



Resource Planning

- This process details the **materials, labor, and equipment** that you will use in the project, complete with quantities.
- The resource plan is an important document for determining costs and budgets. Labor projections are a challenging aspect of resource planning.
- Making up for a labor shortfall is more difficult than coping with an equipment or resource short-fall. Rapid fluctuations in the size of the labor force are a function of poor management.



Quality Planning

- A quality plan details **standards** for project **deliverables** and is a central piece of the puzzle in contractor accountability.
- The quality plan also describes the processes by which you will maintain quality as well as what steps you will take if the quality of deliverables do not meet standards.
- It addresses who on the project team is in charge of quality and how you will measure and communicate quality.



Risk Planning

- Construction projects face a wide range of risks, from **fluctuating prices of raw materials** to changes in laws, fire, **shortage of qualified workers**, and **natural disasters**.
- The risk planning involves the risks that a project

- Possibility of performance
- Certainty
- Legal formalities

6

- **Competent parties**
 - Both the parties are to be major
 - Mentally sound
 - No financial liquidation
- **Consideration lawful**
 - If the contract is for construction of a building, the consideration is the amount to be paid for that.
 - The money transactions should be transparent
 - Legal money transactions
 - No backdoor transactions.

7

- **Object must be lawful**
 - The object is the building.
 - The building should be used for lawful and good purpose and not for anti-social purpose like terrorist activities.
- **Free consent**
 - Both the parties must give consent to the contract without any conditions.
 - Offer and acceptance must be unconditional.

8

- **The agreement must not be declared void**
 - If the contract work is in India, it must abide by the Indian Contract Act.

The law also deals with types of contracts for depending situations.

14

TYPES OF CONTRACTS

- Measurement contracts
 - percentage rate contracts
 - item rate contracts
- Lump sum contracts
- Cost plus fee contract
- Turnkey contracts
- Build own operate and transfer (BOOT) contract

15

Measurement contracts:

- a. Percentage Contracts:
 - For small works and works of repetitive nature percentage rate contracts are adopted.
 - Owner indicates quantities and estimated rates for all items of work.
 - The estimated cost is reflected in the tender schedule.
 - The tenderer quotes % above or % below the estimated cost put to tender.
 - Payment is made on the basis of actual quantities executed and measured.

16

Measurement contracts:

- b. Item rate contracts:

foundation problems.

- For a turnkey contractor, time is truly equal to money and schedule slippage may adversely affect his profitability particularly in cases where there is no provision for escalation.

20 • Bonus or penalty clause may be included as an incentive or disincentive to the contractor to

Turnkey contracts:

- This type of contract is suitable for project where all the function parameters are finalized and changes and extras are not made later.
- Such type of contracts are seen more in commercial, defense and interior projects of multi-disciplinary character and when timely completion is important as any delay in completion results in economic loss for every day of delay, (example- commercial projects for revenue yielding projects).
- Turnkey contract or selected must have an excellent track and management of projects.

21

BOOT contract:

- With the liberalization and opening up of the economy, private sector is encouraged to execute the public works, own them, operate for a specific period and transfer the same to public authority.
- The entrepreneur will recover his investment during the period he owns and before the transfer of asset. This type of contract is adopted for highway projects, airports, convention centres, IT parks, power plants, and bridges.

22

BOOT contract:

- Government avoids funding and allows a

COMPACTION

- Can be defined as process of densifying or increasing the unit weight of a soil mass through the application of static or dynamic force, with the resulting expulsion of air and in some cases moisture.

36

Roller Compactor:

- For compaction of earth or other material.
- Used for large works of highways, canals and airports.
- Various types of rollers are
 1. **Smooth wheeled** - for consolidating stone soling, gravel, sand, hard core, ballast and surface dressings, and for **compacting silty and sandy soils**
 2. **Vibratory rollers** - for compacting granular base courses
 3. **Pneumatic tyred rollers** - for compacting cold laid bituminous pavements, soft base course materials or layers of loose soil. Also suitable for compacting **closely graded sands, and fine-grained cohesive soils**
 4. **Sheep foot roller** - used for compaction of cohesive soils such as **heavy clays and silty clays**. Not effective with sandy soils

37



CONSTRUCTION MANAGEMENT

1

SYLLABUS- CEPE13

UNITS	CONTENTS
I	INTRODUCTION
II	MAN AND MACHINE
III	PLANNING, SCHEDULING & PROJECT MANAGEMENT
IV	CONTRACTS
V	COMPUTER APPLICATIONS IN CONSTRUCTION MANAGEMENT

OVERVIEW

- Introduction
- Project
- Management
- Significance
- Objectives
- Functions
- Organizational chart of a construction company
- Manager's duties/responsibilities
- Public relations
- Leadership and team
- Ethics, morale, delegation and accountability.

3

INTRODUCTION

- Construction Management is both an art and a science, and is something that is usually quite hard to do.
- It is hard because one has to look at a broad range of variables, try and guess what effect each variable will have on a construction project.
- For example, a construction manager in the middle of a project will have to take into account the following:
 - the weather,
 - the availability of construction workers who may be sick or may not feel like showing up for work,
 - the fact that some materials are out of stock just when they are needed,
 - the availability or non-availability of key equipment like cranes,

4



- changes made to the existing design by architects and clients the previous evening,
 - juggling the work of 20 or more different trades at the same time,
 - surprise discoveries of electrical cables below the ground that no-one knew about,
 - inspections and permitting delays by government authorities.
- It is the inter-relationships between all these variables and the effect they will have on the project that creates complexity in project management.
 - Compounding these problems is the team from the owners of the building, who often sit in plush offices far from the construction site, have little understanding of the difficulties in building construction, and demand that the project be finished before time.
 - It is these difficulties that make it both extremely challenging, as well as extremely rewarding if done right.

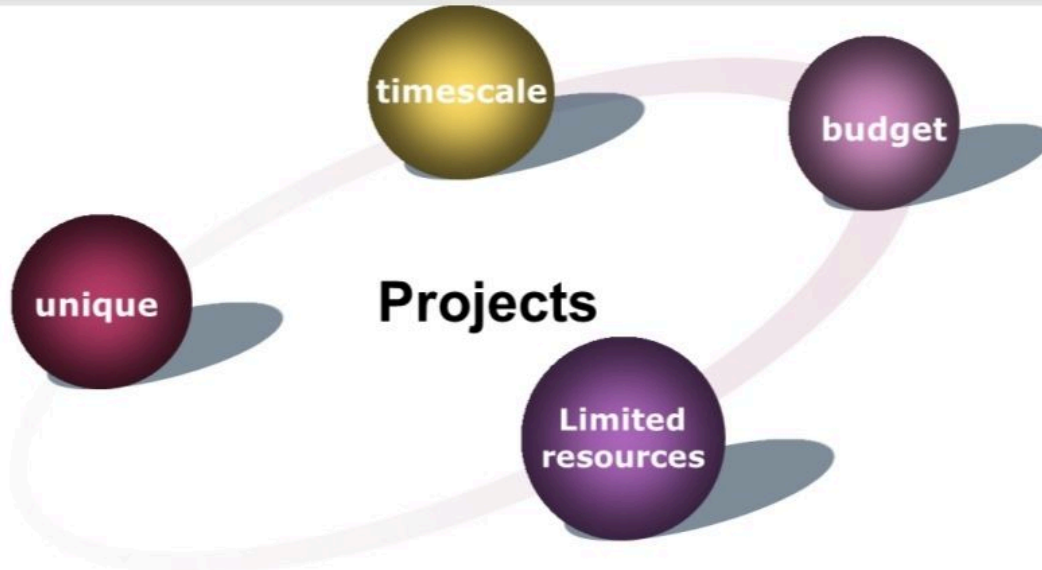


PROJECT:

- It comprises of a number of **interrelated activities and events** to be **executed systematically** in an order to get the work completed within a **stipulated time period**.
- Project is the **collection of activities**, that are related or connected, for developing a product or a service.
- Projects have always **start and end times**.
- Projects have always a **customer** who uses the results.

7

7



PROJECT:

It is an assignment/task/job that has to be undertaken and completed within a set time, budget, resources, and performance specifications designed to meet the needs of stakeholder and beneficiaries.

8

8

TECHNOLOGY:

It is a **body of knowledge** used to create tools, develop skills and extract materials.

MANAGEMENT:

It is the art of putting **men, materials, and machines** to **complete** the work within **stipulated time** and to derive **maximum efficiency** by the judicious utilization of resources.



9

o PROJECT MANAGEMENT:

It is the **economic execution** of the project right from its **inception** to its **completion** within a time limit and with **resources** available without sacrificing the **quality**.



10

SIGNIFICANCE OF CONSTRUCTION MANAGEMENT

11

11

SIGNIFICANCE

- Under Developed to Developing country through major infra-projects such as multipurpose river valley projects, industrial development projects, Irrigation Canal projects, Railway Projects, Port development projects etc., carries a major part in the growth of the country.
- On an average about 50% of the total expenditure of our 5year plans is invested in construction works.
- Construction is an everlasting activity across the globe. Every sector of our economy involves construction activities.
- Construction is a major economic activity in India (7% GDP @2005 and 19% GDP @2012) and playing important role in the development of the country.

12

12

SIGNIFICANCE OF CONSTRUCTION MANAGEMENT

- Construction industry provides employment on large scale (31.5million manpower in 2005) (49.5million manpower in 2012). If construction project schedules are not maintained, the cost increases.
- Use of machine and equipment in construction industry increases the quality of construction. The art of construction has slowly developed as a science through ages.

13

13

SIGNIFICANCE OF CONSTRUCTION MANAGEMENT

- India is still developing country (scope for construction). The input of the labor, capital, machinery and raw materials can never become production without the catalyst of management.
- In order to ensure that the huge resources invested in the construction industry are deployed efficiently for the benefit of society it needs construction management professionals.

OBJECTIVES OF CONSTRUCTION MANAGEMENT



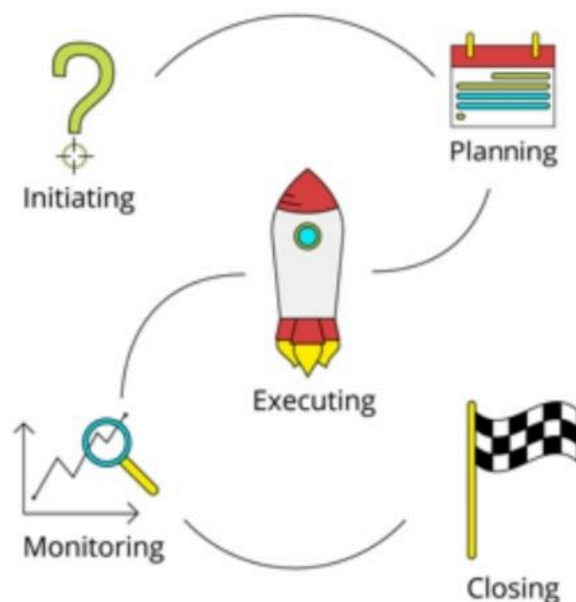
OBJECTIVES OF CONSTRUCTION MANAGEMENT

- Completing the work with specified **time** and **budget**.
- Evolving a reputation for **high quality workmanship**.
- Providing **safe working conditions** for staff and workers.
- Taking sound **decisions** at lowest practical management level through delegation of authority.
- **Motivating** people to give their best.
- Creating an organization that works as a **team**.

16

16

- To complete the construction work with the maximum economy, safely and efficiently.
- To develop proper planning for procuring resources including procurement of stores and recruiting of personnel.



17

17

FUNCTIONS OF CONSTRUCTION MANAGEMENT

18

FUNCTIONS OF CONSTRUCTION MANAGEMENT

Deciding in advance what is to be done, how and, in what order it is to be done. It involves:

- Crystallizing objectives
- Collecting and synthesizing information
- Developing alternatives within specified constraints
- Comparing alternatives in terms of objective feasibility and consequences
- Selecting optimum course of action
- Establishing policies, methods, systems, standards and budgets for objectives

19

CONSTRUCTION MANAGEMENT FUNCTIONS



20

PLANNING AND SCHEDULING

- **Planning** involves formulation of a number of alternative realistic work plan for achieving specified objectives and finally selecting a plan which is best suited from the standpoint of available resources and constraints imposed upon the project. It essentially covers the aspects of “**what to do**” and “**how to do it**”.



- **Scheduling** is the fitting of the final work plan to a time scale. It shows the duration and order of various construction activities. It deals with the aspect of “**when to do it**”.

21

ORGANIZING

- Dividing the work into component activities
- Designing job structures
- Defining targets and responsibilities
- Allocating resources
- Delegating specific tasks to individuals
- Establishing organizational chart for better.



22

22

STAFFING

- Staffing functions include
 - Recruiting the right people
 - Arranging staff training courses
 - Carryout proper staff assessment
 - Building effective human resource



23

23

Steps of Staffing Function Management

Manpower
planning

Recruiting

Selecting

Orientation

Training
&
Development

Appraisal

Compensation

Promotion

24

24

DIRECTING

- Providing effective leadership
- Motivating participants behavior
- Communicating instructions and orders
- Providing suitable workspace for subordinate's development.



25



CONTROLLING

- Specifying the factors to be controlled
- Monitoring the performance in terms of progress, quality and cost
- Comparing actual and planned performance
- Analysis of shortfalls and implementation of suitable remedial measures
- Quick and accurate flow of information.



26

26

CO-ORDINATING

- Bringing together and coordinating the work of various departments.
- Arranging regular meeting of departments.



27

27

STAGES OF CONSTRUCTION MANAGEMENT TEAM

- Their scope may differ from one project to another, but their content should be clearly described for each project.
- The main parties involved in a construction project are:
 - The client
 - The users
 - The designers
 - The executors
 - Public authorities and agencies.

28

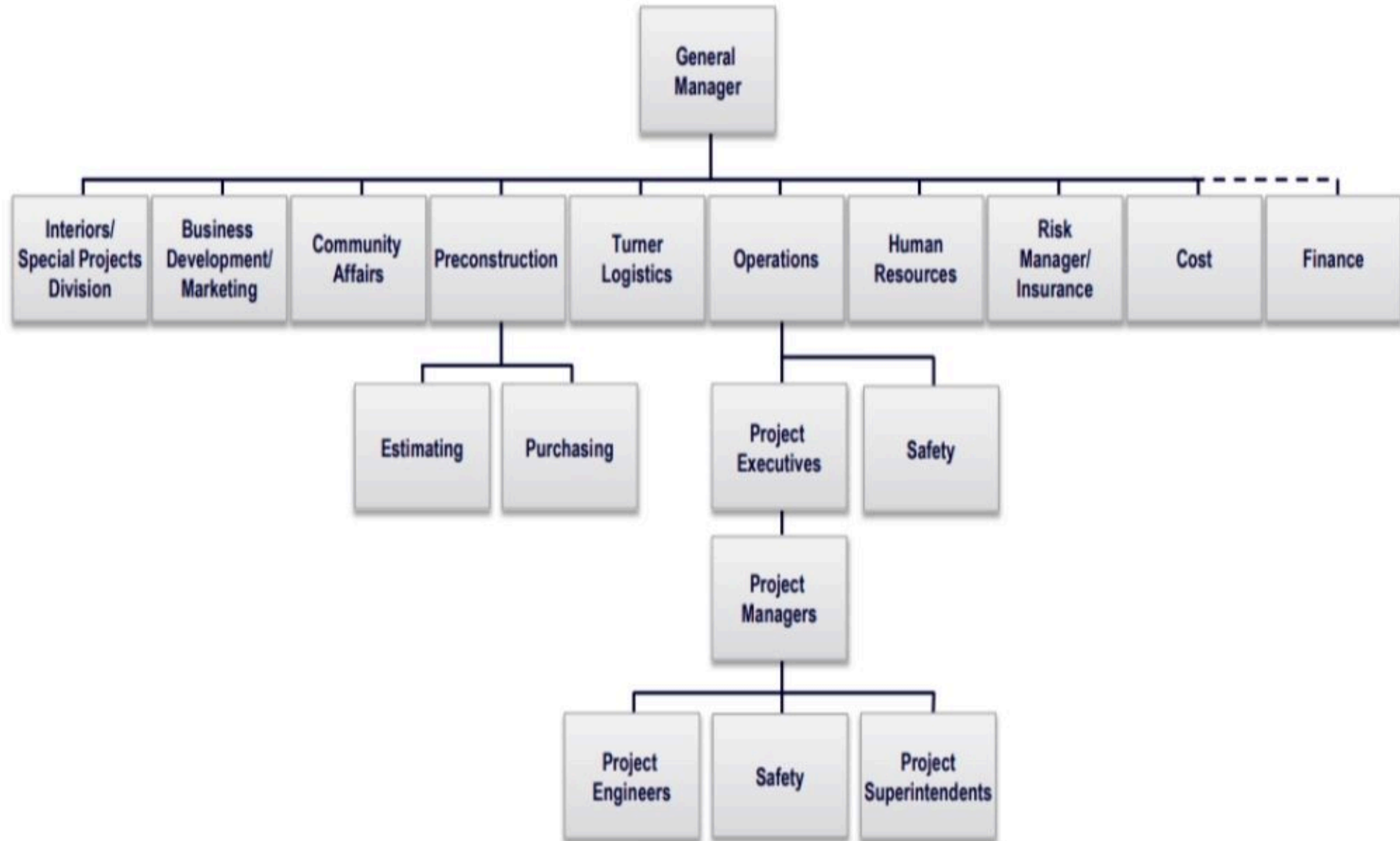
STAGES OF A CONSTRUCTION PROJECT



- The project management team creates the link between the above stages throughout the duration of the project.
- This team is a permanent body which includes the designers, contractors, suppliers and managerial staff.
- The team is normally headed by a project manager, who is responsible to the client for the execution of the project.

29

ORGANIZATIONAL CHART OF A CONSTRUCTION COMPANY



PLANNING OF CONSTRUCTION ACTIVITIES

UNIT-3

WHAT IS CONSTRUCTION PLANNING ?

- Construction planning is the first stage of construction management, the discipline of taking a construction project from conception to completion.
- It includes components such as
 - ☒ Scheduling
 - ☒ Organizing
 - ☒ Staffing
 - ☒ Directing
 - ☒ Monitoring

STAGES OF PLANNING



3

Strategic Planning

- This determines **sets and articulates project objectives.**
- It answers the big questions concerning a project's mission, how it will achieve this mission, and how these objectives align with the project sponsor's or owner's larger strategy.
- In short, strategic planning is the big-picture analysis that the project sponsor carries out.

4

Operational Planning

- This delivers into the details of how the **project** will **meet its strategic objectives** – if it can meet them at all.
- Construction teams **evaluate** whether they have the **resources** they need to meet the strategic objectives, identify any shortfalls, and seek the sponsor's approval to cover those shortfalls.

5

Scheduling

- This lays out the **operational plan** on a projected timescale, including the anticipated **completion date**.
- Small type of planning does not involve highly detailed scheduling of every project task (that is a separate activity that usually follows the planning phase).
- On large projects, specialist schedulers draw up detailed schedules.

6

Site Planning

- This process analyzes the building site to see how **natural conditions** might affect the project.
- For example, space constraints, soil stability, climate, light, accessibility, geography, wildlife, and proximity to rivers or lakes can all affect a construction project. Site planning ensures that a project plan will work in the field.

Financial Planning

- A project's financial plan relates closely to its resource plan.
- A financial plan details the **costs** to incur in the **resource** plan and accounts for **administration and overhead**.
- It also includes contingency reserves for unexpected events that drive up project costs.
- The financial plan can map expenditure over the course of the project so that the project manager and sponsors know when they require money.

Risk Planning

- Construction projects face a wide range of risks, from **fluctuating prices of raw materials** to changes in laws, fire, **shortage of qualified workers**, and **natural disasters**.
- The risk planning involves the risks that a project might be susceptible to and discusses what can be done to eliminate, mitigate, or tackle the risks deemed significant by risk analysis.
- It also lays out how the team will monitor risks and respond if anything unfortunately happens.



Communication Planning

- It addresses how to **convey information** (through email, paper documents, meetings, etc.), defines your audience, indicates frequency, and defines who is responsible for handling the information
- An adequate information flow is critical for building and maintaining trust, ensuring transparency, and keeping everyone aligned.
- The information you communicate will vary with the audience. With field crew, you would **share operational updates**. With project sponsors, you are more likely to discuss **high-level information regarding the project's progress**

CONSTRUCTION PLANNING STEPS

- Define the **scope** of work, **method** statement, and **sequence** of work.
- Generate the work breakdown structure (**WBS**) to produce a complete list of activities.
- Develop the organization breakdown structure (**OBS**) and link it with work breakdown structure identify responsibilities.
- Determine the **relationship** between activities.
- Estimate activities **time** duration, **cost** expenditure, and **resource** requirement.
- Develop the project network.

13

PLANNING

- Hierarchical project structure
 - Work breakdown structure (WBS)
 - Organization breakdown structure(OBS)
 - Cost breakdown structure(CBS)

14

WBS(Work Breakdown Structure)

- The WBS is described as a **hierarchical structure** which is designed **to logically subdivide** all the **work-elements** of the project into a **graphical presentation**.
- The full **scope** of work for the project is placed at the **top** of the diagram, and then **sub-divided** smaller **elements of work** at each lower level of the breakdown.
- At the lowest level of the WBS the elements of work is called a work package.



15

WBS(Work Breakdown Structure)

- WBS means name given to a technique in project management in which the project is broken down into manageable chunk.
- WBS represents the task oriented family tree of activities and organizes, defines and graphically displays the total work to be accomplished in order to achieve the final objective of the project.
- WBS is a hierarchical (from general to specific) tree structure of deliverables and tasks that need to be completed.
- WBS are usually triangular in shape, progresses downwards in the sense.

16

WBS(Work Breakdown Structure)

•It serves as a common framework for other exercises such as:

- Planning
- Scheduling
- Cost Estimating
- Budgeting
- Configuring
- Monitoring
- Reporting
- Directing
- Controlling the entire projects.

17

WBS – Methodology

- Projects should be split into different levels from top to bottom level of activities.
- It shows whole to part relationship between activities.
- It does not go into the details of activity at an operational level.

- WBS are divided into sub-projects
- Breakdown is limited to second sub facilities
- Next breakdown- work items required like architectural, structural activities.

18

- Tasks are the next level

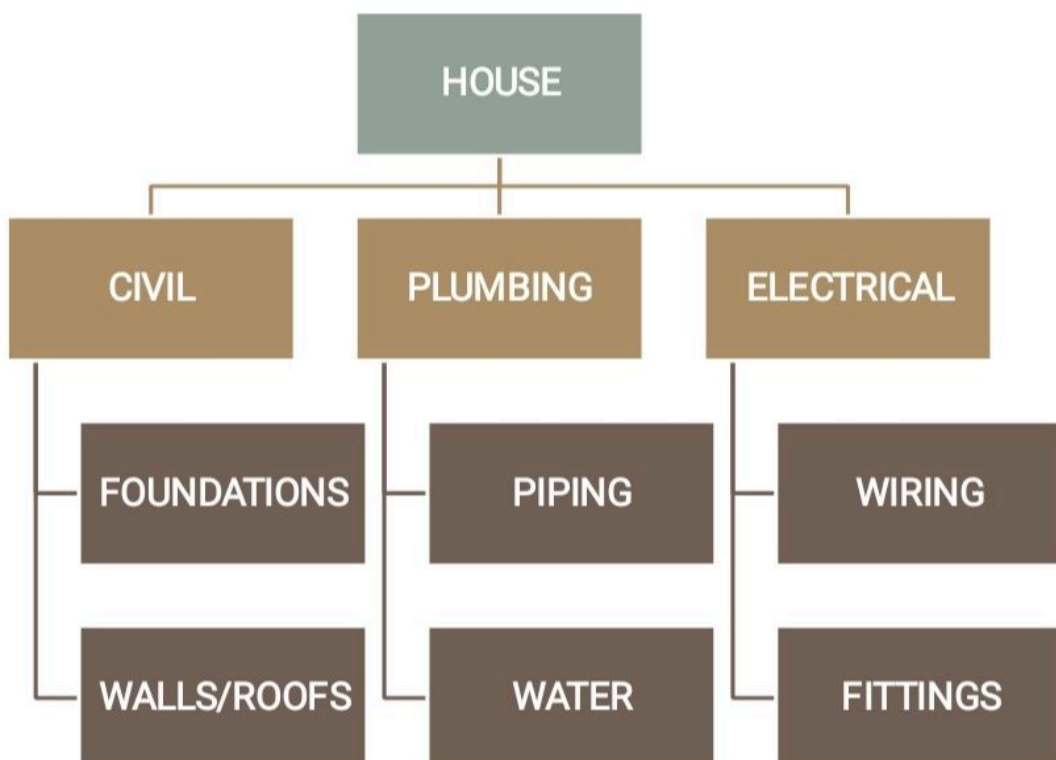
Work Packages

- Lowest level
- Distinguished from others
- Single responsible organization
- Assigned start and finish time
- Assigned budget
- Limited duration



19

WORK BREAKDOWN STRUCTURE



20

ORGANIZATION BREAKDOWN STRUCTURE

- Decomposition of necessary resources to perform the job.
- Identification and organization of resources – responsible with carrying out activities associated with the project.
- OBS is used to keep track of specific work assignments and resource allocations.

21

Project resources

Project management team

Project manager

Construction superintendent

Field inspector

Office manager

Scheduler

Accountant

Field Engineer

22

Cost breakdown structure

- Breakdown of cost of the various components of the structure including all work done by subcontractors.
- Serves as a basis for subsequent monthly pay requests by the contractors.
- Used to continuously compare costs as they actually occur with the budget.

23

Effective combinations

- WBS + OBS = task assignments
- CBS + OBS = Budget monitoring of crews, etc.
- OBS + schedule = Time-specific crew assignments.
- CBS + schedule = Cost monitoring



24

METHODS OF PLANNING

- When the planning of a project is undertaken, a host of questions arise:
 - How should the work be accomplished?
 - What resources will be needed?
 - How long will it take?
 - How much will it cost?

25

Planning



- Managers at all levels need improved techniques at all stages in a project to:
 - Define the work to be performed
 - Develop more realistic schedule and cost estimate based on resources planned to perform the task.
 - Determine where resources should be applied to best achieve the time, cost and technical performance objectives
 - Identify those areas of developing potential delays or cost over-runs, in time to permit corrective action.

26

TOOLS OF PROJECT MANAGEMENT

- Bar charts
- Milestone charts
- Network diagrams
 - PERT
 - CPM
 - UNETICS
 - LESS
 - TOPS
 - SCANS

27

Bar charts



- Bar charts were introduced by Henry Gantt -1900 A.D.
- It is a pictorial representation in two dimensions of a project by breaking it down into a number of manageable units or activities for planning and control shown on the axis and the durations assigned to these activities on the other axis.
- Bar charts were later modified to yield the milestone charts.

Network methods

- Network diagram is an outcome of the improvements in the milestone charts.
- The network technique is a major advance in management science.
- This technique is based on the basic characteristics of all project, that all work must be done in well-defined steps.

29

- For example, for completing a foundation the various steps are
 - i. Layout
 - ii. Digging
 - iii. Placing side boards
 - iv. Concreting.

The network technique exploits this characteristics by representing the steps of the project objective graphically in the form of a network or arrow diagram.

30

PERT

- Program Evaluation and Review Technique (PERT)
-
- PERT system is preferred for those projects or operations which are of non-repetitive nature or those projects in which precise time determination for various activities cannot be made.
- In such projects, management cannot be guided by the past experience. They are referred to as once through operations or projects.

31

CPM

- Critical Path Method (CPM)
- In CPM, networks, the whole project consists of a number of clearly recognizable jobs or operations called **activities**.
- Activities are usually the operations which take time to carry out, and on which resources are expended.
- CPM networks are generally used for repetitive type projects or for those projects for which fairly accurate estimate of time for completion of each activity can be made.



32

Bar charts

- A bar chart consists of two co-ordinate axes, one (horizontal axis) represent the jobs or activities to be performed.
- Each bar represent one specific job or activity of the project.
- The beginning and end of each bar represent the time of start and time of finish of that activity.
- The length of bar represents the time required for the completion of that job or activity.

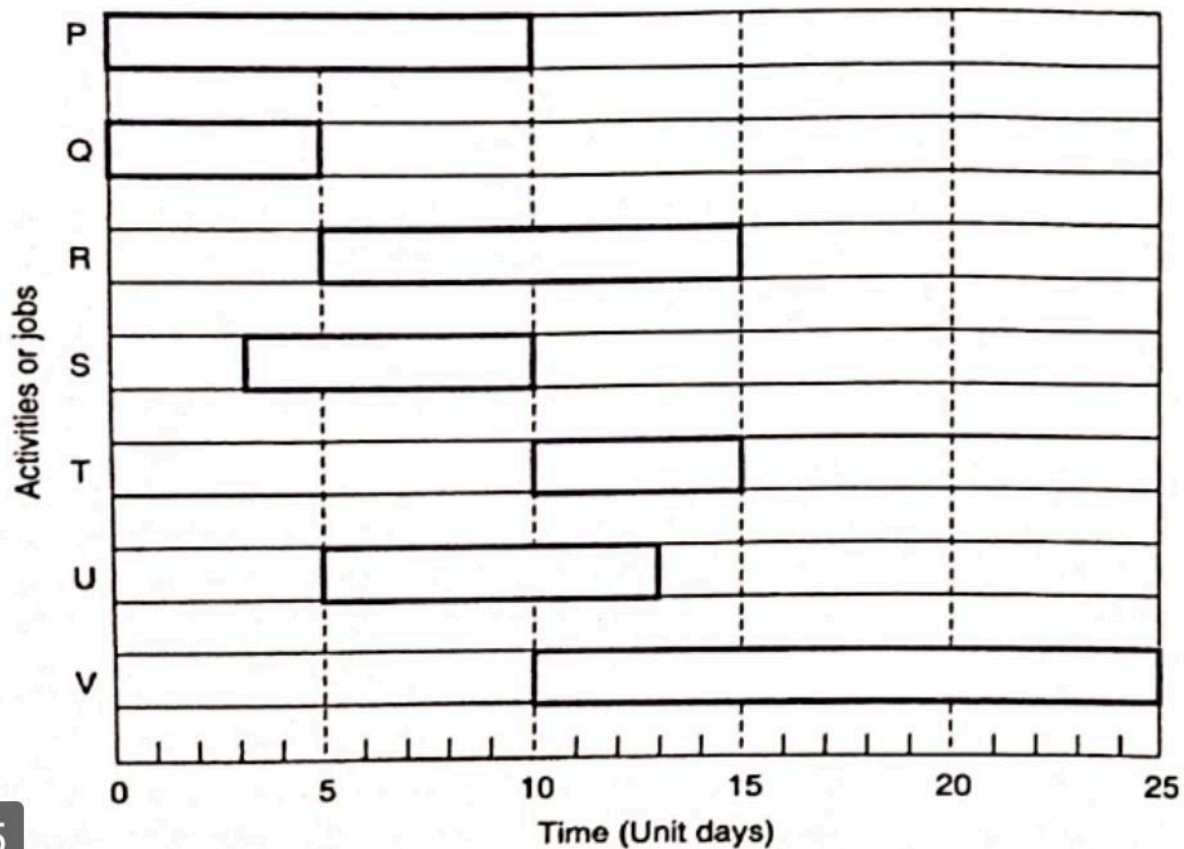
33

Example 1

- Figure shows the bar chart for a project
 - 7 activities (P,Q,R,S,T,U,V) to be performed for its completion.
 - The time durations required for the completion of these activities are 10,5,10,7,5,8 and 15 unit days respectively.
- Each bar of a bar chart can be represented either by a set of two lines running parallel of two each other (i.e., rectangle) or by a thick solid line. The first form is preferred

34

Example 1: Bar chart



35

Example 1 - Description

- i. Activities P and Q can start simultaneously, at zero time. Both the activities are independent. However, activity Q is completed much earlier than activity P.
- ii. Activity R starts only when activity Q is complete.
- iii. However, activity S is independent of activity R. It starts earlier than R and is completed earlier.
- iv. Activity T starts only when activity S is complete.
- v. Activity U and R can start simultaneously when activity Q is complete.
- vi. Activities V can start when activities P and S are complete. End of activity V marks the completion of the project.

36



Example 2

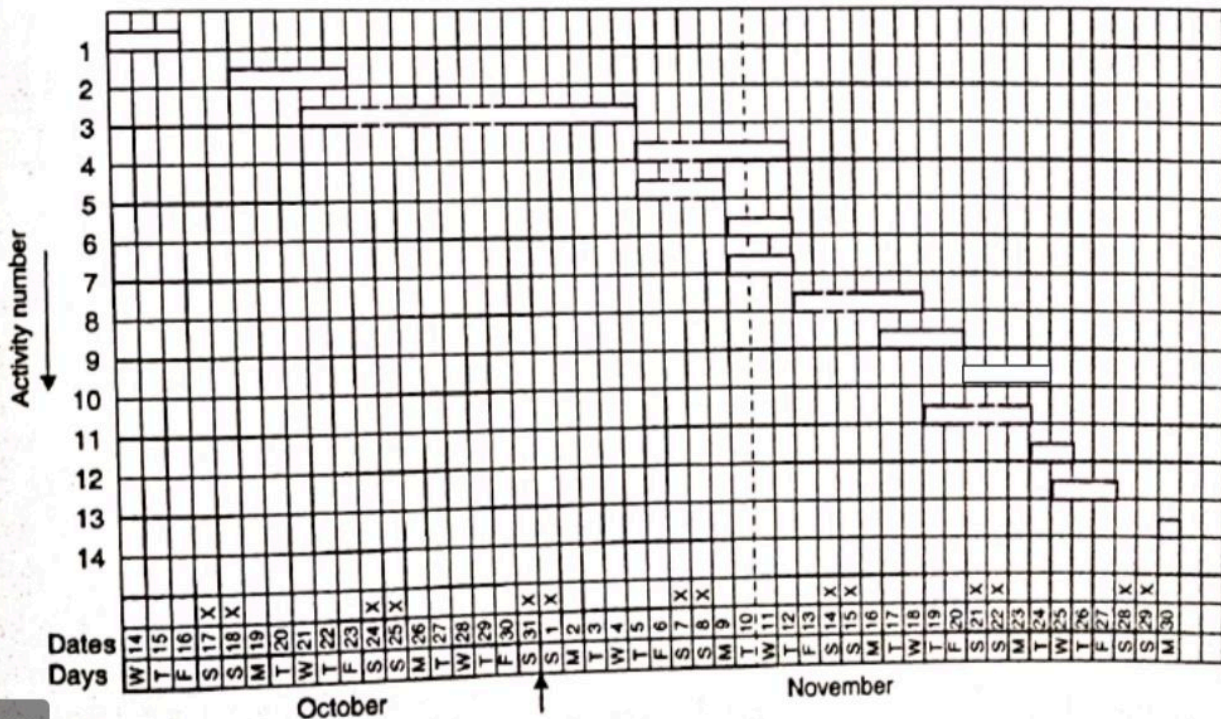
- A typical small house construction project consists of the following operations along with the time set for its completion.

S. No.	Operation	Time (in days)
1	Survey, design and layout	3
2	Construction of foundations	5
3	Construction of superstructure	11
4	Roofing	5
5	Fixing doors and window frames	2
6	Plumbing and house drainage	3
7	Electric fitting	3
8	Plastering	4
9	Flooring	4
10	Carpentry work	4
11	Construction of boundary wall and other minor items	3
12	Land shaping and clearing	2
13	White-washing of walls and painting of doors	3
14	Inauguration	1

37

The project commences on Wednesday, 14th October. Assuming five working days in a week, prepare bar chart of the project. State the assumptions made. Also determine (a) total time, and date of completion of the project (b) expected progress by 10th November.

Solution. The bar chart is shown in Fig. 29.2, prepared with the following assumptions regarding the sequence of various activities:



38

Figure 29.2. Bar Chart for Construction of a House

Example 2- description

- i. Activity 2 can start only after Activity 1 is over.
- ii. Activity 3 can start even when half the work of activity is over.
- iii. Activity 4 and 5 can start concurrently, but only after Activity 3 is over.
- iv. Activity 6 and 7 can start concurrently, but only after Activity 5 is over.
- v. Activity 8 can start only after activities 6 and 7 are complete.
- vi. Activity 9 can start even when half of activity 8 is over.

39

Example 2- description

- vii. Activity 10 can start only when Activity 9 is over.
 - viii. Activity 11 can start only when Activity 8 is over.
 - ix. Activity 12 can start only when Activity 11 is over.
 - x. Activity 13 can start only when Activity 10 is half over.
 - xi. Activity 14 is the last activity which marks the completion of the project.
- × → days on which there will be no completion of the project.

40

Example 2- solution

From the bar chart, we find that the project will be complete on 30th Nov- 48days after its start.

Also the progress up to 10th Nov will be:

- a) Activities 1,2,3 and 5 will be completely over.
- b) Activities 4,6,7 and will have 2days work left.

41

Shortcomings & remedial measures

- Lack of degree of detail

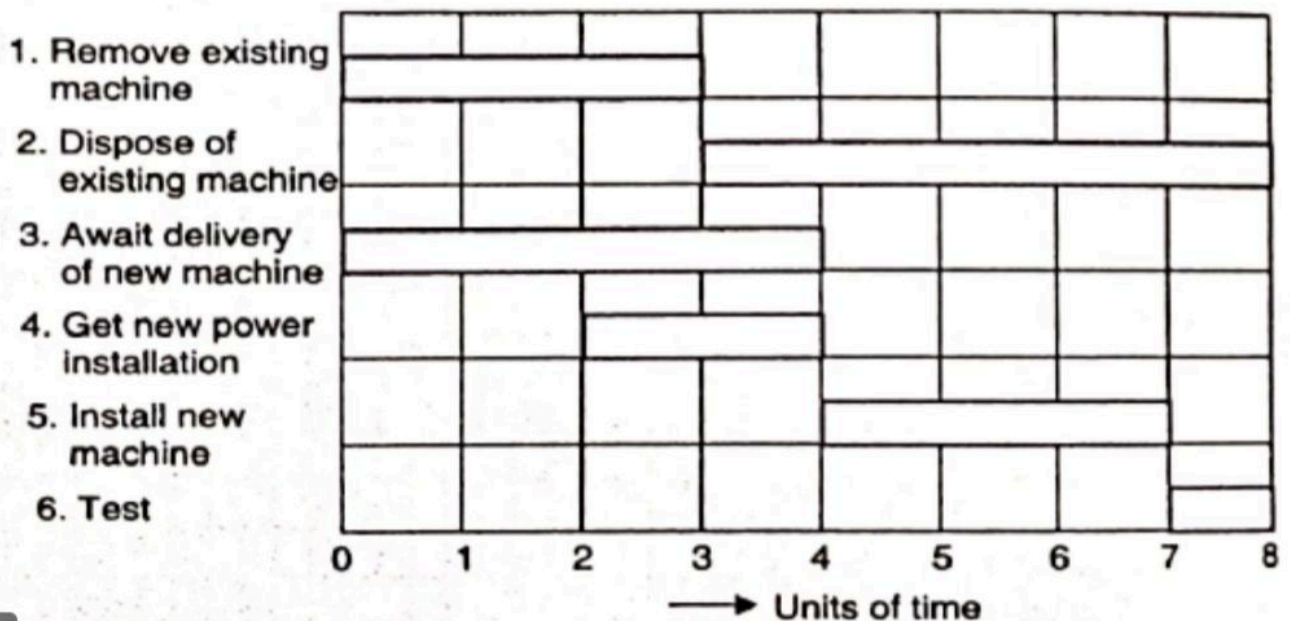
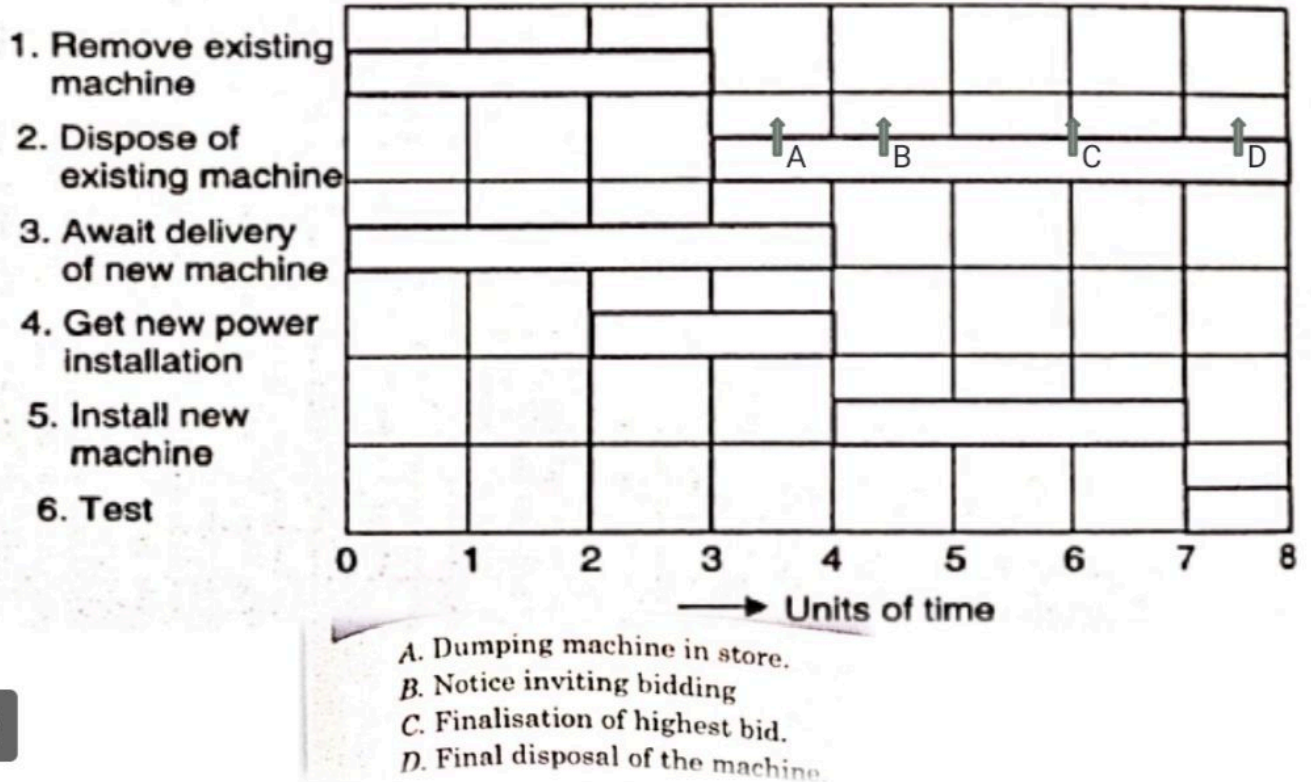


Figure 29.3. Original Bar Chart

42

Improved bar chart



43

Review of project progress

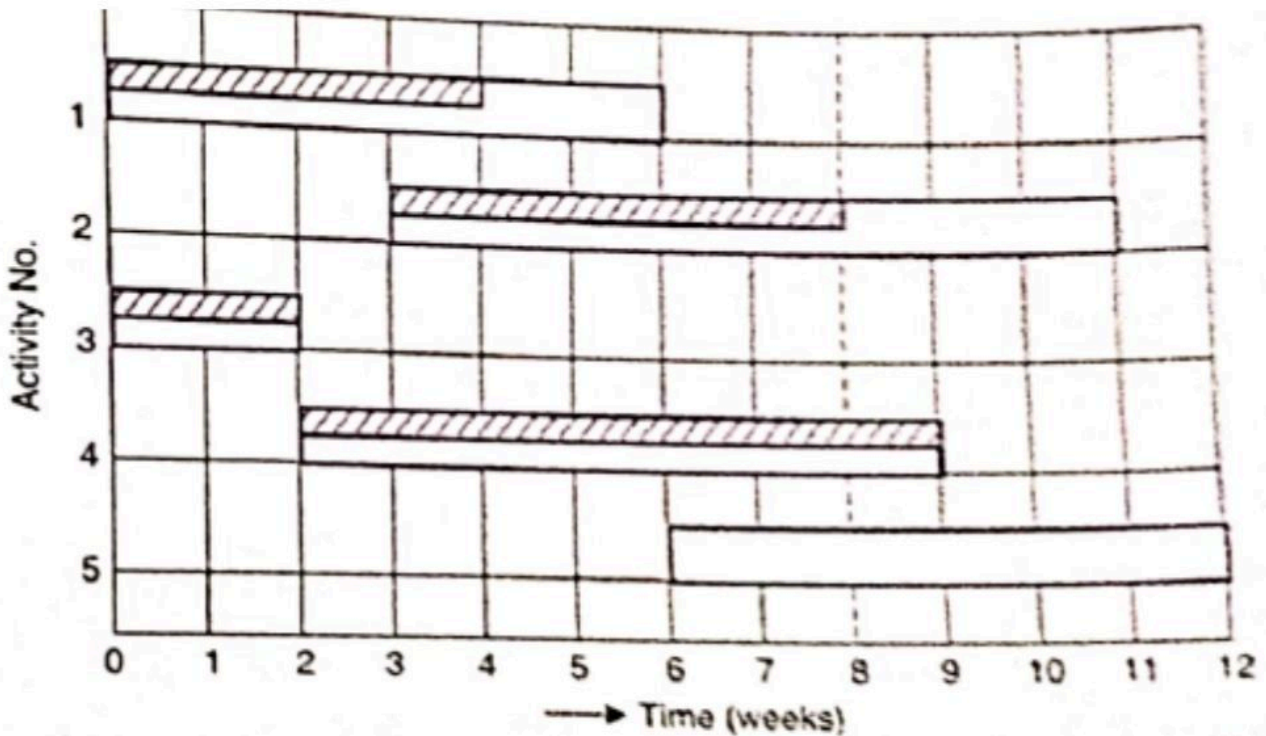


Figure 29.5. Progress of Activities on Bar Chart

44

- Sometimes, different colours are filled in the bars to show various “control information” as indicated below:

Control Information	Colour
Anticipated progress	Black
Actual progress	Green
Progress behind schedule	Red.



CONTRACTS

UNIT-IV

CONTRACTS

- An Engineering contract is a mutual agreement negotiated between two parties for the purpose of understanding a Engineering work
- A contract is a mutual agreement enforceable by law.
- It is an agreement between two or more competent parties, reached upon offer and acceptance and a mutual true MEETING OF THE MINDS of all parties thereto, relating to a competent subject matter, requiring legal consideration and mutuality of obligation, and set out such that its terms are ascertainable and not overly vague or uncertain, that creates, modifies, or destroys a legal relationship.

- Contract law can be classified, as it is habitual in civil laws systems, as part of a general law of obligations, along with tort and unjust enrichment.
- Contracts can also be formed orally (parol contracts)
- The remedy at law for breach of contract is usually “damages” or compensations.

3

ELEMENTS OF A CONTRACT

- The first step in a contract question is always to make sure that a contract actually exists.
- These are certain elements that must be present or a legally binding contract to be in place.
- An OFFER: an expression of willingness to contract on a specific set of terms, made by the offer or with the intention that, if the offer is accepted, he or she will be bound by a contract.

4

- ACCEPTANCE: an expression of absolute and unconditional agreement to all the terms set out in the offer.
 - It can be oral or in writing.
 - The acceptance must exactly mirror the original offer made.
- A COUNTER-OFFER is not the same as an acceptance. A counter-offer extinguishes the original offer: you can't make a counter-offer and then decide to accept the original offer!
- A request for information: is not a counter-offer. If you ask the offer or for information or clarification about the offer, that doesn't extinguish the offer; you're still free to accept it if you want.

5

VALID CONTRACT DOCUMENT

- The salient requirements of a valid contract document should contain
 - Competent parties
 - Consideration lawful
 - Object-lawful
 - Free consent
 - The agreement must not be declared void
 - The agreement must be registered.
 - Possibility of performance
 - Certainty
 - Legal formalities

6

- **Competent parties**
 - Both the parties are to be major
 - Mentally sound
 - No financial liquidation
- **Consideration lawful**
 - If the contract is for construction of a building, the consideration is the amount to be paid for that.
 - The money transactions should be transparent
 - Legal money transactions
 - No backdoor transactions.

7

- **Object must be lawful**
 - The object is the building.
 - The building should be used for lawful and good purpose and not for anti-social purpose like terrorist activities.
- **Free consent**
 - Both the parties must give consent to the contract without any conditions.
 - Offer and acceptance must be unconditional.

8

- The agreement must not be declared void
 - If the contract work is in India, it must abide by the Indian Contract Laws.
 - Elsewhere the law of the land
- The agreement must be registered
 - The agreement must be registered to satisfy legal formalities.
 - Also answers for the valid agreement.

- Certainty
 - Ever valid contract must be certain, if it is not uncertain then it is not valid or void contract.
- Legal formalities
 - The legal formalities should be either oral, written or registered.
 - In special cases, the agreements should be written.
 - Incase of buying and selling shares of the company, hen it is to be registered.

Indian Contract Act 1872

- It is the main source of law regulating contracts in Indian Law, as subsequently amended.
- It determines the circumstances in which promise made by the parties to a contract shall be legally binding on them.
- All of us enter into a number of contracts everyday knowingly or unknowingly.
- Each contract creates some right and duties upon the contracting parties.
- Indian Contract deals with the enforcement of these rights and duties upon the parties.

11

Indian Contract Act 1872

- The Indian Contract Act 1872 sections 1-75 came into force on September 1872.
- It applies to the whole of India except the state of Jammu and Kashmir.
- It is not a complete and exhaustive law on all types of contracts.

12

Indian Contract Act 1872

- The act lays down the general principles relating to formation performance and enforceability of contracts.
- The contract deals with the problems encountered during the contract period.
- Delay in progress of work
- Poor quality
- Force- major
- Delay in progress leads to fine or liquidated damages.
- The poor quality leads to contractor re-doing the work.

13

- When the contractor stops the works and run away, the contract provide procedure to carry out the balance work.
- The law deals with the Earnest money deposit (EMD) and Security deposit (SD).
- The law also deals with types of contracts for depending situations.

14

TYPES OF CONTRACTS

- Measurement contracts
 - percentage rate contracts
 - item rate contracts
- Lump sum contracts
- Cost plus fee contract
- Turnkey contracts
- Build own operate and transfer (BOOT) contract

15

Measurement contracts:

a. Percentage Contracts:

- For small works and works of repetitive nature percentage rate contracts are adopted.
- Owner indicates quantities and estimated rates for all items of work.
- The estimated cost is reflected in the tender schedule.
- The tenderer quotes % above or % below the estimated cost put to tender.
- Payment is made on the basis of actual quantities executed and measured.

16

Measurement contracts:

b. Item rate contracts:

- For major works, item rate contracts are adopted.
- Owner indicates quantities and units only for all items of work and the tenderer quotes rates for each individual item.
- Payment is made for the actual work done based on measurements.
- This type of contract is useful for works where all items are not finalized at the beginning.
- Item can be modified within certain limits on the basis of detailed planning and design.

17

Lump sum contracts:

- Scope of work, construction drawings and detailed specifications are given to tenderer along with the terms and conditions of contract.
- Schedule of quantities may or may not form a part of tender documents.
- Even if they are supplied they are not contractually operative and informative only.
- The tenderer quotes a fixed price for the whole work tendered.
- If this type of contract is adopted, the owner will be knowing cost of work on the eve of award of contract.

18

Cost plus fee contract:

- This type of contract is adopted for
 - Emergency works
 - Miscellaneous works
 - Works for which scope cannot be defined properly at tender stage.
- Contractor is paid his actual cost of materials labour, hire charges of machinery and a fee towards his profit and overheads. Fee may be a percentage of total cost with or without a ceiling or a lumpsum amount. Here contractor took residence contractor's as risk is minimum and owner's liability is not known on the eve of commencement of works. Under some circumstances, this type of contract is adopted in government or private sector works.

Turnkey contracts:

- In turnkey contract, contractor takes full responsibility for design, construction and commissioning of the facility of defined scope for a fixed lumpsum price.
- This is an area of high risk for the contractor. The contractor has to bear the normal risk of unforeseen site conditions, poor weather and foundation problems.
- For a turnkey contractor, time is truly equal to money and schedule slippage may adversely affect his profitability particularly in cases where there is no provision for escalation.
- Bonus or penalty clause may be included as an incentive or disincentive to the contractor to

Turnkey contracts:

- This type of contract is suitable for project where all the function parameters are finalized and changes and extras are not made later.
- Such type of contracts are seen more in commercial, defense and interior projects of multi-disciplinary character and when timely completion is important as any delay in completion results in economic loss for every day of delay, (example- commercial projects for revenue yielding projects).
- Turnkey contract or selected must have an excellent track and management of projects.

21

BOOT contract:

- With the liberalization and opening up of the economy, private sector is encouraged to execute the public works, own them, operate for a specific period and transfer the same to public authority.
- The entrepreneur will recover his investment during the period he owns and before the transfer of asset. This type of contract is adopted for highway projects, airports, convention centres, IT parks, power plants, and bridges.

22

BOOT contract:

- With the liberalization and opening up of the economy, private sector is encouraged to execute the public works, own them, operate for a specific period and transfer the same to public authority.
- The entrepreneur will recover his investment during the period he owns and before the transfer of asset. This type of contract is adopted for highway projects, airports, convention centres, IT parks, power plants, and bridges.

BOOT contract:

- Government avoids funding and allows a private person or a group to invest, build and transfer the facility after recovering their investment. The government acts as a facilitator in terms of legal issues, acquisition of land and enforcement of issues.
- This type is desirable where the government itself is unable to rise huge resources to take up such big projects. Further the government can also join with private companies in the form of separate holding company specifically constituted for the purpose