PROFESSIONAL ENGINEERING ECONOMICS

ENME356

Lecture	**: 3**	**Year : III**
Tutorial	**: 1**	**Part : II**
Practical	**: 0**	

Course Objectives:

The objective of this course is to provide comprehensive knowledge of engineering economics, focusing on business operations, financial project analysis, and the impact of engineering decisions on a firm's financial viability. It equips engineers with theoretical foundations and modern decision-making tools, including optimization and simulation, to make informed financial decisions under uncertainty and risk.

1 Engineering Economics and Cost Concepts (6 hours)

- 1.1 Principles of engineering economics
- 1.2 Role of engineers in economic decisions
- 1.3 Direct costs: Material costs, labor costs
- 1.4 Overheads: Manufacturing overheads, non-manufacturing costs
- 1.5 Period costs and product costs
- 1.6 Cost volume analysis: Fixed cost, variable cost, mixed cost, per unit cost
- 1.7 Break-even analysis, opportunity cost, sunk cost, marginal cost
- 1.8 Application of spreadsheet tool for cost analysis

2 Financial Statements (6 hours)

- 2.1 Fundamental equation and terminologies in accounting
- 2.2 Balance sheet
- 2.3 Income statement
- 2.4 Cash-flow statements
- 2.5 Financial ratios and analysis

3 Interest Rate and Economic Equivalence (6 hours)

- 3.1 Time value of money
- 3.2 Simple interest and compound interest
- 3.3 Economic equivalence
  - 3.3.1 Single cash-flow
  - 3.3.2 Uniform cash-flows
  - 3.3.3 Linear gradient series
  - 3.3.4 Geometric gradient series
  - 3.3.5 Irregular cash-flows
- 3.4 Nominal and effective interest rate

3.5 Application of interest table and spreadsheet for economic equivalence analysis

4 Project Evaluation Techniques (12 hours)

4.1 Project cash flows
4.2 Payback period methods
4.3 Net present value (NPV) method
4.4 Future value method
4.5 Annual equivalent method
4.6 Internal rate of return (IRR) method
4.7 External rate of return (ERR) method
4.8 Project evaluation for the mutually exclusive projects
4.9 Application of interest table and spreadsheet tools for project evaluation

5 Depreciation (4 hours)

5.1 Economic depreciation and accounting depreciation
5.2 Useful life and salvage value
5.3 Book Depreciation methods
  5.3.1 Straight-line method
  5.3.2 Declining balance method
  5.3.3 Sum-of-years'-digit method
  5.3.4 Units-of- production method
5.4 Tax depreciation systems in Nepal
5.5 Application of spreadsheet for depreciation estimation

6 Income Tax and Discounted Cash-flow models (3 hours)

6.1 Effect of income tax on cash-flows
6.2 Tax treatment of gains and losses on depreciable assets
6.3 Individual and corporate tax
6.4 Development of discounted cash-flows models on spreadsheet tools

7 Project Risk Analysis (4 hours)

7.1 Sensitivity analysis
7.2 Breakeven analysis
7.3 Scenario analysis
7.4 Probability concepts and distributions
7.5 Risk simulation
7.6 Application of spreadsheet tools and add-in for risk analysis

8 Economic analysis in public project (4 hours)

8.1 Social costs and benefits
8.2 Benefit-cost analysis

8.3 Incremental benefit-cost analysis
8.4 Application of spreadsheet tools for public sector economic analysis

Tutorial **(15 hours)**

1. Numerical problems on cost concepts
2. Numerical problems on interest rate and economic equivalence
3. Numerical problems on project evaluation techniques
4. Numerical problems on depreciation
5. Numerical problems on income taxes and risk analysis
6. Numerical problems on economic analysis of public projects
7. Case study of any engineering project and group presentation on detailed economic feasibility study report

Final Exam

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below:

Chapter	Hours	Mark distribution*
1	6	8
2	6	8
3	6	8
4	12	16
5 and 6	7	10
7 and 8	8	10
Total	**45**	**60**

* There may be minor deviation in marks distribution.

References

1. Park, C. S. (2019). Contemporary engineering economics. Pearson.
2. Blank, L., Tarquin, A. (2018). Engineering economy. McGraw-Hill Education.
3. Sullivan, W. G., Wicks, E. M., Koelling, C. P. (2015). Engineering economy. Pearson.
4. Newnan, D. G., Eschenbach, T. G., Lavelle, J. P. (2017). Engineering economic analysis. Oxford University Press.
5. White, J. A., Case, K. E., Pratt, D. B., Agee, M. H. (2012). Principles of engineering economic analysis. John Wiley & Sons.
6. Weygandt, J. J., Kimmel, P. D., Kieso, D. E. (2019). Financial accounting. John Wiley & Sons.