PROJECT PLANNING AND DEVELOPMENT LABORATORY

LAB MANUAL

Course Code	**:**	**ACE114**
Regulations	**:**	**IARE – R16**
Class	**:**	**VII Semester (CE)**

Prepared by

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Assistant professor

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Assistant professor

DEPARTMENT OF CIVIL ENGINEERING

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal – 500 043, Hyderabad

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Dundigal, Hyderabad - 500 043

DEPARTMENT OF CIVIL ENGINEERING

Program: Bachelor of Technology (B. Tech)

VISION OF THE DEPARTMENT

To produce eminent, competitive and dedicated civil engineers by imparting latest technical skills and ethical values to empower the students to play a key role in the planning and execution of infrastructural & developmental activities of the nation.

MISSION OF THE DEPARTMENT

To provide exceptional education in civil engineering through quality teaching, state-of-the-art facilities and dynamic guidance to produce civil engineering graduates, who are professionally excellent to face complex technical challenges with creativity, leadership, ethics and social consciousness?

NSTITUTE OF AERONAUTICAL ENGINEERING

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DEPARTMENT OF CIVIL ENGINEERING

Program: Bachelor of Technology (B. Tech)

PROGRAM OUTCOMES (PO's)	
PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of theengineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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The Program Specific outcomes (PSO's) listed below were developed specifically to meet the Program Educational Objectives (PEO's). The focus of these PSO's is consistent with the set of required PO's identified in the NBA accreditation guidelines.

The Civil Engineering PSO's require that graduates receiving a Bachelor of Technology in Civil Engineering degree from IARE demonstrate the following.

PROGRAM SPECIFIC OUTCOMES (PSO's)	
PSO1	**ENGINEERING KNOWLEDGE:** Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication
PSO2	**BROADNESS AND DIVERSITY: Graduates** will have a broad understanding of economical, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage.
PSO3	**SELF-LEARNING AND SERVICE:** Graduates will be motivated for continuous self-learning in engineering practice and/or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.

PROJECT PLANNING AND DEVELOPMENT LABORATORY

SYLLABUS

EXP. NO.	NAME OF THE EXPERIMENT
1	Site Visit-I
2	Site Visit-II
3	New Advances In Construction
4	Work Flow Of Construction Activities
5	Quantity Estimation And Purchase
6	Precedence Network
7	Cash Flow Analysis
8	Model Preparation
9	Site Visit-III
10	Site Visit-IV
11	Tendering
12	Valuation

ATTAINMENT OF PROGRAM OUTCOMES (PO's) & PROGRAM SPECIFIC OUTCOMES

Exp No.	Name of Experiment	Program Outcomes Attained	Program Specific OutcomesAttained
1	Site Visit-I	PO1(H), PO3(H), PO12(H), PO9(S)	PSO1(H), PSO2(S)
2	Site Visit-II	PO1(H), PO9(S)	PSO1(H), PSO2(S)
3	New Advances In Construction	PO1(H), PO3(H), PO9(S)	PSO1(H), PSO2(S)
4	Work Flow Of Construction Activities	PO1(H), PO5(H), PO9(S)	PSO1(H), PSO2(S)
5	Quantity Estimation And Purchase	PO1(H), PO3(H), PO9(S)	PSO1(H), PSO2(S)
6	Precedence Network	PO1(H), PO5(H), PO9(S)	PSO1(H), PSO2(S)
7	Cash Flow Analysis	PO1(H), PO3(H), PO9(S)	PSO1(H), PSO2(S)
8	Model Preparation	PO1(H), PO9(S)	PSO1(H), PSO2(S)
9	Site Visit-III	PO1(H),PO3(H), PO9(S)	PSO1(H), PSO2(S)
10	Site Visit-IV	PO1(H), PO3(H), PO9(S)	PSO1(H), PSO2(S)
11	Tendering	PO1(H), PO3(H),PO9(S)	PSO1(H), PSO2(S)
12	Valuation	PO1(H), PO3(H), PO9(S)	PSO1(H), PSO2(S)

MANDATORYINSTRUCTIONS

1. Students should report to the labs concerned as per the timetable.

2. Record should be updated from time to time and the previous experiment must be signed by the faculty in charge concerned before attending the lab.

3. Students who turn up late to the labs will in no case be permitted to perform the experiment scheduled for the day.

4. After completion of the experiment, certification of the staff in-charge concerned in the observation book is necessary.

5. Students should bring a notebook of about 100 pages and should enter the readings/observations/results into the notebook while performing the experiment.

6. The record of observations along with the detailed experimental procedure of the experiment performed in the immediate previous session should be submitted and certified by the staff member in-charge.

7. Not more than FIVE students in a group are permitted to perform the experiment on a set up.

8. The group-wise division made in the beginning should be adhered to, and no mix up of student among different groups will be permitted later.

9. The components required pertaining to the experiment should be collected from Lab-in-charge after duly filling in the requisition form.

10. When the experiment is completed, students should disconnect the setup made by them, and should return all the components/instruments taken for the purpose.

11. Any damage of the equipment or burnout of components will be viewed seriously either by putting penalty or by dismissing the total group of students from the lab for the semester/year.

12. Students should be present in the labs for the total scheduled duration.

13. Students are expected to prepare thoroughly to perform the experiment before coming to Laboratory.

14. Procedure sheets/data sheets provided to the students groups should be maintained neatly and are to be returned after the experiment.

15. DRESS CODE:

    1. Boys - Formal dress with tuck in and shoes.
    2. Girls - Formal dress (salwarkameez).
    3. Wearing of jeans is strictly prohibited

CONTENTS

EXPERIMENT NO: 01

SITE VISIT-I

Describing the Site

1. Look over the requirements of your visit report.

There is no 1 way to write a visit report. If you're a student, check the assignment from your instructor. If you're a consultant or professional working for a company, look at other visit reports from your company to use as a model.

- Reports are usually only 2-3 pages long, but in some cases, these reports may be much longer.
- In some cases, you may be asked to give recommendations or opinions about the site. In other cases, you will be asked only to describe the site.

2. Start the paper with general information about the visit.

This will serve as your introduction. In a paragraph, tell your audience when you visited the site and where the site is located. State that your contact was at the site. If extensive travel was needed, you may also briefly state how you arrived at the site.

3. Define the purpose of the site.

In 1-2 paragraphs, describe what type of site it is. Is it a factory, construction site, business, or school? Include details about the size, layout, and equipment used at the site. State how many people work at the site or who owns the site.

- If you visited a factory, explain what it is producing and what equipment it uses.
- If you visited a construction site, describe what is being constructed and how far along the construction is. You should also describe the terrain of the site and the layout.
- If you're visiting a business, describe what the business does. State which department or part of the business you visited.

4. Explain what happened during the visit in chronological order.

Start at the beginning of your visit. What did you do? Who did you meet? Describe the events of the day going until you left the site. This may be anywhere from a few paragraphs to a few pages long. Make sure to include:

- Who did you talk to? What did they tell you?
- What did you see at the site?
- What events took place? Did you attend a seminar, Q&A session, or interview?
- Did you see any demonstrations of equipment or techniques?

5. Summarize the operations at the site.

In as much detail as possible, describe the processes and procedures at the site. If they use any special techniques, state how these techniques are performed. If they manufacture something in a particular way, give a step-by-step account of this process.

- For example, at a car factory, describe whether the cars are made by robots or humans. Describe each step of the assembly line.
- If you're visiting a business, talk about different departments within the business. Describe their corporate structure and identify what programs they use to conduct their business.

Reflecting on Your Visit

1. Describe what you learned at the site if you're a student.

Draw connections between what you learned at the site and what you learned in class. State how seeing the site helped you understand what you are learning in class. You might ask yourself:

- Is there something you didn't realize before that you learned while at the site?
- Who at the site provided helpful information?
- What was your favorite part of the visit and why?

2. Identify the strengths and weaknesses of the site.

Note which processes, policies, and practices work well at the site. If you notice any flaws, describe these as well. Try to be as specific as possible. Name the exact machine, equipment, process, or policy that could be fixed.

For example, you might state that the factory uses the latest technology but point out that employees need more training to work with the new equipment.If there was anything important left out of the visit, state what it was. For example, maybe you were hoping to see the main factory floor or to talk to the manager.

3. Provide recommendations for improvement if required.

If you're asked to provide recommendations, take a few paragraphs to share your thoughts and observations. Identify problematic areas in the site and provide specific, actionable recommendations to improve them.

Tailor your recommendations to the organization or institution that owns the site. What is practical and reasonable for them to do to improve their site?

Be specific. Don't just say they need to improve infrastructure. State what type of equipment they need or give advice on how to improve employee morale.

Formatting Your Report

1. Add a title page to the beginning of your report.

The title should be the name of the visit and site, such as "Visit to Airplane Factory" or "Corporate Headquarters Visit Report." Under the title, include your name, your institution, and the date of the visit. Do not put any other information on this page.

2. Write in clear and objective language.

Keep your sentences short and concise. Avoid writing with too many adjectives or flowery language. This will make your report clear and direct.

3. Include any relevant pictures if desired.

While pictures are usually not required, they may be helpful in some visit reports. Group photographs, images of machinery, or graphics demonstrating the layout of the site might be helpful.

4. Proofread your report carefully.

Check for any grammatical errors or typos. Ask someone else to read over it for you to make sure it sounds good. If you're a student, check your professor's guidelines to make sure that you have all of the required parts.

EXPERIMENT NO: 02

SITE VISIT-II

Describing the Site

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There is no 1 way to write a visit report. If you're a student, check the assignment from your instructor. If you're a consultant or professional working for a company, look at other visit reports from your company to use as a model.

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EXPERIMENT NO: 03

NEW ADVANCES IN CONSTRUCTION

France Officially Unveils World's First Solar Panel Road

Using the millions of miles of roadways throughout the world to also create power seems like a no brainer, the asphalt and concrete we're using now aren't really accomplishing anything more than handling the traffic on the road. But, there's also a very strong reason why those products are used: they're strong, reliable, and relatively durable. Still, many researchers believe there is a lot of unharnessed potential for roads and the world now has a very strong test subject for the future of solar roadways in Tourouvre-au-Perche, France.
Watt way, a photovoltaic road pavement system, has been in development stages for the past 5 years. Colas, a worldwide infrastructure company, and INES, the National Institute for Solar Energy, joined forces to create what they think is the future of roads. Unlike other solar road systems, Wattway uses existing roads as the base and the solar panels adhere directly on top. The material, which is less than an inch thick, allows for both the thermal expansion of the material beneath, as well as the ability to handle the load from vehicles driving on it, according to the company.

Last year, a small village in France, named Tourouvre-au-Perche, became the first to have the system installed on its roads and the first in the world to have a solar road of any kind. A 0.6 mile (1km) road in the village has been covered by over 30,000 square feet (2,800 square meters) of solar panels, according to The Guardian. The road, which is expected to handle around 2,000 vehicles a day cost over $5.3 million (€5m) to complete. The panels will undergo a test period of 2 years in order to determine their true durability and figure out how much energy they can actually generate. Initial tests have indicated that it will take 215 square feet of panels to power the average French household, as panels that lay horizontal have proven to be much less efficient than those that are tilted.

MIT Researchers Design a Material 10 Times the Strength of Steel

For years, scientists have known that graphene, in its two dimensional form, is one of the strongest materials on the planet. But, converting that strength into a useful three dimensional product has been a major struggle. While studying this material, MIT researchers Markus Buehler, Zhao Qin, Gang Seob Jung, and Min Jeong Kang Meng have discovered that the geometrical configuration may be more important to a material's strength the the material itself. By manipulating the structure, they believe they not only can increase the strength, but greatly reduce the weight in the process.

To illustrate their findings, the team 3D printed oddly shaped cubes of plastic and applied pressure to them. The version with thicker walls, which would seem stronger, actually failed faster than the less rigid version with thinner walls, as you can see in the video below.

Researchers Discover Additive to Help Concrete Withstand 9.0 Earthquakes

To help keep buildings and their occupants safe in major earthquakes, researchers at the University of British Columbia have discovered a spray-on concrete reinforcement that greatly improves concrete's resistance to earthquakes up to a magnitude of 9.1. Concrete walls are sprayed with the reinforcement, which is made up of "polymer-based fibers, flyash, and other industrial additives," in a 0.4 inch (10mm) thick layer. The retrofit reinforcement allows the concrete to bend with the movement of the earthquake, making it much more ductile.

The product is being called Eco-Friendly Ductile Cementitious Composite, or EDCC, due to its heavy reliance on flyash, with is an industrial byproduct of coal.

"By replacing nearly 70 per cent of cement with flyash, an industrial byproduct, we can reduce the amount of cement used," said UBC civil engineering professor NemyBanthia in a press release. "This is quite an urgent requirement as one tonne of cement production releases almost a tonne of carbon dioxide into the atmosphere, and the cement industry produces close to seven per cent of global greenhouse gas emissions."

This is an extremely interesting product to me, because, traditionally, reinforcement has always been added prior to the concrete placement or within the concrete mixture. Since this material is meant as a retrofit for existing walls, it can help save many lives in the event of an earthquake, because it won't require extremely expensive and time consuming demolition and rebuilding of exterior walls on at-risk structures. Imagine the impacts retrofit reinforcement could have on failing infrastructure around the world.

EXPERIMENT NO: 04

WORK FLOW OF CONSTRUCTION ACTIVITIES

1. Construction Pricing and Contracting

There are a number of options when paying contractors and outlining price in contracts. In the competitive bidding process, contractors submit their bid to work on the project. These bids are either submitted on a lump-sum or unit-price basis, whichever the owner specifies. A lump-sum bid refers to the total price of work by the contractor. Unit-price bidding is used in projects where the amount of labor and materials are uncertain.

Instead of inviting competitive bidding, some private owners choose to award contracts to one or more selected contractors with negotiated contracts, which provides more flexibility in pricing. Negotiated contracts usually require reimbursement of direct project costs plus the contractor's fee determined by one of these methods: cost plus fixed percentage, cost plus fixed fee, cost plus variable fee, target estimate, or guaranteed maximum price or cost.

2. Cost Estimation and Budgeting

Cost estimation is prepared in order to submit a bid for a construction project and is used to establish a budget for the project once it is won. The process includes determining the cost estimates from building, unit prices and lump-sum estimates, job sites and general overhead, bidding procedures, and labor costs. Cost estimates are sometimes prepared by a professional, such as a building estimator or a chief estimator. Even though the project manager may not be the sole person responsible for cost estimation, it is still necessary that he or she become familiar with the process to understand the scope of the project.

3. Cost-Control Monitoring

As the project begins, project managers need to quickly create a process to monitor project costs. The sooner the cost-control monitoring phase begins, the faster that project managers will be able to identify trouble spots. For example, if an item is significantly more expensive than the estimate, the project manager should identify the reason for the difference and see if that cost increase affects anything else in the budget.

4. Capital Improvement Plan (CIP)

A Capital Improvement Plan (or Program) is a four- to 10-year plan that identifies capital projects and equipment purchases, provides schedule, and identifies options for financing the plan. The plan links a government entity, a strategic plan, and the entity's annual budget. A CIP includes a list of all projects or equipment to be purchased, the projects ranked in order of preference, the plan for financing the projects, schedules for the construction phase of the project, justification of the project, and explanation of the expenses.

5. Project Accounting

The project manager and/or the agency's accounting department will have to develop the project budget for the fiscal year, record and report expenditures, review and pay contractor invoices, and manage cash flow. From materials to labor, there are many costs in construction projects. Costs are

either direct (labor, material, subcontracting, and land) or indirect (indirect labor, supervision, tools, equipment, supplies, insurance, and support costs).

The project team and the accounting department may need to work closely together to manage contractor invoices. The project team reviews invoices to make sure the work has been properly completed, then the accounting department ensures that the invoices are contractually eligible and the prices are consistent with the contract.

Contract Procurement Planning: Project managers also have to ensure that procurement activities fit with
the project plan. Some of the tasks they have to manage include:

- Setting expected contract price
- Creating the scope of work (SOW) for each contract
- Standardizing procurement documents and any other necessary documents
- Adding completion dates to contracts that align with the project schedule

Commissioning Plan and List: The commissioning plan and list should be started early in the design phase and continually updated as the project progresses. The commissioning plan is designed to provide direction for the commissioning process during construction; to resolve issues related to scheduling, roles, and responsibilities; and to aid in the reporting, approvals, and coordination. It is a systematic process to ensure that buildings perform according to the design and to the owner's operational requirements.

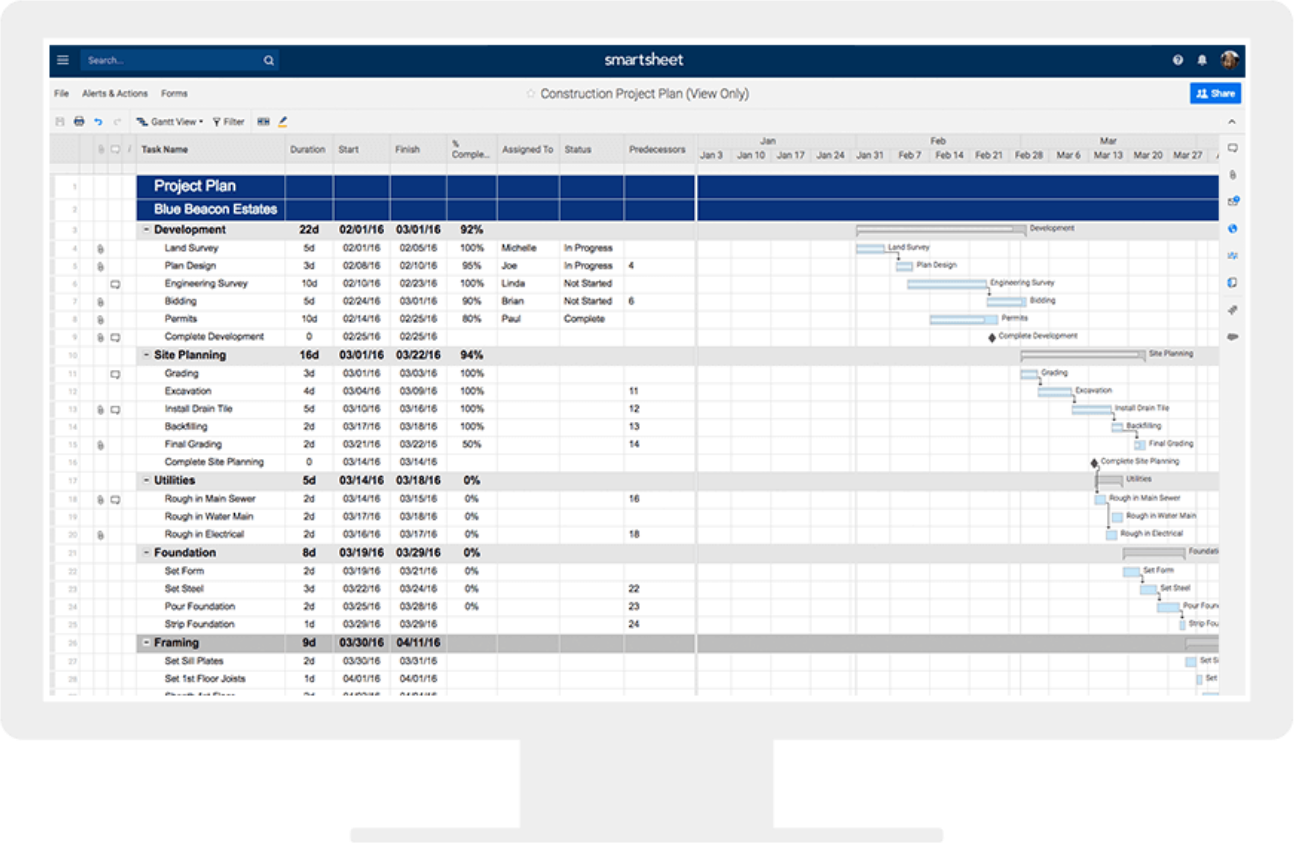
Project Control Process: The project control process tracks and manages the scope, cost, and schedule of a construction project. The goals of this process are to establish a baseline, track performance against the baseline, forecast performance at completion and compare to the baseline, and identify changes and monitor the effects to the baseline.

Project Requirement Definition: Also known as the statement of work, this document details the project deliverables. In the project requirement definition (PRD), the project manager explains the scope of work and what the project will accomplish. It helps stakeholders, team members, and external parties all understand the goal of the project and acts as a record of initial expectations.

As-Built Drawings: Also known as record drawings, these are edited drawings submitted by a contractor at the end of a project. They reflect all the changes made in the working drawings during the construction process and show the dimensions, geometry, and location of all elements included in the contract. As-built drawings provide a quick visual into the existing design and capture deviations from the original documents.

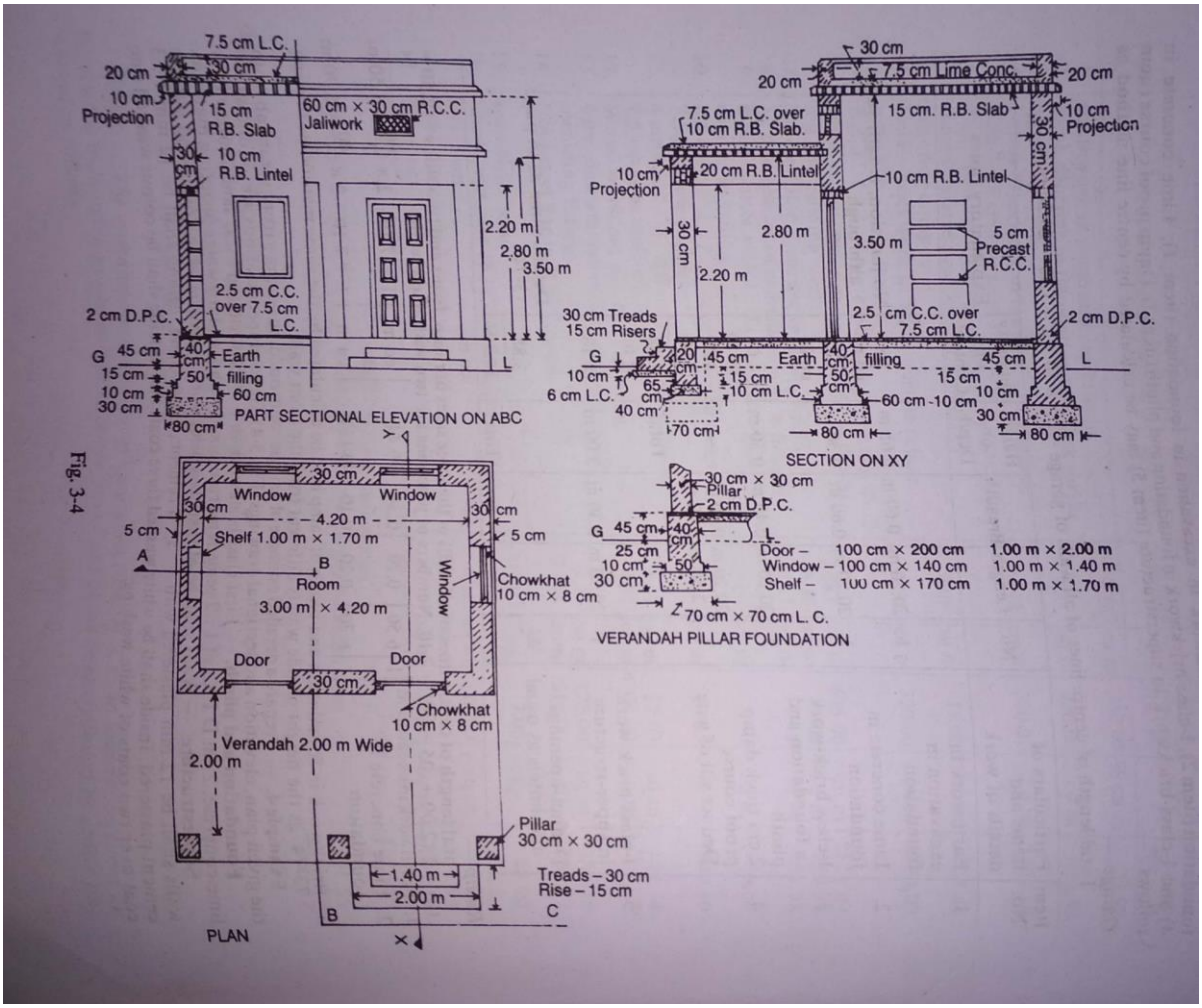
Daily Documentation: Keeping diaries, logs, and daily reports of project activities acts as a reference guide after the work is completed and can mitigate any damages. This kind of documentation can show how questions were answered, how problems were solved, and track any unusual conditions on a certain day. By keeping these daily logs, you are leaving a paper trail throughout the whole project in case anything goes awry later on.

And finally, the working drawings are created. These are the project's final specifications and illustrations that builders use for construction and that contractors add to their bid.


smartsheet
Search...
File
Alerts & Actions
Forms
Construction Project Plan (View Only)
Share
Gantt View
Filter
Task Name
Duration
Start
Finish
% Comple...
Assigned To
Status
Predecessors
Jan
Feb
Mar
Jan 3
Jan 10
Jan 17
Jan 24
Jan 31
Feb 7
Feb 14
Feb 21
Feb 28
Mar 6
Mar 13
Mar 20
Mar 27
Project Plan
Blue Beacon Estates
- Development 22d 02/01/16 03/01/16 92%
Land Survey 5d 02/01/16 02/05/16 100% Michelle In Progress
Plan Design 3d 02/08/16 02/10/16 95% Joe In Progress 4
Engineering Survey 10d 02/10/16 02/23/16 100% Linda Not Started
Bidding 5d 02/24/16 03/01/16 90% Brian Not Started 6
Permits 10d 02/14/16 02/25/16 80% Paul Complete
Complete Development 0 02/25/16 02/25/16
- Site Planning 16d 03/01/16 03/22/16 94%
Grading 3d 03/01/16 03/03/16 100%
Excavation 4d 03/04/16 03/09/16 100% 11
Install Drain Tile 5d 03/10/16 03/16/16 100% 12
Backfilling 2d 03/17/16 03/18/16 100% 13
Final Grading 2d 03/21/16 03/22/16 50% 14
Complete Site Planning 0 03/14/16 03/14/16
- Utilities 5d 03/14/16 03/18/16 0%
Rough in Main Sewer 2d 03/14/16 03/15/16 0% 16
Rough in Water Main 2d 03/17/16 03/18/16 0%
Rough in Electrical 2d 03/16/16 03/17/16 0% 18
- Foundation 8d 03/19/16 03/29/16 0%
Set Form 2d 03/19/16 03/21/16 0%
Set Steel 3d 03/22/16 03/24/16 0% 22
Pour Foundation 2d 03/25/16 03/28/16 0% 23
Strip Foundation 1d 03/29/16 03/29/16 24
- Framing 9d 03/30/16 04/11/16
Set Sill Plates 2d 03/30/16 03/31/16
Set 1st Floor Joists 1d 04/01/16 04/01/16

EXPERIMENT NO: 05

QUANTITY ESTIMATION AND PURCHASE



Total no of bricks: ……..... **Nos**

Total no of cement bags: …… **Bags**

To find calculate M20 Concrete :……..... **Cub Ft**

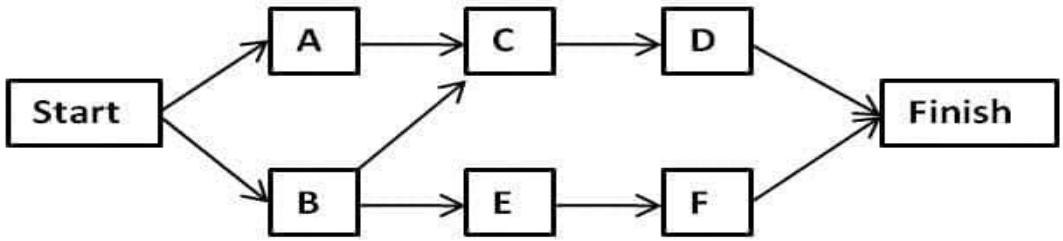
EXPERIMENT NO: 06

PRECEDENCE NETWORK

A Precedence Diagramming Method (PDM), which is sometimes also known as the Activity on Node (AON) Diagramming Method, is a graphical representation technique, which shows the inter-dependencies among various project activities.

This diagramming method is utilized to draw the project schedule network diagrams—for example the critical path network diagram and the critical chain network diagram.
You may have also heard about another less commonly used technique in diagramming methods—the Activity on Arrow (AOA) diagramming method, which is a special case of the Precedence Diagramming Method.

In AOA, all dependencies are Finish to Start, and the duration is shown on arrows. That is why this diagramming method is known as the Activity on Arrow (AOA) diagram. PERT is an example of AOA diagram.
Activity on Arrow (AOA) diagram emphasizes milestones (events), and the AON diagram emphasizes tasks.
The main benefit of the Precedence Diagramming Method (PDM) is that it shows the activity dependencies, and it can be an important communication tool for stakeholders.



Precedence Diagram Method (PDM)

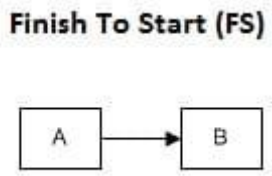
The Precedence Diagramming Method (PDM) consists of rectangles, known as nodes, and the project activities are shown in these boxes. These rectangular boxes are connected with arrows to show the dependencies; therefore, these diagrams are also known as the Activity on Node (AON) diagrams.

The Precedence Diagramming Method uses four types of dependencies. Those dependencies are as follows:

1. Finish to Start (FS)
2. Finish to Finish (FF)
3. Start to Start (SS)
4. Start to Finish (SF)

Finish to Start (FS)

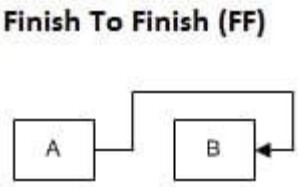
In this type of dependency, the second activity cannot be started until the first activity completes. This type of dependency is the most commonly used dependency in the diagramming techniques.



For example, to paint a wall you first need to build a wall. In this case, the first activity is building the wall and second activity will be painting. You cannot start painting the wall unless the wall is ready.

Finish to Finish (FF)

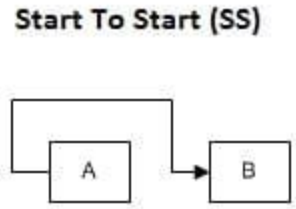
Here, the second activity cannot be finished until the first activity finishes. In other words, both activities should finish simultaneously.



For example, let us say that you are coding a program for a client, and the client is providing you with the characteristics of the program. In this case, you cannot finish coding for your program until the client gives you his complete requirements. Here, both activities should finish simultaneously.

Start to Start (SS)

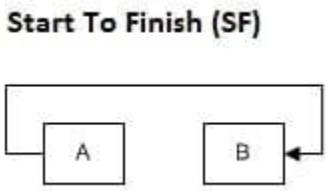
Here, the second activity cannot be started until the first activity starts. Both activities should start simultaneously.



Suppose you have to apply a primary coating on a wall. To apply the coating, you also need to clean the wall. Therefore, one team will start cleaning the wall and second team will paint it. Both activities can be started at the same time.

Start to Finish (SF)

In this type of dependency, the second activity cannot be finished until the first activity starts.



For example, let us say you have to move into a new home, and your old home has to be demolished. In this case, you cannot move to your new home until it is ready. Hence, the second activity (construction of new home) must be finished before the first activity starts (you start moving into a new home); i.e. if you are moving into your new home, you cannot start vacating your old home until the new house is completely ready.

Although this type of dependency is not commonly used, you as a project manager should know about all the types of dependencies. It is important for you, as the project manager, to understand all types of dependencies because it will help you considerably when drawing the network diagram and then creating the project schedule.

This concludes the precedence diagram method and the type of dependencies used in making the diagram.

Problem:

Develop a network diagram for the project specified below:

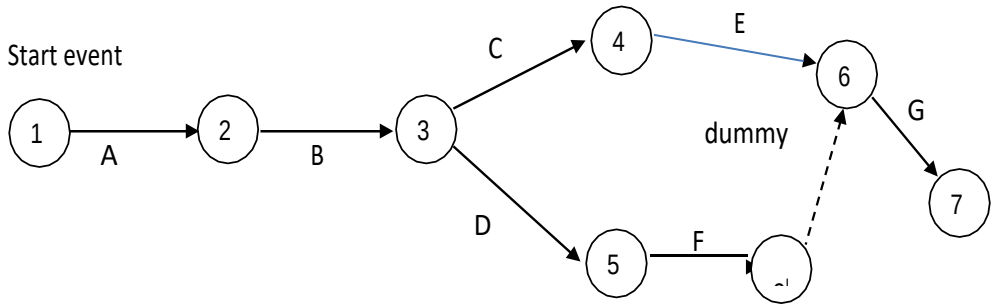
Activity	Immediate Predecessor Activity
A	-
B	A
C, D	B

Activity	Immediate Predecessor Activity
E	C
F	D
G	E, F

Solution

- Activity A has no predecessor activity. i.e., It is the first activity. Let us suppose that activity A takes the project from event 1 to event 2. Then we have the following representation for A:
- For activity B, the predecessor activity is A. Let us suppose that B joins nodes 2 and 3.
- Activities C and D have B as the predecessor activity. Therefore we obtain the following:
- Activity G has E and F as predecessor activities. This is possible only if nodes 6 and 6l are one and the same. So, rename node 6l as node 6. Then we get
- we took nodes 6 and 6l as one and the same. Instead, we can retain them as different nodes. Then, in order to provide connectivity to the network, we join nodes 6l and 6 by a dummy activity. Then we arrive at the following diagram for the project network:

End event



EXPERIMENT NO: 07

CASH FLOW ANALYSIS

1. What is cash flow statement?

Ans. The statement that shows inflow and outflow of cash associated to different activities of a business firm for a specific period. Cash flow is the flow of cash in an accounting year or over two dates of balance sheet. Cash flow statements show the inflows and outflows of cash from different business activities like operating, investing and financing activities. It is the indicator of the amount of cash receipt and amount of cash payment or disbursement during an accounting period in different activities of an organization. It shows the causes of increase or decrease in cash and net change in cash position during a particular period.

According to S.P Gupta," Cash flow statement is a statement designed to highlight upon the causes, which bring changes in cash position between two balance sheet dates.

2. Differentiate between cash flow and funds flow statement?

Ans. Differentiation between cash flow and funds flow statement are as given below:

CASH FLOW STATEMENT	FUNDS FLOW STATEMENT
Cash flow statement is based on narrow concept of funds, which considers changes in cash.	It is based on the changes in working capital, which considers both the changes in cash as well as other components of current assets and current liabilities.
It is prepared on cash basis.	It is prepared in accrual basis.
It does not require use of changes in net working capital because all the changes in assets and liabilities are summarized in cash flow statement.	It requires to use of a separate statement of changes in net working capital.
The preparation of cash flow statement considers only those transactions that are linked with flow of cash.	The preparationof funds flow statement considers those transactions that are linked with flow of funds along with actual cash.
This statement is more useful in short term analysis and cash planning.	This is more useful in long-term analysis of financial planning.

3. Describe the importance of cash flow statement.

Ans. The importance of cash flow statement is;

1 To show the various activities where in the cash was utilized.

2 To identify the sources from where cash inflows have risen within in a particular period,

3 To shows the efficiency of the firm in generating cash inflows from its regular operations.

4 To reports the amount of cash used during the period in various long term investing activities.

5 To reports the amount of cash received during the period through various financing activities such as issue of shares, debentures and raising long-term loan.

4. What do you mean by cash from operating activities?

Ans. Operating activities refer to the revenue generating activities of a firm. These activities are considered to be the major sources of internally generated cash. Cash inflows from operating activities include the cash from sales and collection from debtors. Cash outflows for operating activities include cash purchase, payment of suppliers, payment for other operating expenses, payment for interest and taxes thus consist of all cash revenue expenses.

5. In how many ways cash from operating activities is determined? Explain with suitable examples.

Ans. Cash from Operating activities is determined into 2 ways. They are direct methods and direct method and indirect method.

1. Cash flow from operating activities under direct method

Under direct method only those items from income statement are selected that result into actual flow of cash. So, non-cash expenses such as depreciation and amortized amount appeared in income statement are ignored. The change in some components of current assets and current liabilities except cash balance are also incorporated that result into cash inflows and outflows.

2. Cash flows from operating activities under indirect method

Under indirect method first the funds from operation is ascertain by adjusting the net income by non-cash expenses and non-operating incomes and expenses included in the income statement. The funds from operation so ascertained are again adjusted by the changes in current assets and the changes in current liabilities to determine cash flows from operating activities.

6. What is meant by cash from investing activities?

Ans. Investing activities refer to those activities, which are concerned with acquisition or sales of lone-term assets or investment. Cash inflows from investing activities include the cash received from sales of fixed assets as well as investment and cash outflows include cash paid for the purchase of fixed assets and investment made.

7. Mention the items relating to cash flows from financing activities.

Ans. The items relating to cash flows from financing activities are issue of equity share, debentures, repayment of long-term loan, payment of cash dividend and so on.

8. Define direct and indirect cost with examples.

Ans. Direct costs -Direct costs are those materials, labour and other expenses, which can easily be attributed or identified with a unit of product, process or operation. The cost of raw materials, productive labour, and carriage of materials paid are the examples of direct cost. The total of direct cost is termed as prime cost.

Indirect costs- Indirect costs are those types of cost, which cannot easily be attributed to or identified with a unit of product, process or operation. Therefore, the total of costs of indirect materials, indirect labour and indirect expenses is referred to as indirect costs. They are also called overhead costs. The examples of indirect costs are repair charges, salaries, rent, telephone and water.

9. Briefly write the meaning of cost accounting.

Ans. Cost accounting is one of the branches of accounting, which has been developed due to the limitation of financial accounting. Financial accounting communicates economic information of an organization as a whole and that is used for external reporting purpose. The reporting of financial accounting may not be sufficient for internal reporting i.e. for the formulation of policy and strategy, decision making and control.

According to C.Gilespie “cost accounting is a set of producers for determining the cost of a product and various activities involved in its manufacture and sales and for planning and measuring performance.

10. State three objectives of cost accounting.

Ans. The three objectives of accounting are given below;

To ascertain cost: The important objective of cost accounting is to ascertain cost of a product or services or jobs. Ascertainment of cost is process of determining cost after they have been incurred. Generally, there are two methods of determining the cost i.e. job costing and process costing. Due to the different in the nature of activity of industry, different methods of cost may be applied.

To control cost: The objectives of cost accounting is to control over the cost by using various techniques such as standard costing, inventory control, marginal costing etc.

To provide information for decision making: Cost accounting is the formal system of accounting and provides information for various managerial decisions like

I. Whether to accept or reject the offer
II. Whether to make or buy a product
III. Whether to continue or replace the existing machine and

IV. Whether to drop or continue the product or services.

Cash Flow from operating activities by direct method

	Amount(Rs)	Amount(Rs)
Cash sales and collection from customer		
Sales	3,50,000	
Increase in debtors	(10,000)	3,40,000
Cash purchase and payment to suppliers		
Purchases	(2,00,000)	
Increase in creditors	5,000	(1,95,000)
Payment to employees and other operating expenses		
Office expenses	(40,000)	(40,000)
Payment for interest and taxes		
Interest paid	(30,000)	(30,000)
Cash flow from operating activities (A+B+C+D)		75,000

Cash from operation by indirect method

Net profit	33,000
Add: Non-operating and non-cash expenses	
Depreciation for the year	70,000
Funds from operation	1,05,000
Increase in debtors	(10,000)
Increase in stock	(25,000)
Increase in creditors	5,000
Cash from operating activities	75,000

EXPERIMENT NO: 08

MODEL PREPARATION

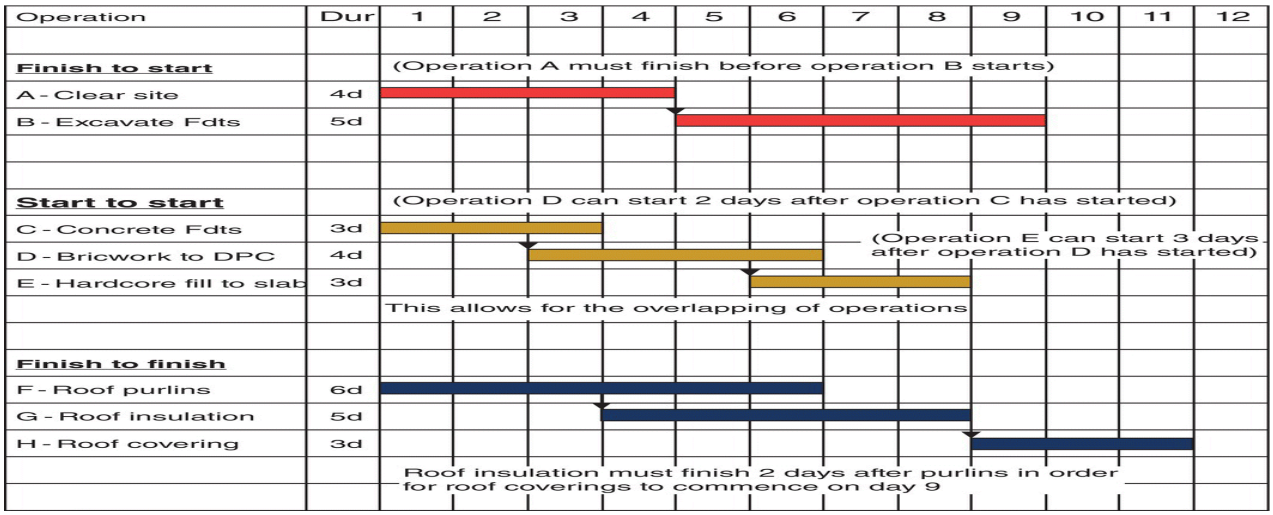
MODEL PREPARATION

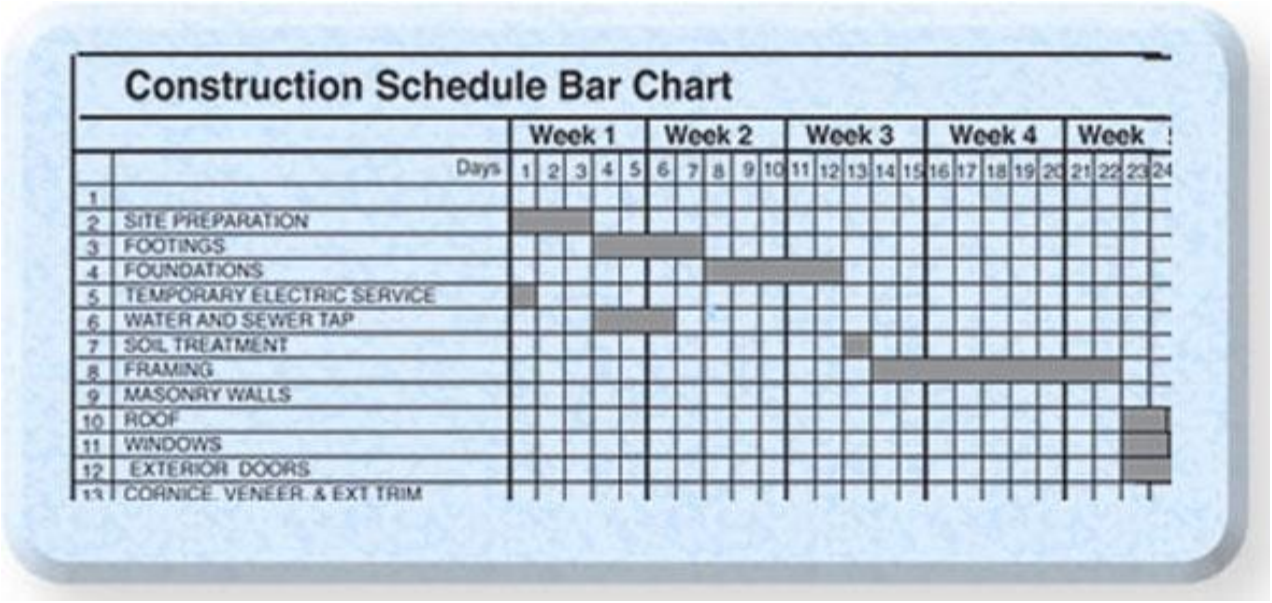
The bar chart display was developed by Henry Gannt in 1915. Other systems, such as critical path analysis (CPA), precedence diagrams and line of balance came some forty years later.

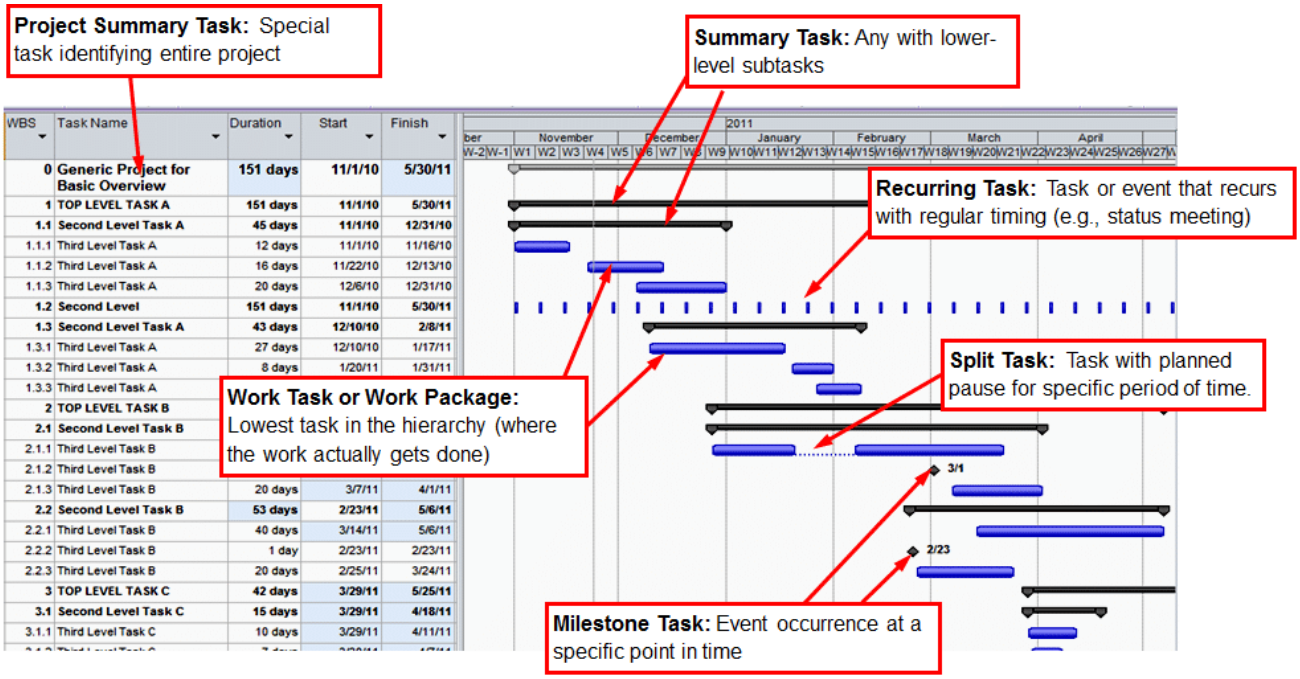
The critical path method was developed by E.I. DuPont de Nemours & Co. in 1956. Further development work by Mouchley, Ketley and Walker in 1957 led to wider applications suitable for the industry. The onset of computers in the early 1960s led to analysis being undertaken by computers as a central analysis source.

The principles of network analysis are still included in construction management degree courses in order to develop an analytical approach to construction situations – long may this practice continue.

Critical path software developed by Pertmaster/Primavera is still used – although only applicable to the large projects involving complex relationships. There was no evidence of it being used on the projects included in the building case studies.




Construction Schedule Bar Chart
Week 1
Week 2
Week 3
Week 4
Week
Days
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
2 SITE PREPARATION
3 FOOTINGS
4 FOUNDATIONS
5 TEMPORARY ELECTRIC SERVICE
6 WATER AND SEWER TAP
7 SOIL TREATMENT
8 FRAMING
9 MASONRY WALLS
10 ROOF
11 WINDOWS
12 EXTERIOR DOORS
13 CORNICE, VENEER, & EXT TRIM


Project Summary Task: Special task identifying entire project
Summary Task: Any with lower-level subtasks
Recurring Task: Task or event that recurs with regular timing (e.g., status meeting)
Split Task: Task with planned pause for specific period of time.
Work Task or Work Package: Lowest task in the hierarchy (where the work actually gets done)
Milestone Task: Event occurrence at a specific point in time
WBS
Task Name
Duration
Start
Finish
0 Generic Project for Basic Overview 151 days 11/1/10 5/30/11
1 TOP LEVEL TASK A 151 days 11/1/10 5/30/11
1.1 Second Level Task A 45 days 11/1/10 12/31/10
1.1.1 Third Level Task A 12 days 11/1/10 11/16/10
1.1.2 Third Level Task A 16 days 11/22/10 12/13/10
1.1.3 Third Level Task A 20 days 12/6/10 12/31/10
1.2 Second Level 151 days 11/1/10 5/30/11
1.3 Second Level Task A 43 days 12/10/10 2/8/11
1.3.1 Third Level Task A 27 days 12/10/10 1/17/11
1.3.2 Third Level Task A 8 days 1/20/11 1/31/11
1.3.3 Third Level Task A
2 TOP LEVEL TASK B
2.1 Second Level Task B
2.1.1 Third Level Task B
2.1.2 Third Level Task B
2.1.3 Third Level Task B 20 days 3/7/11 4/1/11
2.2 Second Level Task B 53 days 2/23/11 5/6/11
2.2.1 Third Level Task B 40 days 3/14/11 5/6/11
2.2.2 Third Level Task B 1 day 2/23/11 2/23/11
2.2.3 Third Level Task B 20 days 2/25/11 3/24/11
3 TOP LEVEL TASK C 42 days 3/29/11 5/25/11
3.1 Second Level Task C 15 days 3/29/11 4/18/11
3.1.1 Third Level Task C 10 days 3/29/11 4/11/11
2011
November
December
January
February
March
April
3/1
2/23

EXPERIMENT NO: 09

SITE VISIT-III

Describing the Site

1. Look over the requirements of your visit report.

There is no 1 way to write a visit report. If you're a student, check the assignment from your instructor. If you're a consultant or professional working for a company, look at other visit reports from your company to use as a model.

- Reports are usually only 2-3 pages long, but in some cases, these reports may be much longer.
- In some cases, you may be asked to give recommendations or opinions about the site. In other cases, you will be asked only to describe the site.

2. Start the paper with general information about the visit.

This will serve as your introduction. In a paragraph, tell your audience when you visited the site and where the site is located. State that your contact was at the site. If extensive travel was needed, you may also briefly state how you arrived at the site.

3. Define the purpose of the site.

In 1-2 paragraphs, describe what type of site it is. Is it a factory, construction site, business, or school? Include details about the size, layout, and equipment used at the site. State how many people work at the site or who owns the site.

- If you visited a factory, explain what it is producing and what equipment it uses.
- If you visited a construction site, describe what is being constructed and how far along the construction is. You should also describe the terrain of the site and the layout.
- If you're visiting a business, describe what the business does. State which department or part of the business you visited.

4. Explain what happened during the visit in chronological order.

Start at the beginning of your visit. What did you do? Who did you meet? Describe the events of the day going until you left the site. This may be anywhere from a few paragraphs to a few pages long. Make sure to include:

Who did you talk to? What did they tell you?

What did you see at the site?

What events took place? Did you attend a seminar, Q&A session, or interview?

Did you see any demonstrations of equipment or techniques?

5. Summarize the operations at the site.

In as much detail as possible, describe the processes and procedures at the site. If they use any special techniques, state how these techniques are performed. If they manufacture something in a particular way, give a step-by-step account of this process.

- For example, at a car factory, describe whether the cars are made by robots or humans. Describe each step of the assembly line.
- If you're visiting a business, talk about different departments within the business. Describe their corporate structure and identify what programs they use to conduct their business.

Reflecting on Your Visit

1. Describe what you learned at the site if you're a student.

Draw connections between what you learned at the site and what you learned in class. State how seeing the site helped you understand what you are learning in class. You might ask yourself:

- Is there something you didn't realize before that you learned while at the site?
- Who at the site provided helpful information?
- What was your favorite part of the visit and why?

2. Identify the strengths and weaknesses of the site.

Note which processes, policies, and practices work well at the site. If you notice any flaws, describe these as well. Try to be as specific as possible. Name the exact machine, equipment, process, or policy that could be fixed.

For example, you might state that the factory uses the latest technology but point out that employees need more training to work with the new equipment.

If there was anything important left out of the visit, state what it was. For example, maybe you were hoping to see the main factory floor or to talk to the manager.

3. Provide recommendations for improvement if required.

If you're asked to provide recommendations, take a few paragraphs to share your thoughts and observations. Identify problematic areas in the site and provide specific, actionable recommendations to improve them.

Tailor your recommendations to the organization or institution that owns the site. What is practical and reasonable for them to do to improve their site?

Be specific. Don't just say they need to improve infrastructure. State what type of equipment they need or give advice on how to improve employee morale.

Formatting Your Report

1. Add a title page to the beginning of your report.

The title should be the name of the visit and site, such as "Visit to Airplane Factory" or "Corporate Headquarters Visit Report." Under the title, include your name, your institution, and the date of the visit. Do not put any other information on this page.

2. Write in clear and objective language.

Keep your sentences short and concise. Avoid writing with too many adjectives or flowery language. This will make your report clear and direct.

3. Include any relevant pictures if desired.

While pictures are usually not required, they may be helpful in some visit reports. Group photographs, images of machinery, or graphics demonstrating the layout of the site might be helpful.

4. Proofread your report carefully.

Check for any grammatical errors or typos. Ask someone else to read over it for you to make sure it sounds good. If you're a student, check your professor's guidelines to make sure that you have all of the required parts.

EXPERIMENT NO: 10

SITE VISIT-IV

Describing the Site

1. Look over the requirements of your visit report.

There is no 1 way to write a visit report. If you're a student, check the assignment from your instructor. If you're a consultant or professional working for a company, look at other visit reports from your company to use as a model.

- Reports are usually only 2-3 pages long, but in some cases, these reports may be much longer.
- In some cases, you may be asked to give recommendations or opinions about the site. In other cases, you will be asked only to describe the site.

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EXPERIMENT NO: 11

TENDERING

TENDERING

The agreement of two or more persons, upon a sufficient consideration or cause, to do, or to abstain from doing, some act; an agreement in which a party undertakes to do, or not to do, a particular thing; a formal bargain; a compact; an interchange of legal rights.
In our civil engineering field construction of buildings and other projects executed, supplying of materials, supplying of labours and conveyance of stocks etc., through the tender system. The qualified contractors offered their quotes through tender in different contract methods.

Preparation of Tender Documents
Before tenders for a work are invited, a detailed estimate showing the quantities, rates and amounts of the various items of work and also the specifications to be adopted should be prepared and sanctioned.
In the case of urgent works, when there is not time to prepare a complete estimate, rough quantities and rates for the main items of that part of the work for which tenders are called and which cover the major part of the cost should be worked out before tenders are invited and adopted for the purpose of comparison.
In the case of work for which tenders are to be invited, tender documents comprising of the following should be prepared and approved by an authority who is empowered to approve, before the notice inviting tender is issued:

1. The notice inviting tender in standard form.
2. The form of tender to be used along with a set of conditions.
3. The schedule of quantities of work.
4. A set of drawings referred to in the schedule of quantities of work.
5. Specification of the work to be done.
6. Essential architectural drawings and adequate structural drawings for commencing the work together with specifications are to be made available to the contractors at the time of inviting tenders.

Unless there is any general or special departmental instructions or any other bonafide reasons to stipulate certain materials, only those materials should be stipulated in the tender which are either available at the time of inviting tender or are likely to be received before commencement of the work.

The Tender notice should contain the following information:

- Name of the department-calling tenders.
- Designation of the officer calling tenders.
- Name of work or job description.
- Last date and time for receipt of tenders.
- Tender forms, place of availability date and timings.
- Time allowed for the execution of work.
- Earnest Money Deposit to be made and mode of payment.
- Approximate value of work.
- Date, Time and Place of opening tenders.
- Designation of the officer opening the tender.

In response to the tender notice published, people who are really interested in undertaking the work will obtain a set of tender documents, kept ready for sale if it is a big work and sale is anticipated or in the alternative, the tender document should be permitted to be perused by the probable tenders.

The tender documents should normally consist of three parts:

- General conditions of tender.
- Schedule of items of work involved, approximate quantity of each item and general description of work.
- Special conditions, designs, drawings etc.

Information should also be given, in clear terms about

- Conditions regarding departmental supply of steel, cement, bitumen, etc., point of supply and rate chargeable to the contractor.
- Availability of tools and plant on hire charges from the department and hire charges to be borne by the contractor, if they are provided.

- Availability of power and water at the site of work.

- Time allowed for the completion of work, stages of work, progress of work and penalties for delay.

- Employment of technically qualified supervisory personnel and strict adherence to departmental standards and specifications.

- Amount of Earnest Money Deposit which should accompany the tender and mode of payment.

- Amount of a Security Deposit to be made by the successful tenders before the work is entrusted.

- Enclosures to the tender such as Income Tax clearance certificate, Solvency Certificate and list of works executed by him recently.

- Powers of accepting or rejecting tenders of canceling of any work or extension of time for tenders etc., without assigning any reasons.

Conditions regarding the responsibility of the successful tenders whose tender is accepted, to make good any loss which may occur due to re-tender, in case he does not pay the security deposit and enter into agreement within the stipulated time i.e., conditions of penalty, forfeiture of earnest money etc.

Text of CPWD form 6 : NOTICE INVITING TENDER [NIT]

Item rate / percentage rate tenders are invited on behalf of the President of India from approved and eligible contractors of C.P.W.D. and those of appropriate list of P&T, M.E.S. and …… State P.W.D. for the work of ……..

1. The work is estimated to cost Rs…….

This estimate, however, is given merely as a rough guide.

2. Tendered will be issued to eligible C.P.W.D. as well as non-C.P.W.D. contractors provided they produce definite proof from the appropriate authority, which shall be to the satisfaction of the competent authority, of having satisfactorily completed similar works of magnitude specified below:

Criteria of eligibility for issue of tender documents

3. Conditions for Non-CPWD Contractors only

1.3.1	For works estimated to cost above Rs.25 lacs but uptoRs. 2 crores	Three similar works each costing not less than Rs…….. lacs during the last 5 years.

1.3.2	For works estimated to cost above Rs. 2 crores but upto Rs.5 crores	Three similar works each of value 40% of estimated cost or one work of 100% estimated cost (rounded off to nearest 10 lacs) in the last 7 years ending last day of the month previous to the one in which the tenders are invited.

4. Conditions for CPWD as well as Non-CPWD contractors.

5.

For works estimated to cost above Rs.5 crores	Tenders shall be invited from pre-qualified contractors only.

For the purpose of this clause "similar work" means the works of ……

2. Agreement shall be drawn with the successful tenderer on prescribed Form No. CPWD 7/8 which is available as a Govt. of India Publication. Tenderer shall quote his rates as per various terms and conditions of the said form which will for part of the agreement.

3. The time allowed for carrying out of the work will be ……. from the ……. day after the date of written orders to commence the work or from the first date of handing over of the site, whichever is later, in accordance with the phasing, if any, indicated in the tender documents.

4. The site for the work is available.

The site for the work shall be made available in parts as specified below:

5. Receipt of applications for issue of forms will be stopped by 1600 Hrs. four days before the date fixed for opening of tenders. Issue of tender forms will be stopped three days before the date fixed for opening of tenders.

6. Tender documents consisting of plans, specifications, the schedule of quantities of the various classes of work to be done and the set of terms & conditions of contract to be complied with by the contractor whose tender may be accepted and other necessary documents can be seen in the office of the ……. between hours of 11.00 A.M. & 04.00 P.M. everyday except on Sundays and Public Holidays. Tender documents, excluding standard form, will be issued from his office, during the hours specified above, on payment of Rs…….. in cash/DD.

7. The tenderer must produce an Income Tax clearance certificate in the revised form as modified under Ministry of Finance O.M. No.67/30/69/ITAL dated 02.07.1970 as amended from time to time before tender papers can be sold to him.

8. Tenders, which should always be placed in sealed envelope, with the name of work and due date written on the envelops, will be received by the …… upto 03.00 p.m. on…….. and will be opened by him of his authorized representative in his office on the same day at 03.30 p.m.

    1. The tender shall be accompanied by earnest money (unless exempted) of Rs…… in / Receipted Treasury Challan / Deposit at Call receipt of a Scheduled Bank / Fixed Deposit Receipt of a Scheduled Bank / Demand Draft of a Scheduled Bank issued in favour of …….. the amount being credited to……. The Fixed Deposit Receipt shall be accepted only if it is valid for six months or more after the last date of receipt of tenders and is pledged in favour of …….. A contractor exempted from depositing earnest money in individual cases, shall enclose with the tender an attested copy of the letter exempting him from depositing earnest money in a manner described for earnest money in condition No.8.2. below and shall produce the original when called upon to do so.

    2. The tender and the earnest money shall be placed in separate sealed envelops each marked "Tender" and "Earnest Money" respectively. In cases where earnest money in cash is acceptable, the same shall be deposited with the Cashier of the Division and the receipt placed in the envelope meant for earnest money. Both the envelops shall be submitted together in another sealed envelope. The envelope marked "Tender" of only those tenders shall be opened, whose earnest money placed in the other envelope is found to be in order.

9. The description of work is as follows:

Copies of other drawings and documents pertaining to the works will be open for inspection by the tenders at the office of the above mentioned officer.
Tenderers are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders as to the nature of the ground and sub-soil (so far as is practicable,), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risk, contingencies and other circumstances which may influence or affect their tender. A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not, and no extra charges consequent on any misunderstanding or otherwise shall be allowed. The tenderer shall be responsible for arranging and maintaining at his own cost all materials, tools and plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant, etc. will be issued to him by the Government and local conditions and other factors having a bearing on the execution of the work.

9. The competent authority on behalf of President of India does not bind himself to accept the lowest or any other tender, and reserves to himself the authority to reject any or all of the tenders received without the assignment of a reason. All tenders, in which any of the prescribed conditions is not fulfilled or any condition including that of conditional rebate is put forth by the tenderer, shall be summarily rejected.

10. Canvassing whether directly or indirectly, in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.

11. The competent authority on behalf of President of India reserves to himself the right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rate quoted.

12. The contractor shall not be permitted to tender for works in the CPWD Circle (responsible for award and execution of contracts) in which his near relative is posted as Divisional Accountant or as an officer in any capacity between the grades of Superintending Engineer and Assistant Engineer (both inclusive). He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any Gazetted officer in the Central Public Works Department or in the Ministry of Urban Development. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this Department.

13. No Engineer of gazetted rank or other Gazetted officer employed in Engineering of Administrative duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of two years after his retirement from "Government service, without the previous permission of the Government of India in writing. This contract is liable to be cancelled if either the contractor or any of his employees found any time to be such a person who had not obtained the permission of the Government of India as aforesaid before submission of the tender or engagement in the contractors service.

14. The tender for the works shall remain open for acceptance for a period of ninety days from the date of opening of tenders. If any tenderer withdraws his tender before the said period or makes any modifications in the terms and conditions of the tender which are not acceptable to the department, then the Government shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid.

15. This Notice Inviting Tender shall form a part of the contract document. The successful tenderer / contractor, on acceptance of his tender by the Accepting Authority, shall, within 15 days from the stipulated date of start of the work sign the contract consisting of:

    1. the notice inviting tender, all the documents including additional conditions, specifications and drawings, if any, forming the tender as issued at the time of invitation of tender and acceptance thereof together with any correspondence leading thereto.

    2. Standard C.P.W.D. Form 7/8.

EXPERIMENT NO: 12

VALUATION

PURPOSE OF VALUATION

- Purchasing for Investment
- Purchasing for self Occupation
- Revision of Capitals
- Interim Reports of Execution of Buildings or other structures.
- Compensation for land Acquisition
- Present Value of Old Properties
- Arbitration
- Assessing property Tax
- Income Tax, Wealth Tax
- Gift Tax, Capital Gains
- Selling
- Mortgaging
- Collateral Security
- Auctioning
- Insurance
- Court fee stamp
- Partitions
- Stamp Duty
- Rent Fixation. etc., etc.

All the above purpose of valuation has been divided into six major categories, each category is discussed in detail.

- Taxation
- Finance
- Industrialist
- Statute

- Personal planning
- Social Responsibilities.

Introduction

The following the methods of valuation being adopted in General practice by a practicing valuer are:

I. Land and Building Method
II. Rent Capitalization Method
III. Development Method
IV. Profit Method
V. Direct Comparison Method

Land Building Method:

By this method, the value of the land and the value of Building are assessed separately and added to get the present value of the property. Depreciation is calculated either by straight line method or applying Linear method

Rental or Capitilisation Method:

Rental method of valuation consists in capitilising the Net Annual Rental Income (NARI) at an appropriate rate of interest or rate of capitilisation.Net annual rent income equals to Gross Annual Rental Income (GARI) minus outgoings like Property Tax, repairs, and maintenance, Service Charges, Insurance Premium, Rent Collection and Management Charges etc.

Development Method (or Residual Method):

This method is used to evaluate such property where there is a development potential, so that the value of the property after development will be increased more than the expenditure incurred. For example, a large portion of land can be divided into small plots and developed fully so as to provide plots of land for a residential Colony or a large complex of multi-storied buildings, housing ownership flats in a Co-operative Housing Society.

Profit Method:

This method is applicable to Hotels, Cinema Theatres, Marriage Halls and Public Places. This method as the name suggests deals in working the profit from a property and subsequently capitalizing the same at appropriate rate of return depending upon a number of factors.

The net profit to be adopted should be an average of last three years of profit. Part of the profits is due to goodwill which should be properly reflected in the rate of return.

GENERAL Procedure to do the Valuation of Building

Measure the Plinth Area. Observe the specification and other factors which affect the value.

Adopt suitable Replacement Rate of construction (for the Building portion alone) depending upon the existing conditions and specifications.

Multiply the plinth area by the unit rate to get the replacement value of the building.

Ascertain the age of the Building.

Estimate suitable total life of the Building.

Assume suitable % age for salvage value. Calculate Depreciation by Straight line method. Depn% = (Age / Total life) x (100 - % Salvage value). If the age is not known or if the building has crossed its service life, estimate future life and calculate the depreciation by using the formula.

D = x (100 - % age salvage value)

Depreciation % age multiplied by the Replacement value will be the Depreciation Value.
Present Value = Replacement Value – Depn. Value
This is the value of Building.

Add suitable depreciated value for other works like Amenities, extra works, miscellaneous works etc.
Add suitable value separately for services depending upon the actual's specifications.

LAND AND BUILDING METHOD

Definition

In this method of valuation building portions being valued separately after allowing depreciation and the land is valued separately and their added to get the present value of the property:
Present Value of the Property = Value of the building + Value of the land +Value of the amenities & services.

PROCEDURE OF VALUATION:

- Ascertain from the applicant the exact purpose of valuation.
- From the document available, note down the measurement of the plot and other details.
- Verify the measurements and the extent at site.
- Assess suitable unit rate based upon the prevailing market rate or from the recent comparable sale instances of a similar vacant plot with almost similar characteristics.
- Arrive the value of Building by adopting the procedure.
- Addition of value of Land and Building will be the present value of the property.
- If the aim of valuation is to assess the market Value
- apply the reduction factor to the value of land.
- Add suitable percentage towards any potential value
- Deduct any percentage towards negative factors.

Analyse any other points depending upon the individual merits of the case.
Give valuation report in the appropriate format

CASE STUDY
Example : 1

A R.C.C Roofed Residential Building 1800 SFT it is constructed in year 1965 and the First Floor Constructed in year 1975. The total land area 4000 SFT (40 x100). The building built-up with load bearing structure with aesthetic look and having all services like bore, motor, OHT, Septic tank etc.

VALUATION DETAILS

Part – I - Land

Size of the plot	40 x 100
Total Extent of the plot	4000 Sqft
Prevailing Market Value	Rs. 120.00 Sqft
Adopted rate of valuation	Rs. 100.00 Sqft
Assessed Value of the plot	**Rs. 4,00,000/-**

Part – II Building

S No.	Floor	Reported year of construction	Roof	Plinth area Sq.ft
1	Ground Floor	1965	R.C.C	1800 SFT
2	First Floor	1975	R.C.C	1000 SFT

B. General information

Type of construction	Load Bearing Structure
Quality of construction	I class
Appearance of the building	Excellent and aesthetic
No. of floors	GF & FF
Maintenance of the building	Excellent
Water supply arrangements	Deep bore, motor and OHT
Drainage arrangements	Septic Tank

C. Valuation of Ground Floor Construction

Specifications:	
Foundation	Stepped footing
Superstructure	Brick Work in C.M 1:5
Roof	R.C.C. 1:2:4
Joinery	Teak wood
Floor finish	Colour Mosaic
Total Plinth area	**1800 SFT**
Year of construction	1965
Age of building	39 yrs
Total life of the building estimated	70 yrs
Depreciation percentage (assumed salvage value 10%)	70 – 31/70 (100 – 10) = 50.14%
Replacement rate of construction with the existing conditions & specifications	Rs 500.00/SFT
Replacement value	**Rs. 9,00,000.00**
Depreciation value at the rate of 50.14%	**Rs. 4,51,260.00**
Estimated present value of **ground floor** construction	**Rs. 4,48,740.00**

D. Valuation of First Floor Construction

Specifications:	
Superstructure	Brick Work in C.M 1:5
Roof	R.C.C. 1:2:4
Joinery	Teak wood with mica
Floor finish	Colour Mosaic
Total Plinth area	**1000 SFT**
Year of construction	1975
Age of building	39 yrs
Total life of the building estimated	70 yrs
Depreciation percentage	50.14 %
Replacement rate of construction with the existing conditions & specifications	Rs. 400.00/SFT
Replacement value	**Rs. 4,00,000.00**
Depreciation value at the rate of 50.14%	**Rs. 2,00,560.00**
Estimated present value of **First floor** construction	**Rs. 1,99,440.00**

E. Replacement, Depreciation and Net Value

SNo.	**Description**	**Replacement value**	**Depreciation**	**Net value**
1	Ground Floor	9,00,000.00	4,51,260.00	4,48,740.00
2	First Floor	4,00,000.00	2,00,560.00	1,99,440.00
	Total	**13,00,000.00**	**6,51,820.00**	**6,48,180.00**

Part III – EXTRA ITEMS

Portico 200 Sqft @ 150 Sqft		Rs.	30,000.00
Ornamental front door		Rs.	5,000.00
Sitout/ Verandah with steel grills		Rs.	5,000.00
Over head water tank		Rs.	5,000.00
Extra Steel /Collapsible gates		Rs.	3,000.00
Side dadoos 200 Sft @ 30/Sqft		Rs.	6,000.00
		Rs.	**54,000.00**
Less depreciation 50.14%		**Rs.**	**27,076.00**
Net Value		**Rs.**	**26,924.00**

Part IV – Amenities

Wardrobes 250 Sqft x 125 / Sqft		Rs.	31,250.00
Glazed tiles 375 Sqft x 25/Sqft		Rs.	9,375.00
Extra sinks and bath tub		Rs.	6,000.00
Marble / ceramic tiles flooring		Rs.	3,600.00
Interior decoration		Rs.	10,000.00
Architectural elevation works		Rs.	15,000.00
Panelling works 225 Sqft x 100		Rs.	22,500.00
Aluminium works 100 Sqft x 100		Rs.	10,000.00
Aluninium hand rails 32 RFT x 80	5	Rs.	2,560.00
Total		**Rs.**	**1,10,285.00**
Less Depreciation 50.14%		**Rs.**	**55,297.00**
Net Value		**Rs.**	**54,988.00**

Part V – Miscellaneous

Separate toilet room 50 Sqft			5,000.00
Separate lumber room			-
Separate water tank / sump			3,000.00
Trees/Gardening			8,000.00
Total			**16,000.00**

Part VI – SERVICES

Water supply arrangements			20,000.00
Drainage arrangements			6,000.00
Compound wall 150 Rft @ 125 Rft			18,750.00
E.B. deposits and fittings etc			10,175.00
Pavement			-
Steel gates			-
Total			**54,925.00**

Part VII - ABSTRACT

Plot			4,00,000.00
Building			6,48,180.00
Extra items			26,924.00
Amenities			54,988.00
Miscellaneous			16,000.00
Services			54,925.00
Total			**12,01,017.00**
Say			**12,00,000.00**

In this method, the buildings attracted by Rent Control Act. The income should be calculated as that actually received. If the rent has not been revised due to the owner not asking for that, the rent calculated should be as per the market value, as on the date on which the valuation is made. Since the

rent itself is fixed as a percentage on the value of the property.

Rate of Return & Capitalisation
Rate of Return : The income what we receive for our capital is called Rate of Return.
i.e.,

Amount invested	2,00,000.00
Rate of Return	10 %
Yearly income	2,00,000 x $\frac{10}{100}$ = Rs. 20,.000/-
Monthly income	$\frac{20,000}{12}$ = Rs. 1666.67

Capitalisation

Capitalisation	Yearly income x $\frac{100}{Rate\ of\ Return}$
	20, 000 x $\frac{100}{10}$
Capital amount	Rs. 2,00,000.00

Calculation of capitalized value of property
Capitalized value of the property = Net Maintainable Rent x 12.5
Case study: Rent capitalisation method
A shop fetches a monthly rent of Rs. 2000 advance amount received Occupier Rs. 30,000, Property tax Rs. 1200. What is the value of the shop? It is a free hold property.

i) GARI (Gross Annual Rental Income)

Monthly rent		= 2000.00
Annual rent 2000 x 12		= 24000.00
Add actual advance paid	= 30,000.00	
Normal Three month Rent	= 6,000.00	
Excess	= 24,000	
Interest @ 12%	= 2,880.00	= 2880.00
GARI	= 24,000 + 2,880	**= 26,880.00**

ii) Outgoings

Property Tax	-	Rs. 1200.00
15% GARI	(0.15 x 24880)	Rs. 4032.00
	Total Outgoing	**Rs. 5232.00**

iii) Net Annual Rental Income: NARI = Gari - outgoings
= 26,880 – 5,232
= 21,648.00
Value of the property: = net maintainable rent x 12.5
= 21648 x 125
= 2,70,600/-

3) Development Method:

In this method, the value of the property is latent and will be released on development. This can be worked out by ascertaining the zoned use and extent of development legally permissible under the rules of local authorities and determining the annual gross income that can be fetched after development. From this the next income can be arrived by deducting the outgoings. The capitalized value can be arrived at. To develop the property certain period will be required right from preparation of plans, getting them approved by the local bodies. The capital expenditure required for development during the phase period should also be estimated. A percentage of amount has to deducted on account of the above. The result so obtained by the above procedure should be compared with the actual sale instances of similar under developed properties.

Under developed property, if occupied by tenant under Rent Control Act, will have constraint in utilizing the potential of the development of vacant land depending upon the legal rights of shifting the tenant. It has to be examined whether surplus land is serveable from the enjoyment of the tenant.
Development method should invariably be adopted for valuing land which is ripe for development. Some of the agricultural land close to the periphery of the city will be allowed to be converted as urban land. Large pockets of land have to be laid out in small housing plots as per the rules of the development authorities taking into account the expense that may be incurred for provision of roads, sewers, drains, water mains, electric mains and leveling up of area should be worked out and priced.

4) VALUATION BY PROFIT METHOD:

Profit method is applicable to Hotels, Cinemas, Marriage Halls and Public Places. This method as the name suggests deals in working the profit from a property and subsequently capitalizing the same at appropriate rate of return depending upon a number of Factors.
Estimating the Fair Market Value by using Profit Method is discussed here.

METHOD OF VALUATION OF A CINEMA THEATRE

The fair market value of a cinema theatre is the best possible price one could give in the case of any sale. The method of valuation which a valuer can adopt depends upon the circumstances of the individual case. Many valuers including this author feel that the profit Method is the most appropriate method of valuation if the owner of the theatre conducts himself the business.
The procedure of valuation of a cinema theatre by using profit method is analyzed here in brief.

ASSESSMENT OF VALUE

Profitably is determined and the value is arrived by capitalizing the net profit at an appropriate rate of return after apportioning the profit due to

- Tangible assets and
- Intangible assets

PROFIT = GROSS INCOME – EXPENSE

GROSS INCOME

Gross Income = Income from exhibiting the pictures excluding entertainment Tax + Income from other sources.

Yearly Gross Income from exhibiting the pictures = [{Full House occupancy – Normal Vacancy} x No. of Shows in a month x 12] – Entertainment Tax paid to the Govt.

More the occupancy percentage, more the income form exhibiting the pictures. The significant factors affecting the better occupancy rates are:

- Competition
- Locational Advantage
- Interior decoration
- Good films
- Capacity of the House
- Environments
- Aesthetics of Foyer
- Excellent Sound Systems
- Video Piracy
- Cable T.V
- No. of Theatres existing in that area
- Development of the adjacent locality
- Modern Cinema Building with amenities
- Elevational Treatments, Facades
- Elegant and comfortable furniture
- Efficient projection equipment
- Pleasant light arrangement
- Perfect cooling systems
- Easy approach to the public
- Power supply – Standby source

Vacancies are determined either from actual observations from a number of inspections or on the basis of averages for similar establishments.

Shows include Morning Shows, Noon Shows, Evening Shows, Night Shows, Special Shows, Etc.,

The entertainment Tax varies with individual state Governments. The TamilNadu Govt. has fixed the entertainment Tax as 40 % of the daily collection from exhibiting the pictures.

Income from other sources

They are:

- Income from Exhibiting the Advertisements
- Income from Exhibition of Slides.
- Rental Income from Stalls, Coffee Houses, Cool drink Shops, Ice Cream Parlour, etc.,
- Rental Income from Car Parking and Cycle Stand.
- Rental Income form showcases.
- Miscellaneous Income from Weighing Machine etc.
- Advertisement display on walls.

- Income from Hoardings display.
- Interest for the deposits paid by the contractors of stalls.

Expenses

The heads of expenses are:

- Preliminary Expenses
- Working Expenses
- Repairs and Depreciation
- Owner's Profit

Preliminary Expenses

- Film hire changes to the distributors
- Hire charges for the Indian News Reels
- Local Tax, if any
- Other Taxes connected to Cinema Business

Working Expenses

- Establishment charges like Staff Salary, Gratuity, Bonus, Provident Fund, Welfare Fund.
- Consumables like Carbon Electrodes etc.,
- Running cost of generators, cooling appliances.
- Legal Expenses, Auditors fees.
- Electricity
- Printing
- Postage
- Property tax
- Ground Rent if any
- Traveling & Conveyance
- Packing and Forwarding
- Stationery
- Publicity
- Various License Fees
- Bank Commissions
- Office Expenses
- Railway Freight, Octroi
- Telephone, Telegrams
- Insurance for Plant & Machinery, Equipments, Furnitures
- Insurance premium to the Building
- Subscription to Associations
- Entertainment to Guests
- Miscellaneous

Repairs and Depreciations:

- Suitable Depreciation
- Repairs and Maintenance of Building
- Maintenance of Plant & Machinery
- Sinking fund for Furnitures

The following percentages are normally adopted as depreciation:

Theatre Buildings	2.5 %
Furniture	15 %
Machinery	20 %
Cooling Plant	10 %
Electrical Fittings	10 – 15 %

Allowance for Repairs and Maintenance of the buildings is normally assumed between 1 to 2 % and this does not exceed by 3 %. Sinking fund deduction is required to be made for replacement of Furnitures, Fixtures, Plant& Machinery etc., which require periodic replacements. The deduction should be calculated not on the prime costs but on prevailing costs of replacement less accumulated sinking fund reserves of earlier year on remaining period of anticipated life.

Owner's Profit:

If the owner runs the Cinema business on his own under his direct supervision, guidance and control, a percentage of 15 % as Owner's Profit on the total gross income excluding the entertainment tax is to be taken into account as an expense.

This percentage covers the items like

- Interest on Capital Blocked up in his assests
- Interest on Capital required for day to day Working.
- Trade Profit which is due to his labour, Skill and Managements.
- Allowance for Risk Element

.

PROFIT AND CAPITALIsING

Profit = Gross Income – Expenses

The profits are to be apportioned to two categories, namely

- Profit from intangible assets and
- Profit from Tangible assets.

The ratio of intangible profit to Tangible profit is normally 1:3.

While Capitalising, a higher rate of interest is to be adopted for intangible profit than Tangible profit since efficient running the Cinema business depends upon the good Management, Good will and license.

Here 12% capitalization is adopted for Tangible profit and 14% Capitalisation is adopted for Intangible Profit.

CASE STUDY: Example

Valuation of Cinema Theatre by adopting profit method is explained by means of a Case Study.

Data:

Type of Theatre	Permanent – Non A/c
Location	Municipal Limit

	I class 250 @ Rs. 10.00
	II Class 300 @ Rs. 7.00
	III Class 250 @ Rs. 5.00
No. of Shows / day	4
Average Percentage	60 %
Occupancy	
Entertainment Tax	40% of Daily Collection
Distributors Share	Average 50% of the Daily collection after deducting the Entertainment Tax.
Advance received from stalls	Rs, 4,00,000/-
Conductor of the Theatre	Owner