

ASSIGNMENT 1

27/1/25

Unit - 1 & 2. Introduction to Software Project Management & Project Evaluation and Project Planning.

Q.1

What is Project? Explain software projects versus other types of project.

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A Project is a planned activity undertaken to create a unique product, service or result with specific objectives, scope and timeframe. It requires careful planning, resource management and balancing between routine and exploratory tasks to ensure successful execution within time, quality and budget constraints.

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Software Projects	Other Types of Projects
<ul style="list-style-type: none"> Focuses on creating software, which involves constant changes and iteration Software is untangible, making it difficult to visualize progress. Complexity is high due to integration of multiple technologies and constant changes. It must conform to coding standards, design patterns and user requirements. 	<ul style="list-style-type: none"> Involves tangible outcomes like construction, manufacturing, etc. Physical Projects are ^{progress} tangible and can be seen. Complexity is often related to physical design, logistics and material management. It conforms to architectural, engineering and safety standards.

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I TIMELESS

- High flexibility during development but can lead to scope creep.
- Here, the team ^{can} consist of developers, testers, project managers, etc.

less flexible once the construction process begins.

Here, the team consist of engineers, architects, construction workers, etc.

Q.2 -4 Discuss Project Management Lifecycle.

The PMLC is a structured framework that guides the planning, execution and completion of a project. It also ensures that the objectives are achieved within the timespan, cost and scope.

The five main phases of the PMLC are:-
i) Initiation Phase.

The Purpose is to define the project and assess its feasibility which includes identifying objectives, scope, deliverables ~~as well as~~ stakeholders, also conducting risk analysis. A Project Charter is created to formalize project approval. The Outcome is the formal authorization ^{of project} and a clear understanding of high-level requirements.

ii) Planning Phase.

The goal is to develop a detailed roadmap for achieving the project's objectives.

which include creating the PMP (Project Management Plan), defining scope, timeline, budget and required resources, along with risk analysis. Communication and quality plans are also established. The outcome is a detailed plan providing clear direction to for the team.

iii) Execution Phase

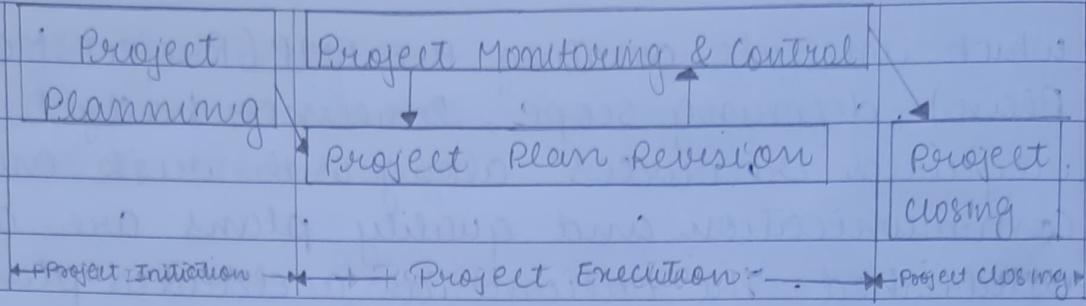
It focuses on implementing ^{the} plan and delivering outputs which include resource allocation, task execution, team performance monitoring and stakeholder communication. Deliverables are created, tested and refined. The outcome is the successful completion of project deliverables.

iv) Monitoring and Controlling Phase

Running alongside execution, it tracks progress and adjusts as needed, which include monitoring KPIs, comparing progress to the plan, resolving variances and managing risks. The outcome is ensuring the project stays on track and deviations are corrected.

v) Closure Phase

It formally concludes the project which involves finalizing outputs, conducting user training, releasing resources and gathering feedback. A post-implementation review is done to analyze successes and lessons learned. The outcome is the project's formal closure and success evaluation.



Q.3

Discuss the criteria for defining a relevant object of the project.

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Project objectives are the specific, measurable goals that define what the projects aim to achieve. A well-defined objective ensures that all stakeholders are aligned and provides a clear direction for the project team.

1.

SMART Criteria

- S - Specific : The objective must be clear and precise, avoiding any ambiguity. They should clearly outline what needs to done, who is responsible and why it matters. Example "Develop a mobile application for managing personal finances targeted at young professionals."
- M - Measurable : The objective must have quantifiable metrics to evaluate progress and success. It should include key performance indicators (KPIs) such as percentages, numbers or deadlines. Example "Reduce the app's loading time by 25% within three months."

- ✓ A - Achievable : The objective should be realistic and attainable within the project's constraints (time, resources, budget). Example "Complete the app prototype in six weeks using the existing development team."
- ✓ R - Relevant : The objective must align with the overall project goals, stakeholder needs and organizational priorities. Example "Develop features that address customer feedback on financial tracking tools."
- ✓ T - Time-bound : The objective must have a clearly defined timeline or deadline to ensure focus and accountability. Example "Launch the app in the App Store by March 15, 2025."

2. Consistency with Project Scope

Objectives should stay within the defined scope of the project to prevent scope creep and avoid objectives that are too broad or irrelevant to the project's purpose.

3. Alignment with Stakeholders Needs

Objectives should reflect the expectations of key stakeholders, including clients, team members and end-users. Engage stakeholders early to gather input and define objectives that satisfy their requirements.

Q.4 Discuss different ways of categorizing Software Projects.

→ i) Compulsory vs. Voluntary users.

Compulsory users, ^{these} are systems that users must use; often for business regulatory ^{reasons} reasons. Users have little to no control over whether they use the software.

Voluntary users, ^{are} these are systems designed for users who choose to use the software based on personal or business needs. Success in these projects heavily depends on user adoption and satisfaction.

Example, a 'CS' could be an Enterprise Resource Planning (ERP) system within a company, while a 'VS' might be a mobile app like Instagram.

ii) Information vs. Embedded systems.

Information systems are the software systems designed primarily for processing, storing and managing information. They can be standalone or integrated with other systems.

Embedded systems are designed to control specific hardware. Often embedded into products or machinery, they perform dedicated tasks within those.

Example, a 'IS' would be a Customer Relationship Management (CRM) tool, whereas 'ES' might be the software running inside a microwave or industrial robot.

iii) Outsourced vs. In-house Projects

Outsourced projects are contracted to third-party vendors or developers, often for reasons like cost-efficiency, expertise or tight deadlines.

In-house projects are developed internally by the organization's own teams, offering greater control over project's direction.

Example, an 'OP' could involve hiring a third-party firm to build a mobile app, while an 'IP' might involve the company's internal IT team developing an inventory MS.

iv) Objective-driven vs. Feature-driven Development

Objective-driven development is centered around meeting specific project goals, such as improving performance, adding functionality or enhancing user satisfaction.

Feature-driven development focuses on building out software based on defined features, which may not necessarily align with broader project objectives.

Example, an 'ODP' could be a healthcare app aimed at reducing patient wait times through improved appointment scheduling, while a 'FDP' might be a project management tool built by adding features like task management or team collaboration.

Q.5 What is Management? Explain management

control in detail.

-4 Management is the process of planning, organizing, staffing, directing, monitoring, controlling, innovating, and representing an organization to achieve its goals efficiently and effectively. It involves setting objectives, structuring resources, leading ~~them~~ teams, tracking progress, making necessary adjustments, fostering innovation and ensuring the organization's image aligns with its values and stakeholder expectations.

-4 Management Control refers to the process of gathering and analyzing information to make informed decisions, ensuring that organizational goals are met efficiently.

(i) Data Collection : local managers play a crucial role in gathering data.

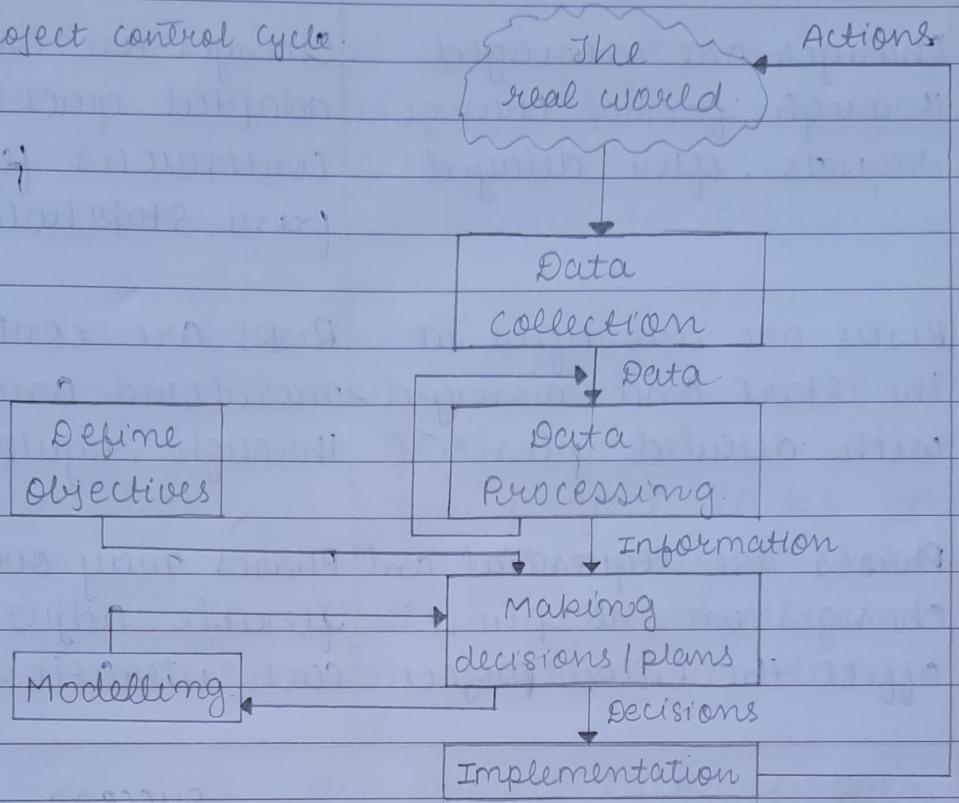
(ii) Data Processing : the raw data is processed into meaningful information.

(iii) Decision-Making : the processed information is analyzed to determine the necessary actions or plans.

(iv) Modeling : Different proposals or strategies are simulated to evaluate their impact before implementation.

(v) Implementation : Once a suitable protocol is selected, it is put into action.

The Project control cycle.



Q.6 Differentiate Traditional versus Modern Project Management Practices.

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Traditional Project Management	Modern Project Management
Extensive upfront planning with fixed scope, time and cost estimates.	Adaptive, flexible planning with iterative cycles; scope and plans evolve.
Delivered in a "big bang" after full completion of the project.	Delivered in incremental iterations or sprints; parts of the projects are released early.
Quality assurance performed at the end (Testing phase).	Quality is built-in throughout the project lifecycle via continuous testing and feedback.

Planning

Incremental delivery

Quality management

Methodology	waterfall	Agile, Scrum, DevOps.
Change Management	Changes are managed through formal change requests, often delayed.	Changes are embraced & adapted quickly with continuous feedback from stakeholders.
Risk Management	Risks are identified at the start and managed with detailed plans.	Risks are continuously monitored and managed through regular reviews.
Project Phases	Phases are sequential and changes in one phase affect the entire project.	Phases may overlap, with flexible adjustments in each iteration.

Q.7 Write a short note on project ^{success} and failure.

Project Success : A project is considered successful when it achieves its predefined goals within the constraints of scope, time, cost and quality while also satisfying stakeholders.

- Key Factors for Project Success :-
- (i) Agreed Functionality : The project delivers the features and functionality that were initially agreed upon with stakeholders.
- (ii) Required level of Quality : The product meets the expected quality standards, including performance, usability and security.
- (iii) On Time : The project is completed within the agreed-upon timeframe.
- (iv) Within Budget : The project is completed within the allocated budget.
Also skilled team, risk management, efficient communication

→⁴ Project Failure, a project is deemed a failure if it does not meet its objective, exceeds its budget or timeline or fails to deliver expected quality and value to stakeholders.

• Key Factors for Project Failure :-

- (i) Unclear Requirements : Vague or constantly changing project goals.
- (ii) Resource shortages : The project lacks the necessary resources (time, money or personnel).
- (iii) Lack of Required Skills : Team members do not possess the technical expertise needed for the project.
- (iv) Poor Planning : The project lacks proper planning, leading to unclear direction and frequent setbacks.
- * Also lack of stakeholders involvement, weak support from Management, unrealistic expectations.

Q.8 Define and discuss activities covered by software project management.

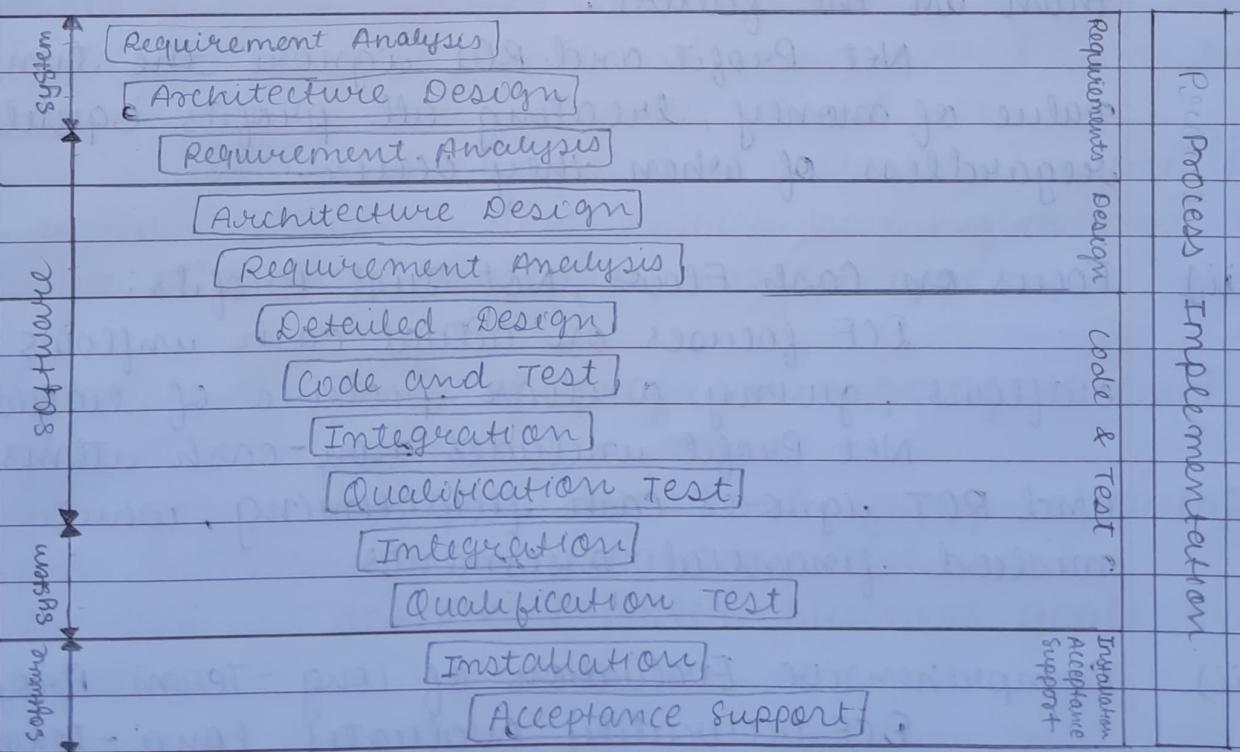
→⁴ Software project management involves overseeing all the activities required to complete a project, from initial requirements gathering to post-installation support.

- i) Requirement Analysis : The team gathers user and stakeholders needs, identifying both functional (features) and non-functional (security, performance) requirements. The outcome is a

detailed list of requirements that guide the design and development.

- ii) Architecture Design : the system's overall structure is planned, selecting the necessary software, hardware and processes. The goal is to create a blueprint that ensures all components work together seamlessly and meet the requirements.
- iii) Detailed Design : the system is broken down into smaller components with detailed specifications for each unit, including algorithms and interfaces. This phase prepares developers to start coding and testing each component independently.
- iv) Code and Test : Developers write code based on the detailed design and perform unit testing to ensure each component works as expected. The purpose is to implement the software units and confirm they function correctly.
- v) Integration : Individual units are integrated into a complete system. This phase ensures all components work together and meet the overall system objectives.
- vi) Qualification Testing : The system is tested to ensure it meets all functional and non-functional requirements. If all criteria are met, it's validated and ready for development.

- vii) Installation : The system is installed on the hardware, configured and prepared for user interaction. This phase also include user training to ensure the system operates smoothly.
- viii) Acceptance Support : After installation, any bugs or issues are resolved, and improvements are made based on user feedback, stabilizing the system for ongoing use.
- ix) Software Maintenance : Post-deployment, the system undergoes continuous support and updates to fix bugs, implement enhancements and adapt to new requirements in the environment.



Q.9

Explain why discounted cash flow techniques provide better criteria for project selection than net profit or return on investment.

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Discounted Cash Flow (DCF) techniques, such as Net Present Value (NPV) and Internal Rate of Return (IRR), are financial evaluation methods that consider the time value of money, making them superior to simpler metrics like net profit or return on investment (ROI) for project selection. Few reasons are :-

i)

Time Value of Money

DCF discounts future cash flows, recognizing that money today is more valuable than in the future.

Net Profit and ROI ignore the time value of money, treating all profits equally, regardless of when they occur.

ii)

Focus on Cash Flows, Not Just Profits.

DCF focuses on actual cash inflows and outflows, giving a clear picture of liquidity.

Net Profit includes non-cash items and ROI ignores cash flow timing, which can mislead financial assessments.

iii)

Comprehensive Evaluation of long -Term Projects

DCF accurately evaluates long -term projects by considering the timing of cash flows over the entire project life.

Net Profit and ROI fail to account for long-term cash flow timing, which can distort project evaluations.

(iv) Risk Adjustments

DCF adjusts for risk by applying ~~for~~^a higher discount rate to riskier projects, reflecting uncertainty in future cash flows.

Net Profit and ROI do not consider project risk, potentially overstating the attractiveness of high-risk projects.

e.g.: Suppose you have two projects:

- Project A: Generates £50,000 in profit over 5 years but starts yielding returns after 3 years.
- Project B: Generates £40,000 in profit over 5 years but starts yielding returns from the 1st year.

Using DCF, Project B is preferred because of its earlier cash inflows, which have higher present value & Net Profit / ROI might suggest opposite. (ⁱhigher returns)

Q.10 Discuss the ~~role~~ of program managers and project managers.

A Program Manager oversees a group of related projects (referred as program) that work together to achieve broader business goals or objectives.

① Strategic Oversight : Manages related projects to ensure they align with organizational goals,

focusing on the broader outcome rather than project details.

- ⑤ Long-Term Focus: Focuses on long-term objectives, with success measured over months or years.
- ⑥ Resource and Budget Allocation: Allocates resources across projects to avoid conflicts and ensure efficiency.
- ⑦ Leadership of Project Managers: Oversees them, ensuring their projects align with program goals.

→ A Project Manager is responsible for overseeing a specific project and ensuring that it is delivered successfully, on time, ~~within~~ⁱⁿ budget and to the satisfaction of stakeholders.

- ① Project-Specific Focus: Manages individual projects, ensuring timely delivery, within budget, and to required quality standards.
- ② Short-To-Medium-Term Focus: Works on projects with shorter timelines, focused on immediate goals.
- ③ Planning and Execution: Handles detailed planning; task scheduling and day-to-day project execution.
- ④ Team Management: Manages the project team, assigning tasks and ensuring resource efficiency.

Q.11 What is program management? Explain different forms of programme.

→ Program Management refers to the coordinated management of multiple related projects, with the goal of achieving specific business outcomes and strategic objectives. A Program manager ensures that all projects within the program align with the company's strategic objectives and deliver value.

i) Business Cycle Programs

These programs focus on managing activities and strategies according to the economic or business cycles. They are designed to help an organization respond to external market fluctuations, adjusting strategies to optimize performance during various stages of the business cycle.

ii) Strategic Programs.

These long-term programs are aligned with the organization's overarching strategy, which involves major initiatives such as market expansions, mergers, acquisitions, that require coordination across multiple projects to ensure long-term success.

iii) Infrastructure Programs.

These programs focus on building, improving or maintaining essential infrastructure that supports the organization's operations. This

can include physical infrastructure (roads, buildings) or IT infrastructure (network systems, software), ensuring the foundation for business continuity and growth.

iv) Research and Development (R&D) Programs.

R&D programs are focused on innovation, technological advancements and developing new products or services. These programs typically involve multiple projects related to scientific research, product development or new technologies aimed at driving future growth and competitiveness.

v) Innovative Partnerships.

These programs involve collaborations between organizations, often across different industries or sectors, to leverage combined expertise and resources. They aim to create innovative solutions, enter new markets or address complex problems through joint efforts and shared risk.

Q.12 Enlist types of risk analysis. Explain any three.

→ Risk analysis is the process of identifying, assessing and prioritizing risks to minimize their negative impact on a project or organization.

1. Qualitative Risk Analysis

Qualitative risk analysis assesses risks based on their likelihood and impact without using precise numerical data, relying on subjective assessments to prioritize risks.

- ① Identify risks : Recognize potential risks to project
- ② Assess probability and impact : Estimate the likelihood and potential impact of risks.
- ③ Prioritize risks : Assign risk ratings based on likelihood and severity.

eg: A Project Manager might assess supplier delays or equipment failure, classifying them as high probability / high impact or low probability / low impact.

2. Quantitative Risk Analysis

Quantitative risk analysis uses numerical data and mathematical models to assess risks, estimating their potential impact on cost, schedule or other key metrics.

- ① Gather data : Collect data on risks and their potential impacts.
- ② Model Risks : Use mathematical models (probability distributions) to estimate risk impacts.
- ③ Analyze Outcomes : Apply statistical techniques to analyze potential outcomes.

eg: A construction company may use quantitative analysis to estimate the financial impact of weather delays, using historical data on delays and costs.

3. Monte Carlo Simulation

Monte Carlo simulation is a quantitative risk analysis technique that uses random sampling and statistical models to simulate multiple outcomes of a project or decision, helping predict probabilities of different results under uncertainty.

- ① Define the model: Identify key variables and relationships
- ② Assign probability distributions: Specify distributions for uncertain variables.
- ③ Run simulations: Simulate the project multiple times with random sampling.
- ④ Analyze results: Assess probabilities and risks.

e.g.: It estimates project completion time by considering uncertainties in task durations and resources.

* Other are Failure Mode and Effects Analysis (FMEA), Fault Tree Analysis (FTA), Scenario Analysis, SWOT Analysis (Strengths, Weakness, Opportunities, Threats).

Q.13 Enlist all cost benefit evaluation techniques.
Explain any three in detail.

→ Cost-benefit analysis (CBA) is a process used to evaluate the costs and benefits associated with a project or decision, which helps determine if a project or investment is worthwhile by comparing its total expected costs to its total expected benefits.

1. Payback Period.

The Payback period is the time it takes for an investment or project to recover its initial cost through its cash inflows. This technique helps determine how long it will take to "break even" and start making a profit.

$$\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Annual Cash Inflows}}$$

eg:

If a project requires an initial investment of £1,000,000 and generates £200,000 in cash inflows per year, the payback period would be:

$$\text{Payback Period} = \frac{1000000}{200000} = 5 \text{ years}$$

so, it would take 5 years to recover the initial investment. (then it will generate profit).

2. Return on Investment (ROI)

ROI is a financial metric used to evaluate the profitability of an investment. It measures the gain or loss relative to the initial cost of the investment, expressed as a percentage.

$$\text{ROI} = \frac{\text{average annual profit}}{\text{Investment Cost}} \times 100$$

eg:

If an investment costs £200,000 and generates £50,000 in profit, the ROI would be calculated as:

$$\text{ROI} = \frac{50000}{200000} \times 100 = 25\% ; \text{ this is for one time that's why we didn't take average.}$$

3.

Net Present Value (NPV)

NPV is a financial metric that calculates the difference between the present value of cash inflows (benefits) and the present value of cash outflows (costs) over a specified period. NPV helps assess if an investment or project is expected to generate more value than its cost.

$$NPV = \sum \frac{C_t}{(1+r)^t} - C_0 \quad \& \quad NPV_t = \frac{\text{value in year } t}{(1+r)^t}$$

(one cash flow at a specific time t)

- * r = Discount rate (rate of return for the investment)
- * t = Time period
- * C_0 = Initial investment or cash outflow at time 0.

Eg: A company is expecting to receive ₹100,000 in 2 years. The discount rate is 10%. So the present value of this future cash flow.

$$NPV = \frac{100000}{(1+0.10)^2} = \frac{100000}{1.21} = ₹82645 \text{ (today)}$$

- * Other are Internal Rate Return (IRR), Net Profit, Benefit-Cost Ratio (BCR), Discounted Cash Flow (DCF) Analysis.

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