

Module 1.

Date 23 / 02 / 24.

Saathi

Decision making

Nature of decision making

Scope of decision making

- 4 main aspects of decision making - 1. Resource Allocation
 2. Inventory
 3. Pricing
 4. Investment

- Steps for decision making - 1. Problem Definition
 2. Identifying the goal
 3. Coming up with alternatives
 4. Forecasting
 5. Decision Making.

Economic Decision Makers - 1. Internal decision makers
 2. External decision makers.

Engineering cost and Estimation

- 1. Fixed cost
- 2. Variable cost
- 3. Total cost
- 4. Total variable cost
- 5. Marginal cost
- 6. Average cost
- 7. Break-even point
- 8. Sunk cost
- 9. Opportunity cost
- 10. Recurring cost
- 11. non-recurring cost
- 12. Incremental cost
- 13. cash cost
- 14. Book cost
- 15. life-cycle cost

Estimate - to provide rough idea about work

- 3 main types of estimate - 1. Preliminary Estimate
 2. Detailed Estimate
 3. Quantity Estimate

Cost estimating & estimating models -

- Several models - 1. per-unit model
 2. Segmenting model
 3. Cost indexes
 4. power-sizing model
 5. learning curve

Module - 2

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1st year

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8: Cash Flow

Cash Flow diagram

Terminology and symbols.

Types of cash flow transaction-

1. Single payment cash flow
2. Uniform cash flow
3. Linear gradient series
4. Geometric gradient series
5. Irregular payment series.

Time value of Money - Example

$$\text{Formula} - 1. FV = PV (1+i)^t \text{ or } PV = FV (1+i/n)^{-nt}$$

$$2. PV = FV (1+i)^t \text{ or } FV = PV (1+i/n)^{nt}$$

Interest Rate

1. Simple Interest

2. Compound Interest

Types of interest - 1. Single payment compound amount.

2. Single payment present worth amount.

3. Equal payment series compound amount.

4. Equal payment series sinking fund.

5. Equal payment series present worth amnt.

6. Equal payment series capital recovery amnt.

7. Uniform gradient series annual eq. amnt.

Assumptions in solving eco. A analysis problem

End-of-year convention

Viewpoint of eco. analysis studies

Sunk cost

Borrowed money viewpoint

Effect of Inflation and Deflation

Income taxes

Economic criteria

Applying present worth techniques

Annual cash flow calculations

1. Resolving a present cost to an annual cost
2. Treatment of salvage value,
3. Annual cash flow analysis
4. Analysis period.

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Internal rate of return.Calculating rate of return

- Incremental Analysis

- Future worth Analysis

- Benefit - cost Ratio Analyses

- Sensitivity & Breakeven Analyses

Incremental Analysis

Value between investment =

Investment in Project =

Investment in Alternative =

Actual Investment in Alternative

Calculated difference in Net Present Value = Incremental Return

Future worth Analysis

Present value of cash inflow =

Present value of cash outflow =

Present value of interest =

Present value of tax shield =

Present value of depreciation =

Present value of residual value =

Present value of investment tax credit =

Present value of working capital =

Present value of operating costs =

Present value of revenues =

Present value of taxes =

Present value of interest =

Present value of principal =

Present value of dividends =

Present value of capital gains =

Present value of other cash flows =

Present value of cash inflow = Present value of cash outflow

Present value of cash inflow = Present value of cash outflow

Present value of cash inflow = Present value of cash outflow

Present value of cash inflow = Present value of cash outflow

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Inflation and Price change

Definition

Effects - Reduced purchasing power

- Uncertainty

- Redistribution of wealth.

Causes - Demand-pull inflation.

- Cost-push inflation

- Expectation.

Price change with indexes

Types of indexes - Price index:

- Stock market

- Bond market

- Commodity index

- Economic index

- Environmental index

- Quality of life index.

Composite vs commodity indexes

Composite indexes -

- definition, composition, Differences

commodity indexes -

- Scope

- Asset class
- purpose.

use of price indexes in eng. eco. Analysis

- Adjusting for inflation

- Comparing Alternatives

- Cost Estimation

- Economic Forecasting

- Project Evaluation

- Contract & Pricing adjustments.

Cash flows that inflates at diff. rates

Variable cost- Inflation

Price Escalation

Revenue Growth

Taxation & Regulatory changes.

Uncertainty in future events

Estimates & their use in eco-analysis:-

- Forecasting

- Risk Assessment

- Planning & Budgeting

- Policy Analysis

- Investment analyses

- Sensitivity Analysis.

- Cost-Benefit analysis

Range of Estimation

Probability - Definition

- Events & Sample space
- Probability distribution
- Probability Calculation

- Conditional probability
- Joint probability
- Prob. distrib. & Expected value.

- Risk ass. & decision making

Joint Probability distribution

Definition

conditional prob. Distribution

Random Variable

Independence

Joint- Prob. Mass Func. (PMF)

Covariance & correlation

Joint- Prob. Density Func. (PDF)

Multivariate Distribution

Marginal Prob. Distribution

Application

Expected valo

Definition

Expected value of risk

Interpretation

Linearity of Expectation

Weighted Avg.

Utility Theory

Continuous & Discrete Random Var.

Applications

Economic Decision Trees

Aspects - Structure

Decision Analysis

Decision points

Sensitivity Analysis

chance events

Risk Preferences

Probabilities

Real Options

Payoffs or costs

Monetary vs. non-monetary

Expected payoff

Risk vs. reward

Attitudes towards risk

Risk

Aspects of Risk - uncertainty

Risk-Return trade off

Prob. and likelihood

Risk Appetite & Risk

Risk Assessment-

tolerance.

Risk Management

Risk Mitigation.

Types of Risk

Market Risk

Rp

Credit Risk

Operational Risk

Political Risk

Political & Regulatory Risk

Systemic Risk.

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Risk vs Return

Relationship b/w Risk and Return

Return

Risk

Risk - Return Trade-off

Risk Assessment

Diversification

Risk Tolerance

Investment Objectives

Risk Management

Simulation

Imp. key points about Simulation

Modeling

Input Parameters

Stochastic Nature

Iterative Execution

Outputs & Analysis

What-if Analysis

Risk Assessment

Benefits & Applications

Types of Simulation

Real Options

Some key points about real options

Flexibility

Option valuation

Value of Real Options

Decision Making

Risk Management

Limitation

Types of Real Options

Options to expand

Options to Abandon

Option to Delay

option to Switch

option to Scale

Module 4

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Depreciation

Aspects of depreciation - cost of asset
- useful life
- Salvage value
- Depreciation Method

- Depreciation Expense
- Estimates.

Dif. b/w deterioration & obsolescence :-

- Deterioration
- Obsolescence.

Dif. b/w depreciation & expenses

Types of property - Real property
Personal Property
Tangible Property
Intangible Property
Public Property

Private Property
Commercial Property
Industrial Property
Agricultural Property

Methods of Depreciation

What is Depreciation

Methods of Depreciation and How to calculate Depreciation

i) Straight Line Method = $\frac{\text{Cost of Asset} - \text{Residual value}}{\text{useful life of asset}}$
(Depreciation rate formula) = $\frac{\text{Ann. of Dep.}}{\text{Original cost of Asset}} \times 100$

ii) Written Down Value Method:

(Depreciation/Reducing balance method) = Rate of Dep. \times Book value

(Depreciation rate under diminishing balance method) $1 - (\frac{S/C}{100})^n \times 100$

iii) Double Declining Balance Method Formula =

Depreciation = $2 \times SL DP \times BV$

iv) Annuity Method =

Depreciation = $(\text{Cost of Asset} - \text{Residual value}) \times \text{Annuity factor}$

v) Sinking Fund Depreciation

Depreciation = $(\text{Cost of Asset} - \text{Residual value}) \times \text{Present value of Rs. 1 at Sinking fund table for a given rate of interest}$

vi) Production Unit Method

Depreciation = $\frac{\text{Estimated Total cost} - RV}{\text{Estimated Total output during the yr}} \times \text{Actual output}$

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Features of DepreciationObjectives of DepreciationNeed of providing DepreciationCommon elements of tax regulations for depreciation & Capital AllowanceEligible AssetsCost BasisUseful lifeDepreciation / Capital AllowanceRecovery periodDisposal of AssetsRecordkeeping Req.Compliance & ReportingReplacement AnalysisReplacement Analysis Decision Map

Time Axis Existing Asset cost lines

cost Axis New Asset cost line

Minimum cost life of a New AssetAcquisition costOperating costSalvage valueMarginal costMin. cost life problemsIdentify the relevant costsDefine the time periodCalculate the total costAnalyze the cost patternsDetermine the min. cost lifeAccounting - FunctionsKey functions of AccountingRecording financial transactionClassifying & Categorizing transactionSummarizing financial info.Analyzing & Interpreting financial DataFinancial Planning & Decision Makingcompliance with Financial RegulationCommunication with stakeholders

Balance sheet - Assets

Liabilities

Shareholders' equity

Income Statement

Components of Income Statement

Revenue

Cost of goods

Gross Profit

Operating Expenses

Operating Income

Non-operating Income

Net Income.

Financial Ratios Capital Transaction

Types of financial ratios

Profitability Ratios

Liquidity Ratios

Solvency Ratios

Efficiency Ratios

Market Ratios

Capital Transactions

Issuing shares

Dept financing

Repurchasing shares

Dividend

Retained Earnings

Cost Accounting

Aspects - cost classification

cost Measurement

cost Analysis

cost control

Decision Support

Performance Evaluation

Budgeting & Forecasting

Direct & Indirect Cost - ~~cost~~
materials
labor
expenses.

Indirect cost Allocation - Identify Indirect cost

- Select Allocation Bases

- Determine Allocation Rates

- Allocate Indirect cost

Recompute & Adjust -