Constructional Planning	07
3	Materials and Stores Management	04
4	Construction Site Management	05
5	Construction Organisation:	06
6	Construction Labour and Labour Management:	06
7	Equipment Management	06
8	Quality Control	05
9	Monitoring Progress	06
10	Safety Management In Construction	05
11	Role of Vulnerability Atlas of India in construction projects	06

D. COURSE CONTENTS:

1 Introduction To Construction Management

1.1 Aims and objectives of construction management.
1.2 Functions of construction management.
1.3 The construction team components-owner,engineer,architect,contractor-their functions and interrelationship and jurisdiction.
1.4 Resources for construction management-men,machines,materials,money

2 **Constructional Planning**

2.1 Importance of Construction Planning

2.2 Developing work breakdown structure for construction work

2.3 Construction Planning stages-Pre-tender stage, Post-tender stage.

2.4 Construction scheduling by Bar charts-preparation of Bar Charts for simple construction works.

2.5 Preparation of schedules for labour materials,machinery, finance for small works

2.6 Limitation of Bar charts

2.7 Construction scheduling by network techniques-defination of terms ,PERT and CPM techniques, advantages and disadvantages of two techniques, network analysis, estimation of time and critical path, application of PERT and CPM techniques in sample construction works.

3 **Materials and Stores Management**

3.1 Classification of Stores-storage of stock.

3.2 Issue of materials-indent , invoice, bin card

4 **Construction Site Management**

4.1 Job Lay out-Objectives, Review plans, specifications, Lay out of equipments.

4.2 Location of equipment, organizing labour at site.

4.3 Job lay out for different construction sites.

4.4 Principle of storing material at site.

5 **Construction Organization:**

5.1 Introduction – Characteristics, Structure, importance.

5.2 Organization types-line and staff, functions and their characteristics

5.3 Principles of organization- meaning and significance of terms- control, authority, responsibility, job & task.

5.4 Leadership-necessity, styles of leadership, role of leader

5.5 Human relations-relations with subordinates, peers, Supervisors, characteristics of group behavior, mob psychology, handling of grievances, absenteeism, labour welfare.

5.6 Conflicts in organization-genesis of conflicts, types-intrapersonal, interpersonal, intergroup, resolving conflicts.

6 **Construction Labour and Labour Management:**

6.1 Preparing Labour schedule

6.2 Essential steps for optimum labour output

6.3 Labour characteristics

6.4 Wages & their payment

6.5 Labour incentives

6.6 Motivation- Classification of motives, different approaches to motivation.

7 **Equipment Management**

7.1 Preparing the equipment schedule

7.2 Identification of different alternative equipment

7.3 Importance of Owning & operating costs in making decisions for hiring & purchase of equipment

7.4 Inspection and testing of equipment

7.5 Equipment maintenance

8 **Quality Control**

8.1 Concept of quality in construction

8.2 Quality Standards- during construction, after construction, destructive & non destructive methods.

9 **Monitoring Progress**

9.1 Programme and progress of work

9.2 Work study

9.3 Analysis and control of physical and financial progress corrective measures.

10 **Safety Management In Construction**

10.1 Importance of safety

10.2 causes and effects of accidents in construction works

10.3 Safety measures in worksites for excavation, scaffolding, formwork, fabrication and erection, demolition.

10.4 Development of safety consciousness

10.5 Safety legislation- Workman's compensation act, contract labour act.

11 **Role of Vulnerability Atlas of India in construction projects**

11.1 Introduction to Vulnerability Atlas of India, Concepts of natural hazards and disasters and vulnerability profile of India. Definition of disaster related terms.

11.2 Earthquake hazard and vulnerability, Magnitude and intensity scales of earthquake, seismic zones, earthquake hazard maps, types of structures and damage classification, effects in housing and resistant measures.

11.3 Wind / Cyclone hazard and vulnerability, wind speed and pressures, wind hazard and cyclone occurrence maps, storm surveys and cyclone resistant measures.

11.4 Flood hazard and vulnerability, Flood hazard and Flood prone areas of the country, General protection of habitants and flood resistant construction.

11.5 Landslides, Tsunamis and Thunderstorm hazards and vulnerability, Landslide & Thunderstorm incidence maps, Measures against Tsunami hazards.

11.6 Housing vulnerability risk tables and usage of vulnerability atlas of India, Inclusion of vulnerability atlas in Tender documents.

CONSTRUCTION MANAGEMENT 15/3/22

Management
↓
(1) ~~cost~~ Time
(2) cost
(3) Material/Resources
(4) Man power — Labour / Team

Construction Management :-

Construction management may be defined as an "art of planning", co-ordinating & controlling various construction activities of a project to produce qualitative & economical product with the available resources.

Objectives of construction Management :-

The main objective of construction management are :-

i) completing the work within estimated budget & specified time.
ii) Evolving high quality workmanship.
iii) Providing safe working conditions for all.
iv) Taking sound decision at the lowest practical management level through delegation of authority.
v) Motivating people to give their best with in their capacity.
vi) Creating an organisation that works as a team.

→ Construction management is the overall planning, co-ordinating & controlling of a project from inspection to completion aimed as meeting our requirements in order to produce a functionally and financially project.

L.Q functions of construction Management :-

The functions of construction management are :-

(i) Planning and scheduling
(ii) Organising
(iii) Staffing
(iv) Directing
(v) controlling
(vi) Co-ordinating

Planning and scheduling :-

(i) It is essentially covers the aspects of "What to do" "How to do it".

(ii) Planning involves formulation of number of alternative realistic work plan for achieving specified objectives with based suitable available resources.

Scheduling :-

(i) Scheduling is the fitting of final work plan to a time scale.

(ii) It shows the duration and order of various construction activities.

(iii) It deals with the aspect of "When to do it".

Organising :-

(i) Organisation is concerned with division of the total construction work into manageable departments or sections.

(ii) Systematically arranging various operations.

(iii) The relation betn various personnel are established.

Staffing :-

i) Staffing is the provision of people to fullfill the positions to created.

ii) Staffing functions include :-

(a) Recruiting the right people

(b) Arranging staff training course

(c) Carryout proper staff assessment.

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Directing :-

The directing function is concerned with training sub-ordinates to carryout assigned task, supervising their work and guiding ~~there~~ their efforts.

Controlling :-

i) Controlling is necessary for ensuring effective and efficient work.

ii) It involves a constant review of the workplan to check ~~actual~~ actual achievement.

iii) comparision of actual and planned performance.

Co-ordinating :-

i) It is necessary to bring together & co-ordinate the work.

ii) Regular meetings of departmental heads with top management.

iii) Plans, problems and control technique ~~of~~ are discussed for determining solution are best solution.

Team work
Regular meetings
Decision making } Co-ordinating

~~Recoureses~~

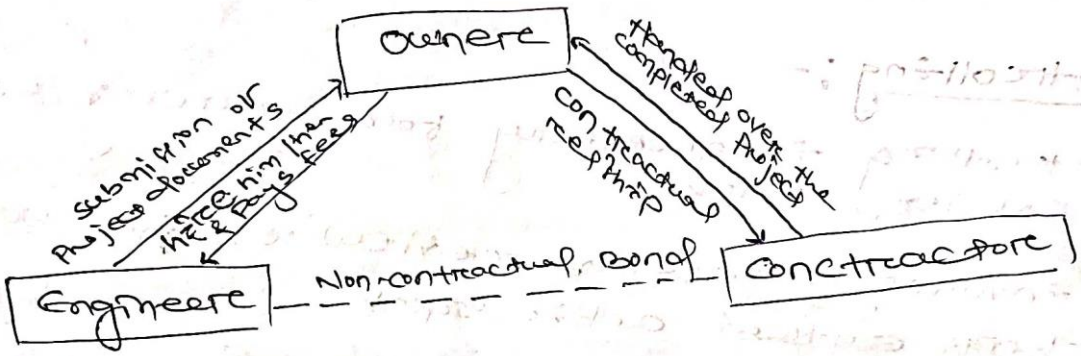
Resources for construction industry :-

Resources -

1. Land | space - Govt | Private land
2. cost - State govt | central Govt | company | Individual
3. Materials - cement, sand, aggregate, water, Reinforcement, soil etc.
4. Man power :- skilled | unskilled | Engineer | contractor | Manager.
5. Machine - Roller | tamping machine | Excavator | Mixture | etc.

Construction Team :-

1. Owner - Govt | Private
2. Engineer - JE | AEE | Designer etc.
3. contractor - Labour, Manager, supervisor etc.



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Construction planning :-

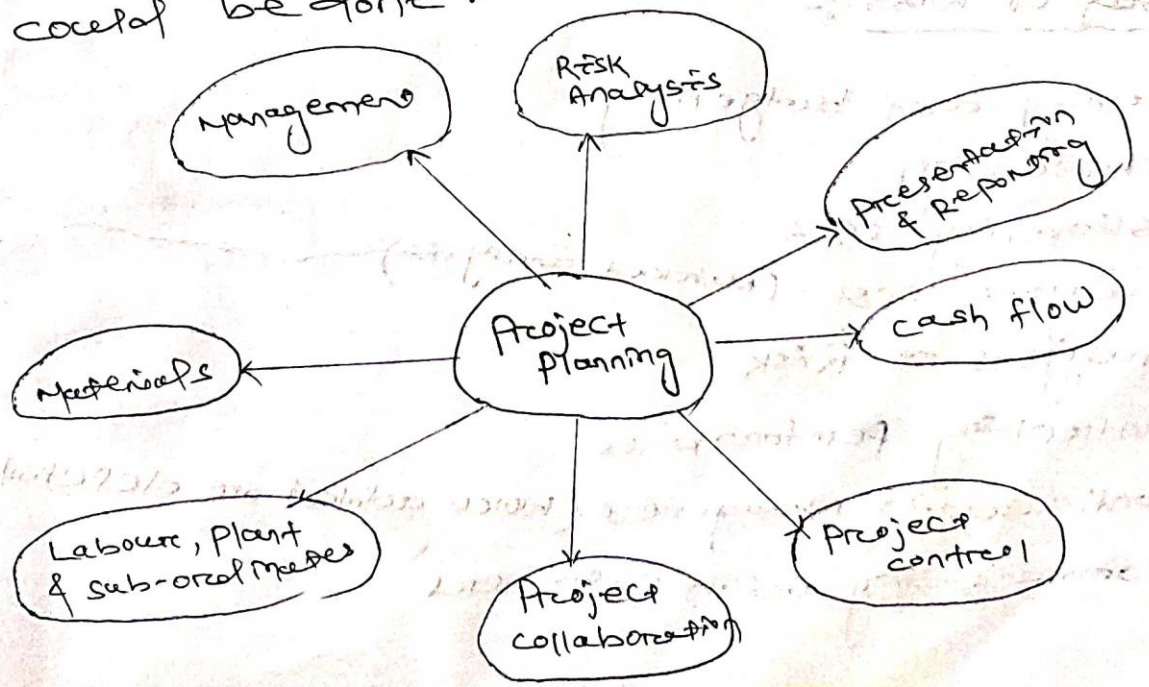
systematic arrangement of all the construction activities before starting actual construction work on a project.

stages of construction planning

- Pre-Tender stage
  - various construction activities required betn the notification inviting tenders & submission of bid by the contractors.
- Post-Tender stage | construction stage
  - Planning required by the contractors after the acceptance of his tender by the authority & award of contract to him.

Project planning :-

It is the process of selecting a particular method and the order of work to be adopted for a project from all the possible ways and sequentially in which it could be done.



Importance of Project Planning :-

(i) Planning helps to minimize the cost by optimum utilisation of available resources.

(ii) Planning reduces inter departmental conflicts.

(iii) Planning encourage innovation & creativity.

(iv) Planning imparts competitive strength to the enterprises.

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WORK BREAKDOWN STRUCTURE (WBS):-

Imp

Breakdown - whole to parts

Defination:-

(i) Work breakdown structure is the most important project management tool.

(ii) WBS captures the entire project scope of work in a very object fa

(iii) WBS guides the project team to do project planning, project execution & project control. Effectively.

(iv) Usage of WBS :-

(i) Planning and budgetting.

(ii) scheduling

(iii) estimating cost

(iv) Analysis cost (Market analysis)

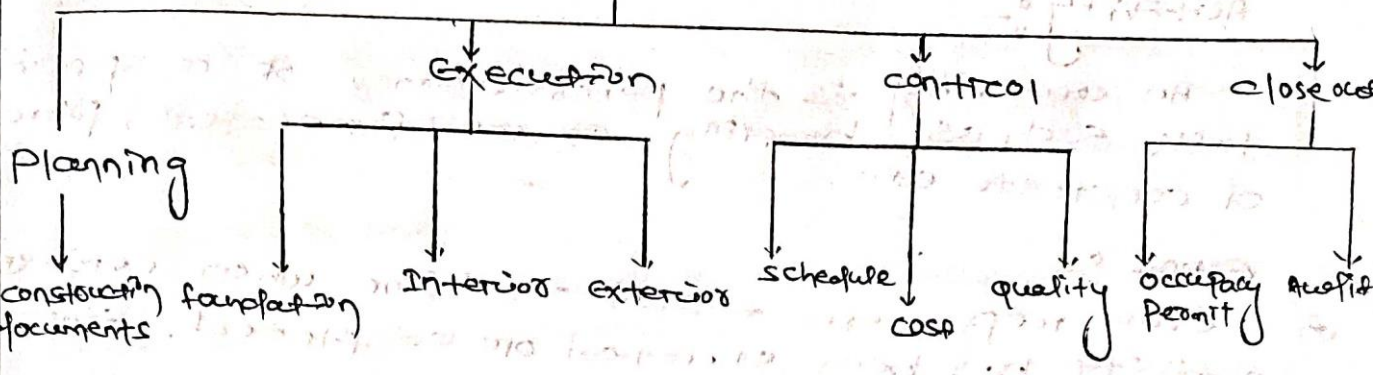
(v) Analysis of Risk

(vi) controlling performance

(vii) configuration Management (work added or deleted)

(viii) communicating with customers.

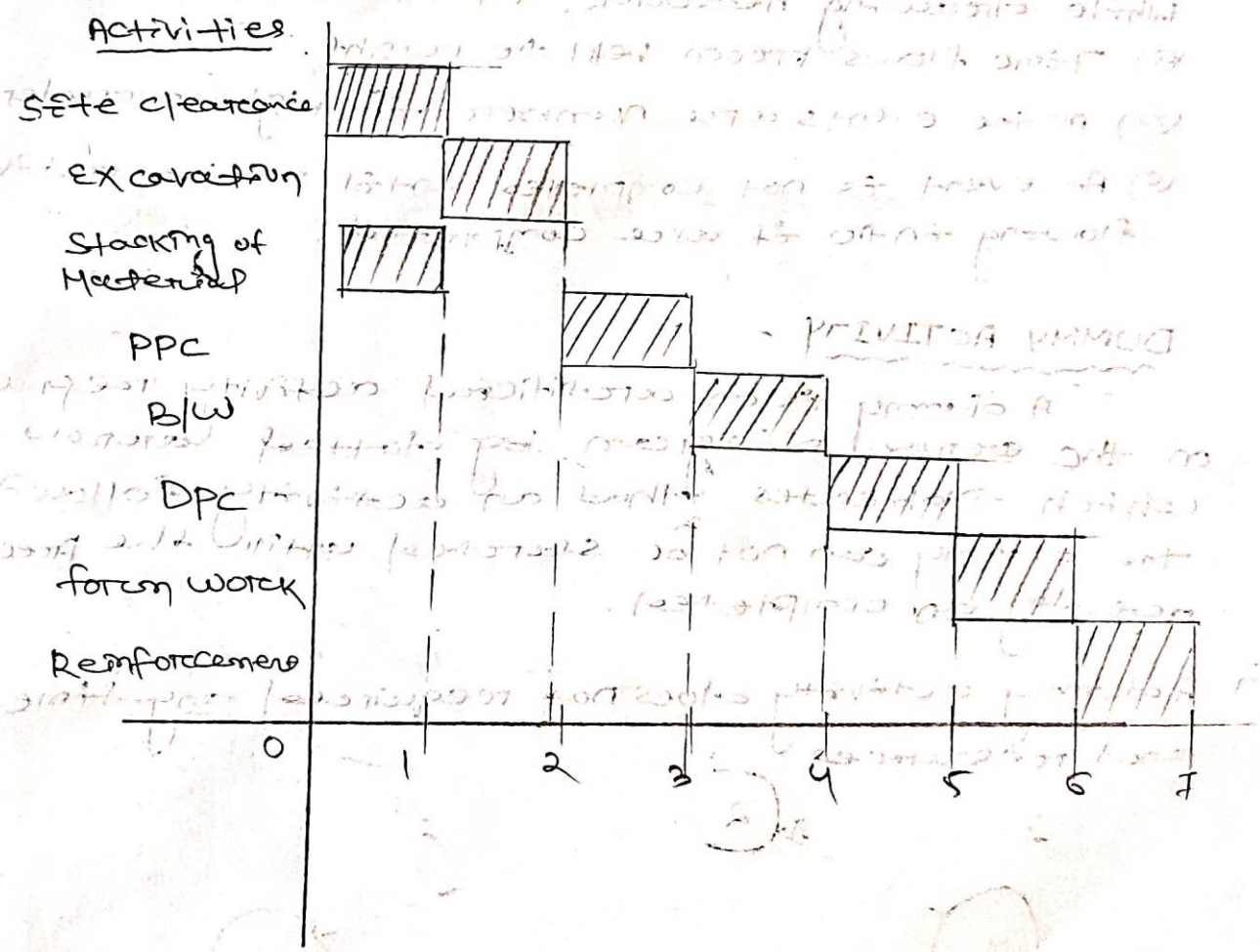
Work Breakdown Structure



Construction scheduling by Barcharts :-

i) A barchart is formed with a list of activities, specifying the start date, duration of the activity and completion date are each activity and then plotted on a project time scale.

ii) The detailed level of the barchart depends on your project complexity and use of the schedule.



CPM & PERT

Elements of Networking :-

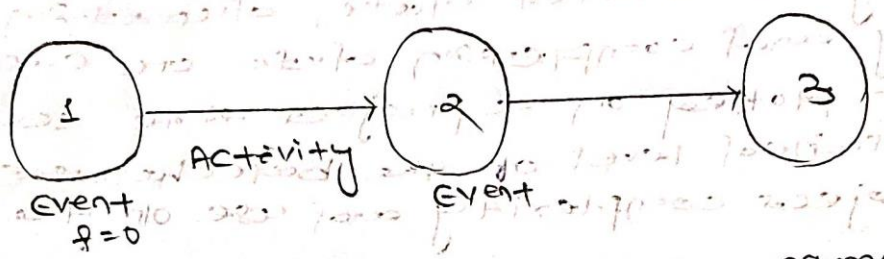
Activity :-

An activity is the performance of a specific task such as bending of reinforcement, placing of concrete etc.

Event :-

(i) Event represents instant in time when certain activity has been started or completed. Event also called NODE.

(ii) It is represented by a circle.



While drawing network, it is assumed that -

(a) Time flows from left to right.

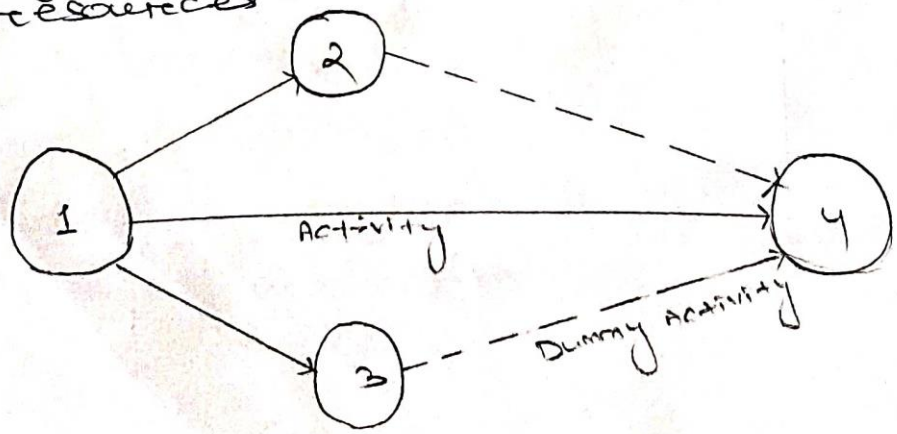
(b) All the events are number in higher order.

(c) An event is not completed until all the activities flowing into it are completed.

DUMMY ACTIVITY -

A dummy is an artificial activity represented on the arrow diagram by dotted arrow, which indicates that an activity following the dummy can not be started until the preceding activity are completed.

(i) A dummy activity does not required any time and resources



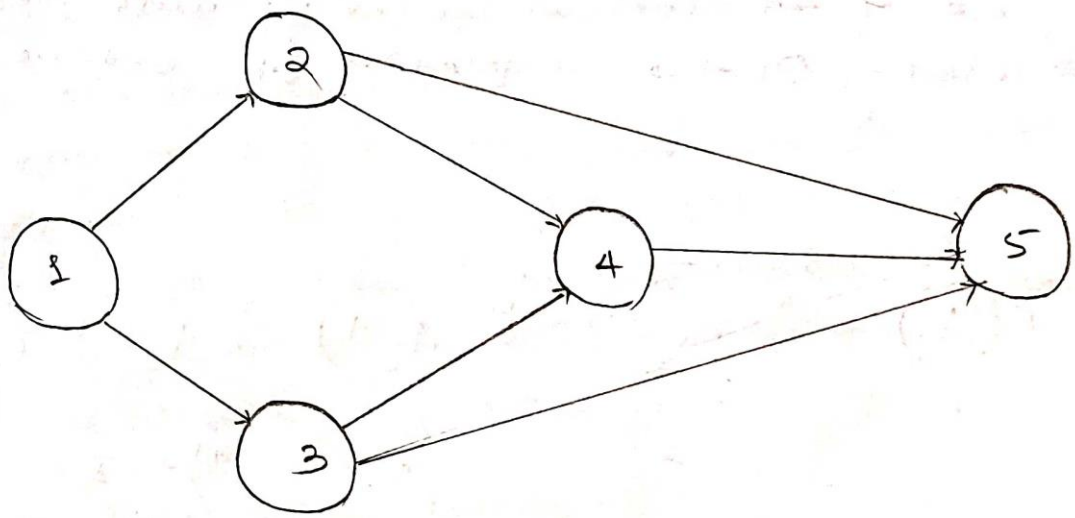
Predecessors :-

Predecessors Events :-

The events are events that happen before another event are called predecessors event two that event.

Successors Events :-

The events are events that follows another event are called successors events.



Events	Predecessor	Successor
1	—	2, 3, 4, 5
2	1	4, 5
3	1	4, 5
4	1, 2, 3	5
5	1, 2, 3, 4	—

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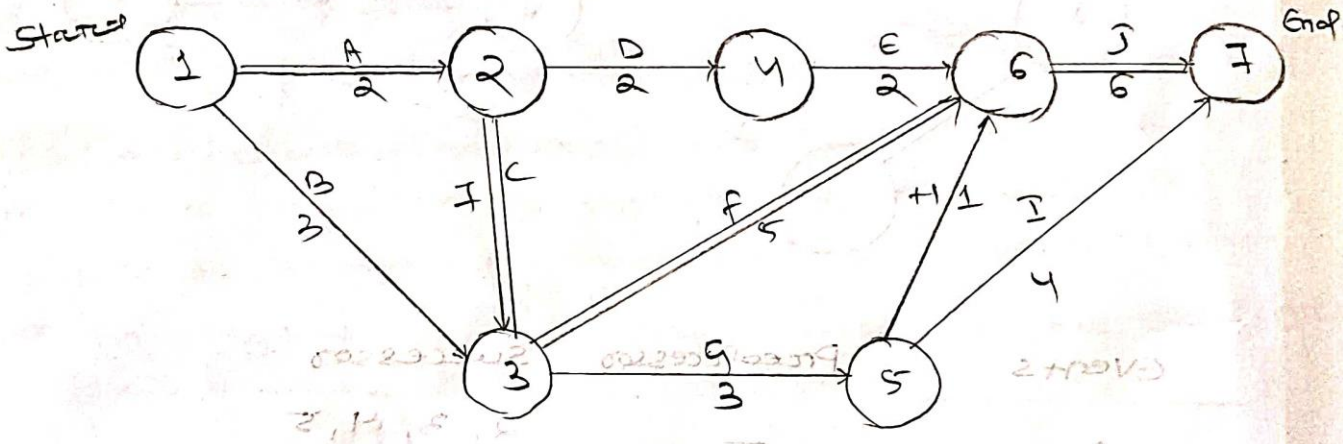
Critical Path Method :-

(i) The total project time is the maximum of the time amounts all paths originating from initial event and terminating at the final event, indicating the completion of the project.

(ii) The path of longest duration is defined as critical path & the activities in this path are called critical activities.

(iii) Any delay in critical activity will result a delay in the completion of entire project.



1 - 2 - 4 - 6 - 7 = 12

1 - 2 - 3 - 5 - 7 = 16

1 - 3 - 5 - 6 - 7 = 13

1 - 2 - 3 - 6 - 7 = 20

1 - 2 - 3 - 5 - 6 - 7 = 19

1 - 3 - 5 - 7 = 10

1 - 3 - 6 - 7 = 14

Dt. 30/3/2

PERT AND THREE TIME ESTIMATES

PERT – Pert stands for project / Programme evaluation and review technique.

(i) The prime function of the management is decision making under such uncertainty conditions and balancing the risk associated with a particular problem.

(ii) In order to reflect this uncertainty, the modeling of network is resorted.

(iii) Pert introduces uncertainity into the account by three types of time estimate of activity duration which are as follows –

1. Optimistic Time estimate (t_o)
2. Pessimistic Time Estimate (t_p)
3. Most Likely Time Estimate (t_m)

1. Optimistic Time Estimate :–

(i) The optimistic time estimate is an estimate of minimum time required for an activity, if nothing goes wrong.

~~Pessimist~~.

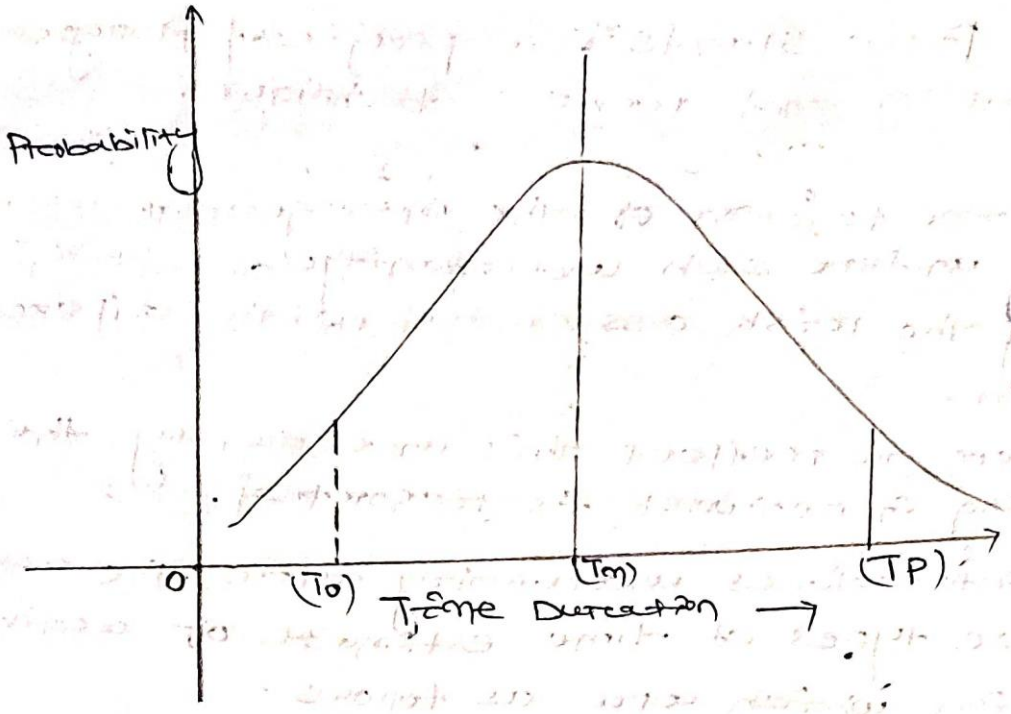
(ii) Ideal conditions are assumed during the execution of the activity.

2. Pessimistic Time Estimate :–

(i) The pessimistic time is an estimate of the max^m time required for an activity, if everything goes wrong.

3. Most Likely Time Estimate :–

The most likely time is based on experience and judgement if the activity is repeated a number of times under essentially the same condition.

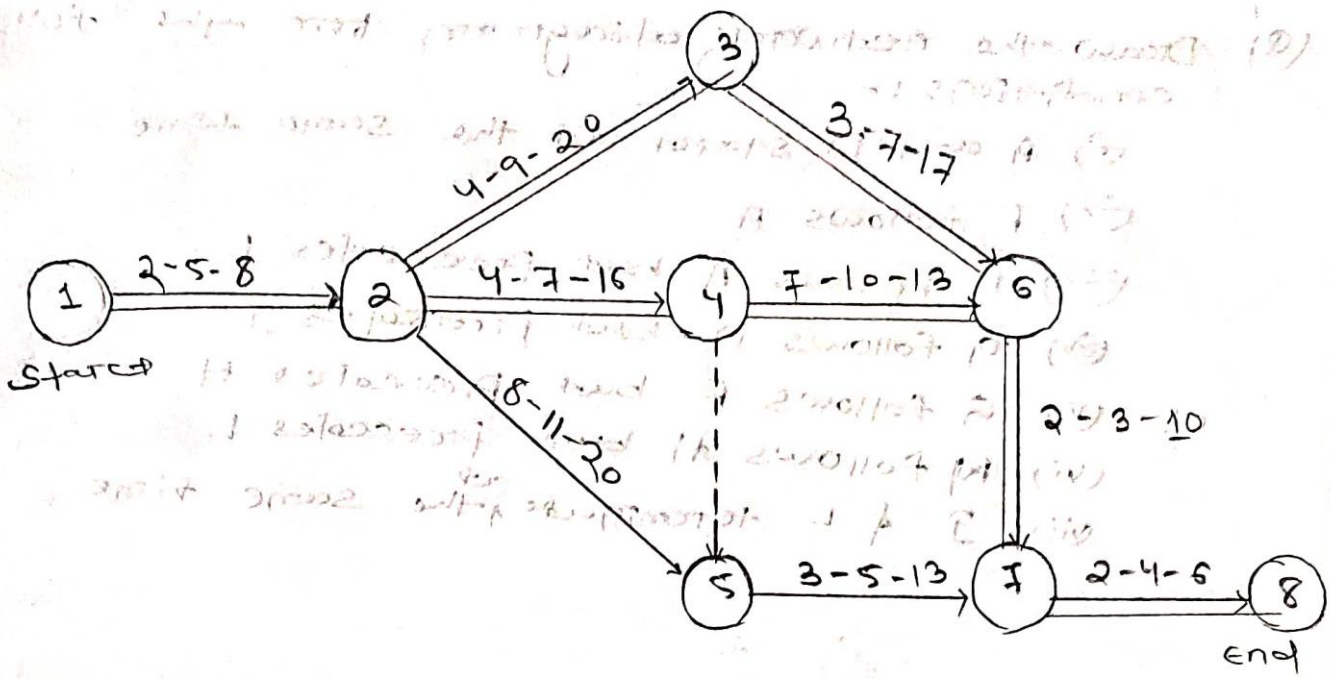


EXPECTED MEAN TIME :-

(i) Expected mean time of an activity is denoted by (T_e).

(ii) Expected mean time of an activity can be calculated

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



Event	t_o	t_m	t_p	$t_e = \frac{t_o + 4t_m + t_p}{6}$
1-2	2	5	8	5
2-3	4	9	20	10
2-4	4	7	16	8
2-5	8	11	20	12
4-6	7	10	13	10
3-6	3	7	17	8
5-7	3	5	13	6
6-7	2	3	10	4
7-8	2	4	6	4

1-2-3-6-7-8 = 5+10+8+4+4 = 31

1-2-5-7-8 = 5+12+6+4 = 27

1-2-4-6-7-8 = 5+8+10+4+4 = 31

1-2-4-5-7-8 = 5+8+0+6+4 = 23

(Q) Draw the network diagram for the following conditions :-

(i) A and D started at the same time

(ii) F follows A

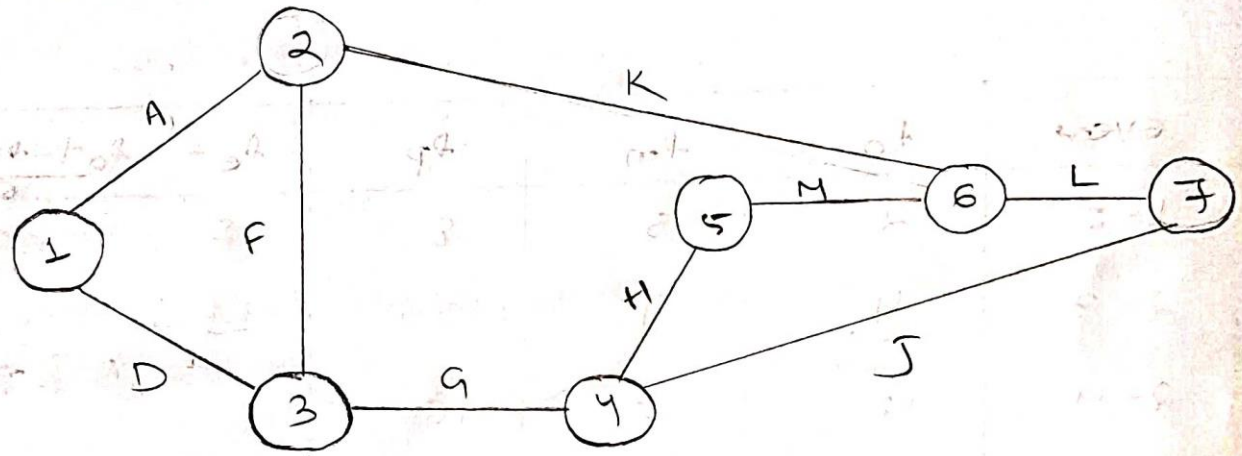
(iii) K follows A but precedes L

(iv) G follows D but precedes J

(v) G follows F but precedes H

(vi) M follows H but precedes L

(vii) J & L terminate at the same time



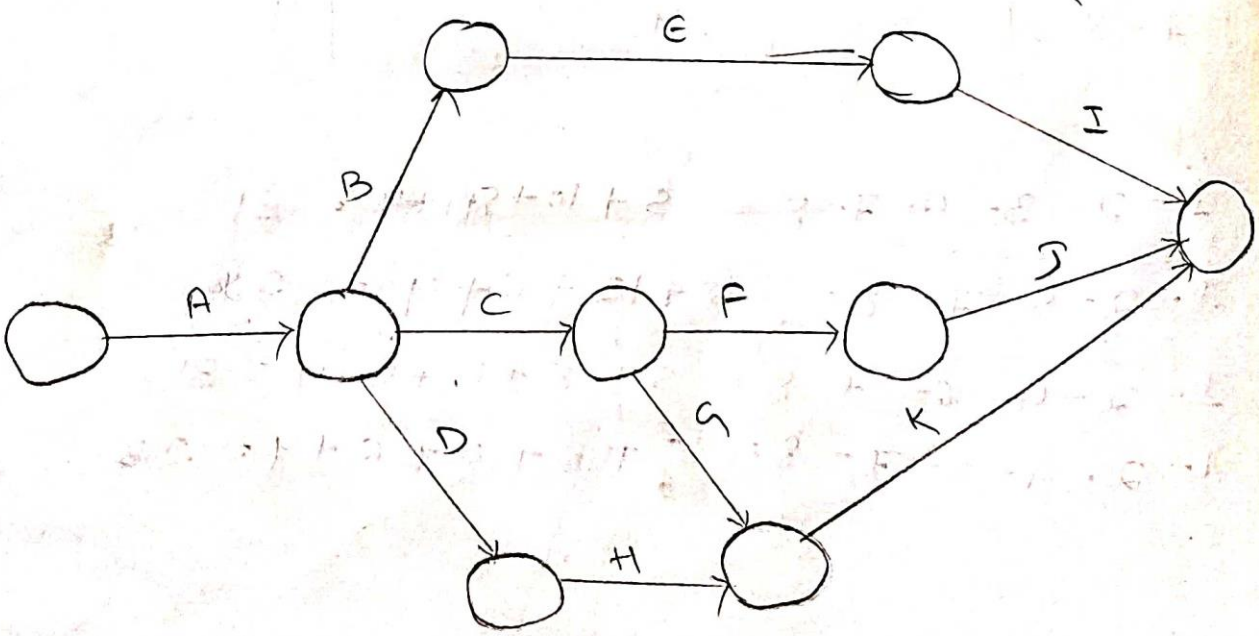
(Q) In a project consisting of 11 activities, the directions are given below:-

(i) A → B B → E D → H H → K

(ii) A → C C → F E → I

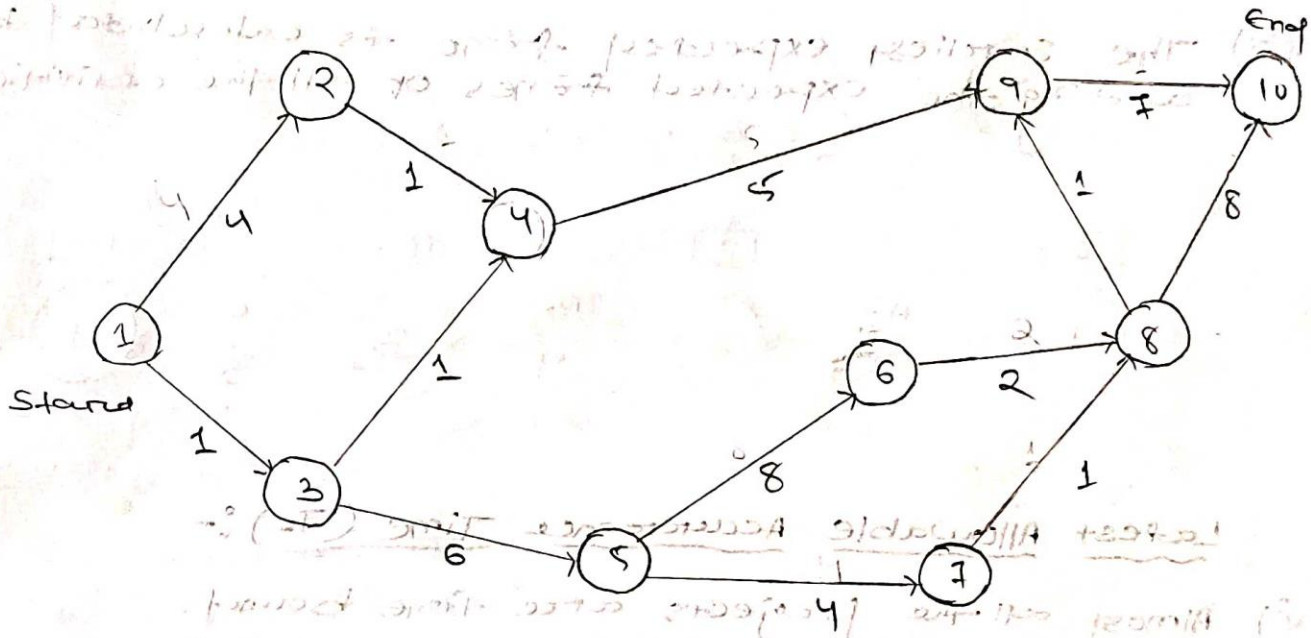
(iii) A → D C → G F → J

G → K



A project schedule has the following characteristics:

Activity	Time (Weeks)	Activity	Time (Weeks)
1-2	4	5-6	4
1-3	1	5-7	8
2-4	1	6-8	1
3-4	1	7-8	2
3-5	6	8-9	1
4-9	5	8-10	8
		9-10	7



Critical Paths.

1-2-4-9-10 = 4+1+5+7 = 17

1-3-4-9-10 = 1+1+5+7 = 14

1-3-5-7-8-10 = 1+6+4+1+8 = 20

1-3-5-7-8-9-10 = 1+6+4+1+1+7 = 20

1-3-5-6-8-10 = 1+6+8+2+8 = 25

1-3-5-6-8-9-10 = 1+6+8+2+1+7 = 25

Dt- 4/9/22

(i) Pert is an event oriented network and ∴ there the importants is bore occurrence bore events.

(ii) Hence, we will loop into duration associated with the occurrence of events.

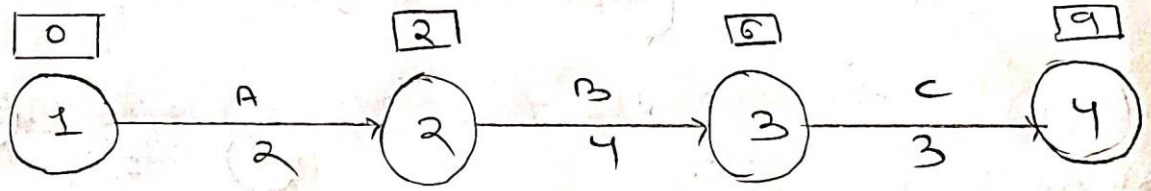
(iii) The two times estimates are :-
(i) earliest expected time (T_E)
(2) Latest allowable occurrence Time (T_L)

Earliest Expected Time (T_E) :-

(i) The earliest expected time is the time when an event can be expected to occure.

(ii) It is usually put above or below that perticular event.

(iii) The Earliest expected time is calculated by adding the expected times of all the activities.

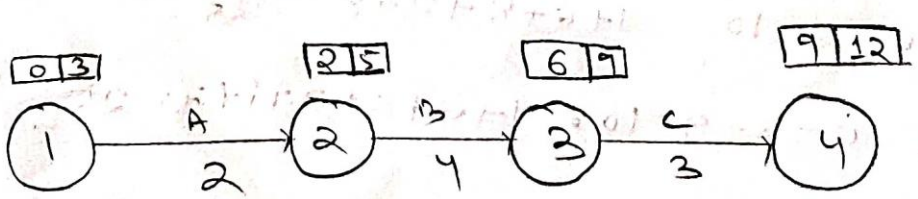


Latest Allowable Accurrence Time (T_L) :-

(i) Almost all the projects are time bound.

(ii) For each Event, some time limit is allowted by which that event must occure.

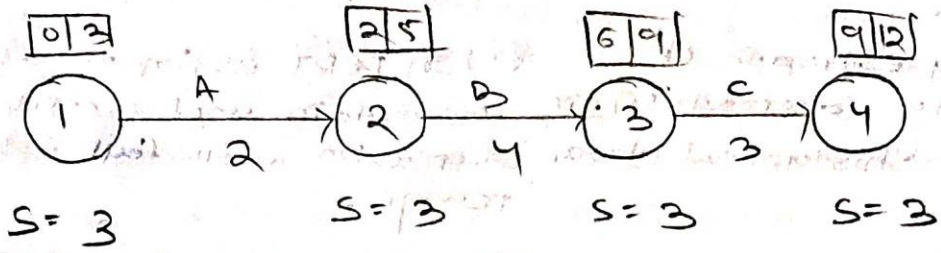
(iii) The latest time by which an event must occure to keep the project on schedule is called latest allowable accurrence time.



substract / Minus

SLACK :-

The difference betn earliest expected time and latest allowable occurrence time of an event is called the slack of that event.



$\boxed{\text{Slack} = (T_L - T_E)}$

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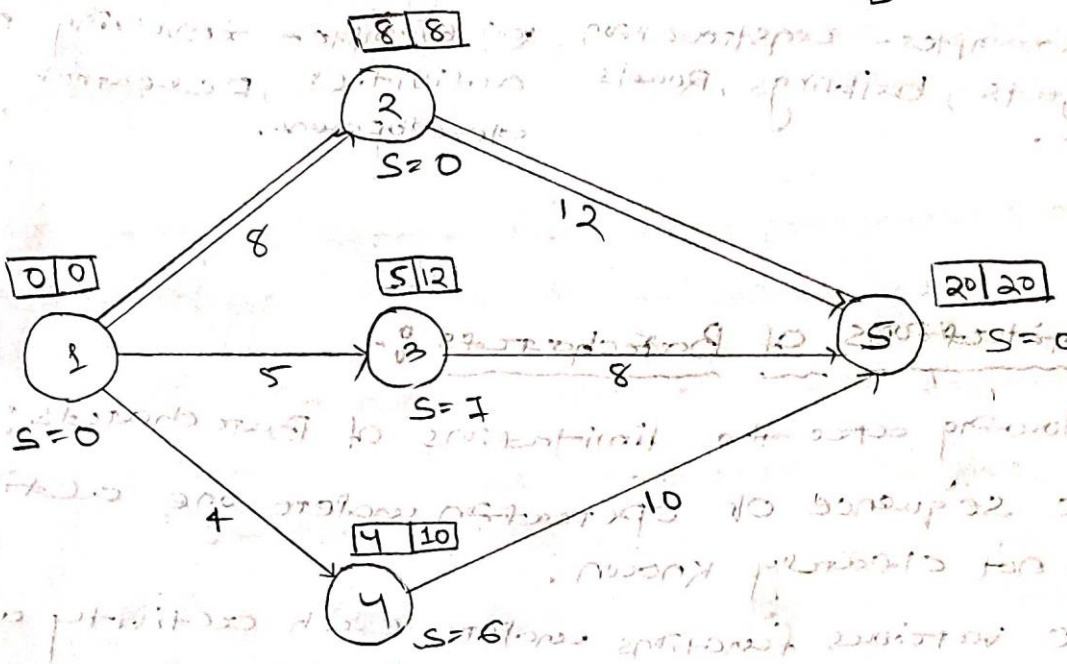


forward (+) Max^m
Backward (−) Min^m

When T_L is not given they assume, $T_E = T_L$

→ A critical path is the one which connects the event having (0) or minimum slack time.

Differenciate betn CPM & PERT :-

9.mp

CPM	PERT
(i) It is a deterministic model.	(i) It is a probabilistic model.
(ii) In CPM estimate of activity duration are based on historical data.	(ii) In PERT estimate are uncertain and activity duration will fall into a range.
(iii) It is used for repetitive job like residential construction.	(iii) It is known for non repetitive job like research & development programme.
(iv) Examples- construction projects, buildings, Roads etc.	(iv) Example- involving new activities, Research & development.

9.mp Limitations of Bar charts :-

following are the limitations of Barcharts :-

(i) The sequence of operation where one activity is not clearly known.

(ii) The various functions where each activity are shown by one bare, that why the interlinking is not clearly known.

(iii) One fails to known the delay in completion of the project due to uncertainity.

(iv) This is not given an idea as to what is completed & what is left because the bare representing any activity does not show any event in it.

(v) Difficult to readjust length of bare & ~~pattern~~ position of bare, if time schedule is change.

CHAPTER-3 Dt-6/4/22

MATERIALS AND STORE MANAGEMENT

Introduction :-

(i) Store is an important component of material management, since it is a place that keeps the material in a way by which the materials are well accounted form, are maintained safe & are available at the time of requirement.

(ii) Literally Store refers to the place where materials are kept under custody.

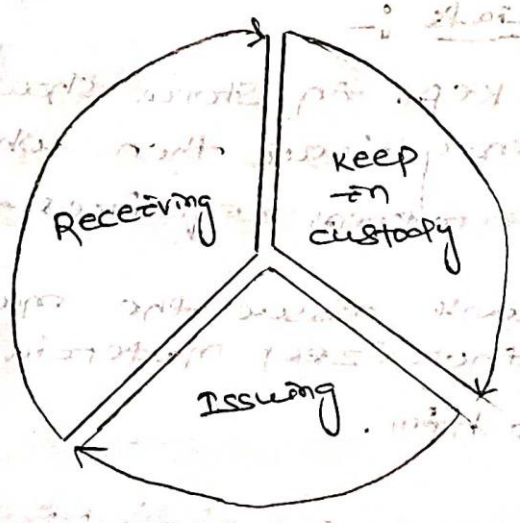
(iii) Storage is an essential and most vital part of the economic cycle & store management.

Typically a store has few processes & a space for storage. The main processes are-

(i) To ~~receive~~ receive the incoming material

(ii) To keep the materials under the custody.

(iii) To move them out of the store for use.



Process of a store

CLASSIFICATIONS OF STORES:-

(i) Stores can be temporary nature which means that it has a limited life.

(ii) Stores can also be permanent nature.

(iii) Stores are classified as under -

(1) functional store

(2) Physical store

Dt:- 8/4/22

functional store :-

(i) functional stores are named based on the function of material store.

(ii) Examples are - fuels store, spare parts store, Electric store, Explosive store & finished goods store, etc.

Physical store :-

(i) Physical stores can be centralised stores or decentralised stores.

(ii) Examples are - central store, sub store, department store, site store, receipt store, open yards & etc.

Issue of materials :-

(i) Materials are kept in store show that the store keeper may issue them, wherever the production department requires these.

(ii) A store keeper can't issue the materials unless a properly authorized material requisition is presented to him.

→ Preparation of material requisition form

→ Pricing of materials

XYZ Company Limited

Material Requisition

Department : No :

Job No : Date :

To

The storekeeper

Please issue the material stated here

Sl No	Description	Quantity	Rate	Amount	Bincard No	Remarks

Authorized By:

Issued By : Received By : Checked By :

P.M.P

Bin Card :-

(i) Bin card is the record maintained where the perpetual inventory system by the stores department

(ii) It shows the quantities of material receive, issued & balance in hand after each receipt & issue.

(iii) It is also known as stock card.

(iv) It is kept inside the store department.

(v) It records only quantities of material not the value.

Bin card

Material code :

Material Description :

Location :

Unit of Measurement :

Maximum Level :

Minimum Level :

Record Level :

Date	Received from/ Issue to	Receipts	Issue	Balance	verification with SL & Date By

Dt - 9/4/22

Indent :-

(i) Purchase indent is an internal document use by companies to authorize the requisition of purchase of raw materials, capital items, machineries & etc.

Machines - Drilling
capital items - excavator / Required huge budget

(ii) It is usually prepared by the store-in-charge for the department.

(iii) It provides detailed information about
a. Item name with the make
b. Technical description
c. Required quantity
d. Estimated price may be mention

I.M.P

Invoice :-

(i) An invoice or bill is a commercial document issued by a seller to a buyer, relating to a transaction & indicating the products, quantities and product service that provided in the bill.

Invoice

Bill No:

From :

Bill To :

Name/ company :

client/ company :

Address :

SL No	Description	quantity	Rate	Amount	Remarks

Thank you fore youre Business :

Total =

Prepared By -

Tax & GST =

Invoice Total =

Chapter - 5

Dt - 12/4/22

Construction organization

Introduction :-

→ A construction organization consist of the management, administration, field controls, engineers, supervisors, safety officers, quality control, precommissioning team and hand-over team.

→ The construction management organization is normally a project task force (PTF) organization and full time assignment.

Precommissioning — To check the profit

Functions of organization :-

(i) Long term planning.
(ii) To prepare a structure of organization.
(iii) To maintain good relationship.
(iv) To prepare wage policy.
(v) coordinate of various department.
(vi) To monitor various activities & progress.
(vii) To fullfill management aims.
(viii) To establish good relationship with worker and management.

Dt:- 13/4/22

Structure of construction organization :-

(i) The organizational structure implicates the arrangements of different departments & the division of labour.

(ii) It refers to the organizational & administrative patterns.

(iii) It is about how to use one of the basic resource, people and how to overcome the communication barriers.

administrative pattern - prepare the paperwork

I.M.P Types of structure of construction organization :-

(i) Depending upon the manner in which the authority and responsibilities in an organization are distributed in to two categories -

1) Line organization
2) Line & Staff organization

Line organization :-

(i) This is the earliest, simplest & most important form of organization.

(ii) In this type of organization, the authority in the top of the structure will take the decision & it will be pass level step by step, through a downward direction.

(iii) All major decisions are taken by the top authority and passed on to two sub-ordinates for neccessary action at their level. (Ex - military organization)

(iv) This type of organization is based upon military formation.

(v) As in Army, commander in chief has full control over the entire Army.

Advantages :-

(i) It is simple to work & easy to understand.

(ii) It permits quick decision.

(iii) It provides strong ~~discipl~~ discipline.

(iv) Responsibility is fixed & everybody is knows to whom he is responsible.

Disadvantages :-

(i) The organization is rigid & inflexible.

(ii) generally there is inadequacy of communication from lower level to higher level.

(iii) The loss of one or two capable person may effect the organization badly.

Date :- 16/4/22

Important

(b) Line and staff organization :-

(i) The line organization is not suitable for large & complex industry, where keyman needs advice from expert in different fields.

Experts – High knowledge on that field / Best ideas

(ii) These specialist who constitute the staff in the organization are expert with long experience.

(iii) They don't have the authority to command anybody.

(iv) Their role is mainly advisory & are not directly involb in carrying out the measure objectives of the organization.

(v) The combination of line organization with expert staff is known as line & staff organization.

(vi) The line executes the work, the staff carries on the research planning, scheduling & recording the performance.

Staff – Expert

Advantages :-

(i) Advice of expert specialist is available.

(ii) The project can be executed with better quality product.

(iii) It provides more job opportunities.

(iv) Discipline problem are resolve by line authority.

(v) It gives increased economy and efficiency through expert staffs.

Disadvantages :-

(i) Possibilities of conflict betn line person & staff.

(ii) The overhead cost of the production will increase due to high salaries of experts.

(iii) The slackness of any section will affect the whole system.

Dt - 7/4/20

EQUIPMENT MANAGEMENT

IDENTIFICATION OF DIFFERENT ALTERNATIVE EQUIPMENT :-

Generally 4 factors are considered for identification of alternative equipment

(i) Equipment productivity
(ii) Product features and attachments
(iii) Supplier support
(iv) cost

EQUIPMENT PRODUCTIVITY :-

(i) For some types of operations, the required production is a known quantity. The best size of equipment can be chosen for the known production at the least cost.

(ii) Past experience is a major factor to assess the size the equipment that will give the best production rate. The buyer's own experience can be supplemented by that of the equipment suppliers.

(iii) Primary usage should be distinguished from secondary usage. suppose a crawler tractor is under consideration it is being purchased primarily for bulldozing and clearing, ripping or loading? primary usage is an important consideration in determining the size of equipment and its attachment, while some compromise can be made in secondary usage.

(iv) Equipment production is also affected by operating conditions.

(v) For large equipments, transportation bet' work sites become an important consideration & legal restriction on the movement on roads should be determined.

(v) operators wages is also a factor in considering equipment size.

2. Product features & attachments :-

(i) construction equipment are available with a wide variety of features & attachments that offer greater productivity, broader applications, increased operating safety and improve operator convenience. These feature should be properly evaluated.

(ii) Equipment productivity can be increased in many ways some of them as follows :-

(a) By choosing the right equipment with the right attachment.

(b) By ~~[illegible]~~ adding special attachments such as a refarbrate for speed control on grades. It can enable an equipment to do work that ordinary it will not able to perform economically.

(c) By reducing equipment downtime i.e the ability to correct malfunctions quickly.

(iii) Safety features deserves particular attention.

(iv) selecting type of wheel type equipment & track for crawler equipment is a critical process.

3 Supplier support :-

(i) From the time of purchase to the final resell, the equipment supplier plays an important role in determining whether a particular equipment can become an an efficient part for an economical system.

(ii) The availability of spare parts, service facilities & qualified personnel for training the operators must be considered

(vi) supplier support can take many forms. agreements are offered that support regular machine inspection, service, guaranteed availability & predetermined prices when the equipment ~~[illegible]~~ is returned for trade. Long & short term lease agreements can be negotiated to guarantee availability, allow for purchase, or guarantee a total cost for equipment hire.

4 <u>COST</u> :-

(i) The cost of an equipment is the final factor of consideration. The cost of purchase should be just one part of overall selection criteria, resell cost should also be considered, along with maintenance & repair cost.

(ii) A low initial cost is a worthy while consideration only when coupled with satisfactory performance & supplier's support for parts & services.

Dt- 8/4/22

Importance of owning and operating costs in making decisions for hiring & purchase of Equipment :-

There are several methods of determining the probable cost of owning & operating construction equipment should provide information that may be used for the particular equipment.

- factors that effect the cost of owning & operating construction equipment include.

(i) The cost of the equipment to the owner.
(ii) the severity of the job condition
(iii) The no of working hours in a year
(iv) the no of years the equipment is used.
(v) the care with which the owner maintains and repairs it.
(vi) the demand for used equipment when it is disposed up, which will effect the salvage value.

When the cost of owning and operating of construction equipment is to be estimated before it is purchased, the cost records based on past experience will generally not be available. The cost which should be considered include capital investments & depreciation (the ownership cost, maintenance, repairs, petrol, oil & lubrication charges (operating cost).

When the contractor require additional equipment to carry out the work under the contract, he should decide whether.

(a) to purchase or

(b) take it on rent with option to purchase

c) to take it on rent with our purchase option but under a lease agreement.

under certain conditions it is financially beneficial to purchase, while under other condition it is more economical & satisfactory to take it on rent the methods selected should be one that will provide the use of the equipment at the lowest total cost, consistent with the use that the contractor will make of the equipment.

Each method has its own advantages & disadvantages which should be considered before making a decision.

The advantages of purchasing the equipment as compared to renting -

(i) It is more economical if the equipment is used sufficiently.

(ii) It is more likely to be available for use when necessary.

(iii) Because of ownership it should assure better maintenance & care, purchased equipment should be kept in better maintained condition.

Disadvantage of purchasing & owning equipment:-

(i) It may be more expensive than hiring.

(ii) The purchase of the equipment may require a considerable investment of money and may be needed for other purposes.

(iii) The ownership & equipment may influence a contractor to continue to use absolete equipment even often superior equipment has been introduced & available in the market.

(iv) The ownership of equipment design primarily for a given type of work may induced a contractor to continue along that type of work.

(v) The ownership of equipment might influence a contractor to continue using the equipment beyond its economic life, there by increasing the cost of production.

(vi) The most important factor is deciding where as to purchase or hire, if it is its expected long term utilization. Renters of equipment charged a profit & thus there hourly rate would be higher then the comparable cost to the owner, if he used the equipment consistency. If the expected use is for a short period, then renting it is usually cheaper.

12/4/22

Inspection and testing of equipment :-

Regular inspection of equipment is an important part of field maintenance. Regular inspection means periodic investigation of the condition of all the components like engine, transmission, drive train, hydraulics, structural members & wearing components, such as undercarriages, tires & cutting edges.

A maintainance programme should be prepared for implementation. Coordination betn maintenance programme & construction operations is the most important responsibilities. In a large organisation, maintenance inspection ~~personal~~ personel would handle only inspections & adjustments.

The areas of responsibilities of maintenance inspection personel are as follows:-

(i) Regular inspecting & adjusting
(ii) scheduling machines for maintenance check
(iii) advising the equipment managers of the service needs.
(iv) keeping records of their works on machines.

Job Layout for different construction site :-

A job layout is prepared by the superintendent at the start of a project. On this layout, drawn to the scale, the area available for offices, equipment, storage of materials & warehouses, construction forms & fabricating reinforcement & structural

steel members. In preparing the site layout all areas are arranged so as to resume the time consume in carrying materials from the storage areas to the project & moving the equipment from the workshop to the site of work.

Equipment & materials that are similar in use should be stored close together where possible. When storing cement the stacking of cement bags should be so made that the first bag in is the first bag in to be taken out.

Materials handling or hoisting equipment has to perform a large verity of funs in building different structures & the selected layout must be able to do all that is required of it. The functions include shifting formwork, welding sets & lasting equipment from block to block, reinforcement bars, resting equipment & so on.

It is desirable to make a layout which, as the work goes on, hands to systemise itself. It is a very expensive job to teach 2000-2004, persons about keeping their work growing in the most economical way for the project as a whole.

Once the plan layout & the equipment have design & selected, the entire job is practically fixed.

Quite often, a small model of a layout will serve as a valuable check or a paperstudy, or will often bring out elements

that have previously been overlooked. Models of special equipment will provide valuable information & assurance before any large expenditures are made on full scale operation that the proposed scheme will work satisfactorily.

Equipment maintenance and Minor Repairs:-

THANK YOU