

Engineering Economics

1. Introduction -- 4

- 1.1.Origin of Engineering Economy
- 1.2.Principles of Engineering Economy
- 1.3.Role of Engineers in Decision Making
- 1.4.Cash Flow Diagram.

2. Interest and Time Value of Money -- 8

- 2.1.Introduction to Time Value of Money
- 2.2.Simple Interest
- 2.3.Compound Interest
 - 2.3.1.Nominal Interest rate
 - 2.3.2.Effective Interest rate
 - 2.3.3.Continuous Compounding
- 2.4.Economic Equivalence
- 2.5.Development of Interest Formulas
 - 2.5.1.The Five Types of Cash flows
 - 2.5.2.Single Cash flow Formulas
 - 2.5.3.Uneven Payment Series
 - 2.5.4.Equal Payment Series
 - 2.5.5.Linear Gradient Series.
 - 2.5.6.Geometric Gradient Series.

3. Basic Methodologies of Engineering Economic Analysis

- 3.1.Determining Minimum Attractive (Acceptable) Rate of Return (MARR).
- 3.2.Payback Period Method
- 3.3.Equivalent Worth Methods
 - 3.3.1.Present Worth Method
 - 3.3.2.Future Worth Method.
 - 3.3.3.Annual Worth Method.
- 3.4.Rate of Return Methods
 - 3.4.1.Internal Rate of Return Method.
 - 3.4.2.External/Modified Rate of Return Method.

3.5.Public Sector Economic Analysis (Benefit Cost Ratio Method).

3.6.Introduction to Lifecycle Costing

3.7.Introduction to Financial and Economic Analysis

4. Comparative Analysis of Alternatives -- 12

- 4.1.Comparing Mutually Exclusive Alternatives having Same useful life by
 - 4.1.1.Payback Period Method and Equivalent Worth Method
 - 4.1.2.Rate of Return Methods and Benefit Cost Ratio Method
- 4.2.Comparing Mutually Exclusive Alternatives having different useful lives by
 - 4.2.1.Repeatability Assumption
 - 4.2.2.Co-terminated Assumption
 - 4.2.3.Capitalized Worth Method
- 4.3.Comparing Mutually Exclusive, Contingent and Independent Projects in Combination.

5. Replacement Analysis: -- 12

- 5.1.Fundamentals of Replacement Analysis
 - 5.1.1.Basic Concepts and Terminology
 - 5.1.2.Approaches for Comparing Defender and Challenger
- 5.2.Economic Service Life of Challenger and Defender
- 5.3.Replacement Analysis When Required Service Life is Long.
 - 5.3.1.Required Assumptions and Decision Framework
 - 5.3.2.Replacement Analysis under the Infinite Planning Horizon

[6 hours] 5.3.3.Replacement Analysis under the Finite Planning Horizon

6. Risk Analysis -- 12

- 6.1.Origin/Sources of Project Risks.
- 6.2.Methods of Describing Project Risks.
 - 6.2.1.Sensitivity Analysis
 - 6.2.2.Breakeven Analysis
 - 6.2.3.Scenario Analysis
- 6.3.Probability Concept of Economic Analysis
- 6.4.Decision Tree and Sequential Investment Decisions

7. Depreciation and Corporate Income Taxes -- 12

- 7.1.Concept and Terminology of Depreciation
- 7.2.Basic Methods of Depreciation
 - 7.2.1.Straight line method
 - 7.2.2.Declining Balance Method
 - 7.2.3.Sinking Fund Method,
 - 7.2.4.Sum of the Year Digit Method
 - 7.2.5.Modified Accelerated Cost Recovery System (MACRS)
- 7.3.Introduction to Corporate Income Tax.
- 7.4.After Tax Cash flow Estimate.
- 7.5.General Procedure for Making After Tax Economic Analysis.

[6 hours]

8. Inflation and Its Impact on Project Cashflows. -- 4

- 8.1.Concept of Inflation.
- 8.2.Measuring Inflation
- 8.3.Equivalence Calculation Under Inflation
- 8.4.Impact of Inflation on Economic Evaluation