UNIT I – INTRODUCTION TO PROJECT MANAGEMENT

This unit lays the foundation of what project management is, why it is needed, and how different approaches like traditional, agile, and hybrid methods work. It also introduces core concepts such as the project charter, scope, planning, requirements, and the Work Breakdown Structure (WBS). The goal of this unit is to help you understand how projects begin and how they are structured and planned at a high level.

1. What is Project Management?

Project Management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. In simple terms, it is a structured approach of leading a team to achieve specific goals within a fixed period and budget. It ensures that the project is completed successfully and delivers the expected value.

Project management involves planning what needs to be done, organizing resources, executing the tasks, tracking progress, and closing the project once the work is completed. It requires coordination across teams, departments, and sometimes even different organizations.

2. Role of a Project Manager

The project manager is the central figure in a project. This person is responsible for leading the project team, controlling the project's progress, and maintaining communication between the stakeholders.

A project manager must:

- Plan the project's objectives, tasks, schedule, and budget
- Coordinate and lead the team
- Communicate clearly with clients, stakeholders, and team members

- Identify and manage risks
- Solve issues and remove roadblocks
- Ensure that project quality is maintained
- Track progress and make adjustments when required
- Deliver the project successfully and close it properly

A project manager needs leadership qualities, decision-making ability, communication skills, and problem-solving capabilities. They act as the bridge between the client, upper management, and the project team.

3. Characteristics of a Project

A project has certain key characteristics that distinguish it from regular operations or ongoing activities:

a. Temporary Nature

Every project has a defined start and end date. It is not ongoing like routine work. Once objectives are achieved, the project ends.

b. Unique Output

The outcome of a project is unique. It could be a new software system, a building, a research report, a product prototype, or a new marketing campaign.

c. Progressively Elaborated

Projects become clearer as more information is gathered. Early plans may be vague, but details improve as the project progresses.

d. Resource Constraints

Projects operate within limited time, cost, manpower, equipment, and materials.

e. Cross-functional Nature

Projects often require coordination between various departments such as finance, IT, HR, and operations.

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4. Responsibilities of the Project Manager

A project manager has broad responsibilities across the life cycle:

Planning Responsibilities

- Defining project goals
- Identifying requirements
- Breaking down tasks
- Creating schedules and timelines
- Planning cost and resources

Execution Responsibilities

- Coordinating team members
- Managing communications
- Ensuring tasks are completed on time
- Motivating the team
- Handling conflicts and issues

Monitoring Responsibilities

- Tracking progress
- Monitoring scope, cost, time, and quality

- Managing risks
- Adjusting the plan when necessary

Closing Responsibilities

- Final deliverable submission
- Gathering feedback
- Conducting lessons learned
- Closing contracts and releasing resources

5. Project Management Professionalism

Professionalism in project management includes ethics, responsibility, and knowledge of best practices. A project manager should follow standards such as PMBOK (Project Management Body of Knowledge) and maintain integrity, fairness, and transparency in decision-making. Professionalism also means commitment to continuous learning, respect for team members, and accountability for outcomes.

6. Project Management Process

Most project management frameworks divide the work into five basic process groups:

1. **Initiation** – defining the project, identifying stakeholders, creating the project charter
2. **Planning** – refining objectives, developing scope, schedule, cost plans, risk plans
3. **Execution** – completing tasks as per plan, managing teams
4. **Monitoring and Controlling** – tracking progress, identifying deviations, implementing corrections
5. **Closing** – finalizing all activities, handing over deliverables, documenting lessons learned

These process groups work together to ensure successful project delivery.

7. Traditional, Agile, and Hybrid Project Management Methods

a. Traditional (Waterfall) Method

Traditional project management follows a linear sequence of steps where each phase must be completed before the next begins. It is suitable for projects where requirements are clear and unlikely to change (e.g., construction, manufacturing).

Key characteristics:

- Predictable
- Heavy documentation
- Sequential phases
- Best for fixed-scope projects

b. Agile Project Management

Agile is an iterative and flexible approach that focuses on fast delivery and continuous improvement. Instead of planning everything upfront, Agile breaks the work into small increments called sprints.

Key characteristics:

- Quick feedback cycles
- Customer involvement
- Adaptive to change
- Less documentation
- Focus on value delivery

c. Hybrid Method

Hybrid combines the structured planning of traditional methods with the flexibility of Agile. Planning is done upfront like Waterfall, but execution is iterative like Agile.

Example:

A project might have a clear scope but require frequent customer feedback during development.

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8. Project Charter

The Project Charter is the first formal document of a project. It authorizes the project and gives the project manager the authority to use organizational resources.

A project charter typically includes:

- Project title and purpose
- Business need / justification
- Goals and objectives
- High-level requirements
- High-level scope
- Budget estimate
- Timeline
- Key stakeholders
- Major risks
- Project manager details
- Success criteria

The charter ensures that everyone understands what the project is about before it begins.

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9. Project Scope

Scope describes what the project will deliver and what it will not deliver. It defines the boundaries of the project.

Scope includes:

- All project deliverables
- Features and functions

- Work required
- Specifications and acceptance criteria

A clear scope prevents misunderstandings and scope creep (uncontrolled addition of extra work).

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10. Planning and Requirements

Requirement gathering is a critical step. It involves understanding what the customer or end-user wants from the project.

Methods include:

- Interviews
- Surveys
- Workshops
- Brainstorming
- Observation
- Document analysis

Well-written requirements lead to accurate scope, planning, and scheduling.

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11. Work Breakdown Structure (WBS)

A Work Breakdown Structure is a hierarchical decomposition of the total work into smaller, manageable parts.

Purpose of WBS:

- Makes work easier to understand
- Helps estimate time and cost
- Clarifies responsibilities
- Improves monitoring

Example:

A software project may be broken down into:

- Requirements
- Design
- Development
- Testing
- Deployment

Each section can be further divided into sub-tasks until the work becomes manageable.

Great. I'll continue with the same clear, detailed, descriptive style.

Here is the complete **UNIT II** reading sheet for your CSEB422: Project Management course.

UNIT II – PROJECT INITIATION AND STAKEHOLDER MANAGEMENT

This unit explains how a project is formally started, how stakeholders are identified and managed, how communication is planned, and how project resources and teams are organized. These concepts form the "people and structure" side of project management.

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1. Project Introduction and Scope Management

Once a project idea is approved, the first formal step is project initiation. This involves defining the project's purpose, identifying high-level requirements, and preparing scope documents that describe what the project will accomplish.

Scope management ensures that all the required work, and only the required work, is included in the project. It prevents unnecessary tasks, reduces confusion, and keeps the project aligned with objectives.

The scope management process typically includes:

1. **Collecting requirements** – understanding stakeholder needs.
2. **Defining scope** – creating a scope statement describing the project boundaries.
3. **Creating WBS** – breaking down project work into small tasks.
4. **Validating scope** – confirming completed deliverables with the customer.
5. **Controlling scope** – preventing scope creep and ensuring changes follow approval procedures.

A clear scope helps avoid misunderstandings between the project team, clients, and other stakeholders.

2. Managing Stakeholders and Communications

Every project involves people with different expectations, interests, and influence. These people are called stakeholders. Managing them effectively is essential because even a technically strong project can fail if stakeholder expectations are not satisfied.

2.1 Who are stakeholders?

Stakeholders are individuals or groups who have an interest in the project or can be affected by the project's outcome.

Examples include:

- Customers
- Users
- Project sponsor
- Team members
- Functional managers
- Suppliers or vendors
- Government or regulatory bodies
- Community or society

Stakeholders can be internal or external to the organization.

2.2 Stakeholder Analysis

Stakeholder analysis helps the project manager understand the influence, interest, and expectations of different stakeholders.

The most common tool for this is the **Power-Interest Grid**:

Category	Meaning	Engagement Strategy
High Power, High Interest	Key stakeholders	Manage closely
High Power, Low Interest	Important but not deeply involved	Keep satisfied
Low Power, High Interest	Supportive stakeholders	Keep informed
Low Power, Low Interest	Minimal engagement	Monitor only

This analysis helps you plan communication effectively and avoid conflicts during execution.

2.3 Stakeholder Engagement Plan

A stakeholder engagement plan outlines strategies for how the project manager will interact with each stakeholder group. It includes:

- Communication frequency
- Preferred communication methods
- Key concerns and expectations
- Level of involvement
- Responsibilities for decision-making

This plan ensures transparency and builds trust with stakeholders.

3. Communications in Project Management

Communication is often considered the most critical skill in project management. Research shows that most project failures occur due to poor communication rather than technical issues.

3.1 Types of Communication

Communication can be:

1. **Formal** – reports, official emails, presentations, documents, contracts.
2. **Informal** – quick messages, discussions, chats.
3. **Vertical** – up the hierarchy (to sponsor) or down (to team).
4. **Horizontal** – across departments or teams.

Different projects require different levels of communication depending on complexity and stakeholder expectations.

3.2 Communication Plan

A communication plan defines:

- Who needs what information
- When they need it
- How the communication will be delivered
- Who is responsible for sending information

Common communication methods include:

- Team meetings
- Status reports
- Emails
- Dashboards
- Video calls
- Instant messaging tools

A communication plan ensures that all stakeholders receive consistent and accurate information.

4. Communication Barriers in the Modern Workplace

In today's digital and global environment, several barriers can affect communication:

a. Cultural Differences

People from different cultures might interpret messages differently. For example, direct communication may be appreciated in some cultures and seen as rude in others.

b. Language Barriers

Misunderstandings can occur when stakeholders speak different languages or use different technical terms.

c. Information Overload

Too many emails, notifications, or documents can cause people to miss important information.

d. Lack of Clear Channels

When communication channels are not standardized, information gets lost or duplicated.

e. Digital Gaps

Some stakeholders may not be comfortable with digital tools.

Project managers must identify and reduce these barriers for smoother project execution.

5. Securing Data and Communications

As projects rely on digital tools, data security becomes essential. Sensitive information—such as financial details, user data, or business strategies—must be protected.

Security practices include:

- Using encrypted communication channels
- Controlling access based on roles
- Verifying users through authentication methods
- Protecting documents with passwords
- Regularly backing up project data

Security builds trust and prevents costly risks.

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6. Project Resource Management

Resource management deals with identifying, acquiring, and managing the resources needed to successfully complete the project. Resources include human resources (team members), materials, tools, equipment, and software.

6.1 Types of Resources

1. **Human resources** – project team, subject matter experts.
2. **Physical resources** – equipment, facilities, tools.
3. **Financial resources** – budget, cost reserves.
4. **Information resources** – documents, data, licenses.

Effective resource planning ensures no shortages or unnecessary costs.

6.2 Plan Resource Management

This process outlines how resources will be identified, managed, and allocated. It includes:

- Defining roles and responsibilities
- Building the team structure
- Creating a staffing plan
- Identifying required skills
- Preparing training or hiring plans

A resource plan ensures the right people and tools are available at the right time.

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7. Team Development

Teams do not become productive immediately. They grow and develop through stages described by Bruce Tuckman:

1. Forming

Members meet, roles are unclear, communication is polite.

2. Storming

Conflicts arise over responsibilities, ideas, and leadership.

3. Norming

Team establishes processes, resolves conflicts, builds trust.

4. Performing

Team functions smoothly, delivers high-quality work, and operates independently.

Team development improves productivity, morale, and collaboration.

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8. Trends in Global Project Management

Modern project management has evolved due to globalization and technological advancements.

a. Distributed and Remote Teams

Teams work from different geographical locations, often across time zones.

b. Digital Tools and Automation

Tools like Jira, Trello, Slack, Asana, and Microsoft Project simplify coordination.

c. Increasing Use of Agile

Organizations prefer Agile for fast-paced environments.

d. Data-Driven Decisions

Project managers use dashboards, performance metrics, and AI-based insights.

e. Cross-Cultural Collaboration

Understanding cultural differences is essential for effective teamwork.

These trends require project managers to be more flexible, tech-savvy, and culturally aware.

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9. Resource Requirements

Resource requirements define what resources are needed, when they are needed, and for how long. It includes:

- Quantity of each resource
- Timing (resource calendar)
- Cost associated with resources
- Skill level needed

Proper estimation helps avoid overallocation, resource shortages, and delays.

UNIT III – PROJECT PLANNING AND SCHEDULING

(Detailed Descriptive Notes)**

Project planning and scheduling form the heart of project management. While Units I and II build the foundation of understanding what a project is and who is involved, Unit III focuses on how to plan time, cost, tasks, and procurement. This helps the project manager create a realistic roadmap for delivering the project within the required timeline and budget.

This unit includes planning activities, scheduling techniques, duration estimation methods, network diagrams, budgeting, procurement processes, and earned value management. These concepts allow you to manage the project's timeline and resources effectively.

1. Project Planning Life Cycle

Project planning is the second major phase of the project after initiation. In this phase, the project manager develops a complete plan that outlines how the project will be executed, monitored, and delivered.

The planning life cycle typically includes:

1.1 Defining Activities and Tasks

The project manager breaks down the scope into smaller, manageable tasks that can be assigned to team members. This is usually done using the Work Breakdown Structure (WBS).

1.2 Estimating Time and Cost

Each task is analyzed to determine how long it will take and how much it will cost. This includes labor, materials, tools, and other resources.

1.3 Developing the Schedule

Once activities are defined and their durations estimated, they are sequenced and displayed in a timeline, usually using Gantt charts or network diagrams.

1.4 Identifying Risks

Planning includes identifying uncertainties that might affect the project and preparing strategies to reduce or respond to them.

1.5 Creating Baselines

Baselines for schedule, budget, and scope serve as references for controlling the project during execution.

Planning is an iterative process. As more information becomes available, plans may be refined or adjusted.

2. Project Schedule Management

Project schedule management ensures that the project is completed within the approved time frame. It includes processes that define activities, sequence tasks, estimate durations, and develop and control the schedule.

The main components of schedule management are:

2.1 Define Activities

This includes listing all the actions required to produce project deliverables. Activities should be clear and specific.

For example:

- Requirement analysis
- UI design
- Backend development
- Integration testing
- Deployment

Each activity can be assigned, tracked, and measured.

2.2 Sequence Activities

Activities must be arranged in the order in which they should occur. This helps understand logical relationships between tasks.

Dependencies include:

a. Finish-to-Start (FS)

Task B cannot start until Task A finishes.

Example: Coding must finish before testing begins.

b. Start-to-Start (SS)

Task B can start only when Task A starts.

Example: You can start design review once design work begins.

c. Finish-to-Finish (FF)

Task B cannot finish until Task A finishes.

Example: Editing cannot finish until writing finishes.

d. Start-to-Finish (SF)

Rare relationship where Task B must start for Task A to finish.

Example: A security shift cannot end until the next guard arrives.

Sequencing allows you to create the network diagram and identify the project's critical path.

2.3 Estimate Activity Durations

Estimating duration means figuring out how long each activity will take. This requires knowledge of team skills, resource availability, and complexity.

Methods include:

- Expert judgment
- Historical data
- Estimation techniques like PERT and three-point estimation

Duration estimates must be realistic to avoid schedule delays.

2.4 Develop the Schedule

Once activities are sequenced and durations assigned, the schedule is created. Common tools include:

Gantt Chart

A Gantt chart shows activities along a timeline using horizontal bars. It helps visualize:

- Start and end dates
- Overlapping tasks
- Dependencies
- Progress

Network Diagram

A network diagram visually represents activities and their dependencies. It is essential for calculating the critical path.

Critical Path Method (CPM)

The critical path is the longest path of activities in the project. It determines the earliest possible completion date.

Float or Slack

Float is the amount of time a task can be delayed without affecting the project finish date.

Tasks on the critical path have **zero float**.

2.5 Control Schedule

This involves continuously monitoring the schedule to identify any delays or deviations. If a task is behind schedule, corrective actions may include:

- Reallocating resources
- Adjusting deadlines
- Fast tracking or crashing

Good schedule control ensures timely project completion.

3. Activities and Sequencing in Detail

A project manager must understand how tasks are connected and how one delay can affect others. The sequencing process ensures that the project follows a logical flow.

3.1 Predecessor and Successor Activities

- A predecessor is a task that must be completed before another begins.
- A successor is the task that follows.

For example:

- "Write code" is the predecessor.
- "Test code" is the successor.

3.2 Using a Network Diagram

A network diagram (also called Activity-on-Node or AON) uses nodes to represent tasks and arrows to show dependencies. It helps visually analyze:

- The workflow
- Bottlenecks
- Critical path

Network diagrams are essential for scheduling optimization.

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4. Duration Estimation Techniques

Predicting duration accurately improves the reliability of the schedule. Here are the commonly used methods:

4.1 Analogous Estimating

This uses information from previous similar projects to estimate duration.

Example: "The last website design took 4 weeks, so this one will take 4–5 weeks."

It is quick but less accurate.

4.2 Parametric Estimating

Uses mathematical formulas to estimate duration.

Example:

If a developer can code 50 lines per hour and the task requires 500 lines, duration = 10 hours.

This method is useful when project data can be quantified.

4.3 Three-Point Estimation

Considers uncertainty by using three values:

- **Optimistic time (O)** – best-case scenario
- **Most likely time (M)** – expected scenario
- **Pessimistic time (P)** – worst-case scenario

Formula:

Estimated time = (O + M + P) / 3

This increases estimate accuracy.

4.4 PERT (Program Evaluation and Review Technique)

A statistical method that gives more weight to the most likely estimate.

Formula:

PERT = (O + 4M + P) / 6

This is commonly used in large or complex projects.

4.5 Bottom-Up Estimating

This method calculates the duration of each individual task and then aggregates these to form the total project duration. It is highly accurate but time-consuming.

5. Scheduling Constraints

Constraints limit how the schedule can be created.

Examples include:

a. Time Constraints

A fixed deadline may limit how long tasks can take.

b. Resource Constraints

Only limited workers, tools, or machines may be available.

c. Budget Constraints

Cost limits may prevent hiring extra workers or using better tools.

d. External Constraints

Weather, delivery delays, legal permits, etc.

Identifying constraints early helps create a realistic schedule.

6. Gantt Charts and Schedule Baseline

A **Gantt chart** visually represents the project schedule. Each activity is shown as a bar stretched over its time period. Dependencies, milestones, and progress can also be displayed.

Once the Gantt chart is approved, it becomes the **schedule baseline**, meaning the official timeline used for monitoring and controlling the project.

You compare actual progress against the baseline to identify deviations.

7. Compressing and Controlling the Schedule

Sometimes the project may fall behind schedule and require acceleration.

There are two main techniques for schedule compression:

7.1 Fast Tracking

You start two tasks earlier, even if one has not fully finished.

Example: Starting testing while coding is still in progress.

Risk: More errors or rework.

7.2 Crashing

Adding extra resources to finish activities faster.

Example: Hiring more developers.

Risk: Increases cost and may reduce quality.

Controlling schedule includes regular status checks and adjusting activities when necessary.

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8. Project Management Cost and Estimation

Cost estimation is the process of calculating how much the project will cost.

Cost components include:

- Labor costs
- Material costs
- Equipment costs
- Overheads
- Training, software, and licensing
- Reserves for risks

Cost management includes:

a. Estimating costs

Using analogous, parametric, or bottom-up methods.

b. Determining the budget

Combining all estimates to form the cost baseline.

c. Controlling costs

Tracking expenses and comparing them with the budget.

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9. Procurement Management

Procurement deals with purchasing goods, services, or materials from external suppliers.

9.1 Procurement Process

Step 1: Plan Procurement

Define what needs to be procured and the type of contract.

Step 2: Conduct Procurement

Prepare RFPs (Request for Proposals), invite bids, evaluate offers.

Step 3: Select Seller

Choose the most suitable vendor based on cost, quality, experience, and reliability.

Step 4: Manage Procurement

Monitor vendor performance, manage invoices, ensure timely delivery.

9.2 Contract Types

Fixed Price Contracts

Price is decided upfront. Good for well-defined work.

Cost-Reimbursable Contracts

Buyer pays actual costs plus a fee. Used when work is unclear.

Time and Material Contracts

Pay based on time and material rates. Useful for flexible scopes.

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10. Earned Value Management (EVM)

EVM is a project performance measurement system that integrates scope, schedule, and cost.

Key Terms:

- **PV (Planned Value):** Budgeted cost for scheduled work
- **EV (Earned Value):** Budgeted cost for completed work
- **AC (Actual Cost):** Actual cost spent

Performance Metrics:

- **Cost Variance (CV) = EV – AC**
  - Positive: Under budget
  - Negative: Over budget
- **Schedule Variance (SV) = EV – PV**
  - Positive: Ahead of schedule
  - Negative: Behind schedule
- **Cost Performance Index (CPI) = EV / AC**
  - 1: Good efficiency
- **Schedule Performance Index (SPI) = EV / PV**
  - 1: Ahead of schedule

EVM allows early detection of problems so corrective actions can be taken.