Engineering Economic Analysis
MEM 111

Semester: First
Credit Hr: 3

General objectives:

- To provide students with a sound understanding of the principles, basic concepts and methodology of engineering economy and economic aspect of management.
- To help them develop proficiency with these methods and with the process of making rational decisions regarding situations they are likely to encounter in professional practice.

Specific objectives:
Specific objectives of this unit are:

- To build a thorough understanding of the theoretical and conceptual basis on which the practice of financial project analysis is built.
- To satisfy the very practical need that engineer will be called upon to make financial decisions when acting as team member or project manager of engineering project.
- To incorporate all the decision making tools including the most contemporary that engineers bring to the task of making informed financial decision.
- To explore the economic aspect of management including the public sector and private sector projects.

Course contents

Unit 1: Foundation of Engineering Economics **2hrs**

Engineering economic definition, origin of engineering economy, basic terminologies used in engineering economic decision, Role of engineers in making economic decision, types of strategic engineering economic decision, introduction to the cash flow.

Unit 2: Money-Time Relationship and Economic Equivalence **7hrs**

The time value of money, simple interest versus compound interest, development of interest formulas, compound interest formula(single cash flow), discrete compounding interest formula (uniform series cash flow), gradient series interest formula (arithmetic and geometric), concept and general principle of economic equivalence, equivalence relation (Payment Period > Compounding Period and Payment Period < Compounding Period), Introduction to continuous compounding interest formula, nominal and effective interest rate

Unit 3: Alternatives Evaluation Procedures **8hrs**

Equivalent worth method: Present worth analysis (PW) of projects having same useful life and different useful lives, Repeatability assumption and co-terminated assumption Future worth analysis (FW), Annual worth analysis (AW), Capitalized worth method (CW), payback period (simple and discounted), Rate of return method: Internal rate of return (IRR) and external rate of return (ERR) of single and mutually exclusive project, Definition of Mutually exclusive project in terms of combination of project.

Unit 4: Economic Analysis of Public sector Project **3hrs**

Introduction to public sector project, difference between public and private sector project, public sector project analysis view point, benefit cost analysis (conventional and modified), alternative selection using incremental benefit cost analysis.

Unit 5: Replacement Decision **6hrs**

Introduction to replacement analysis and reason for replacement analysis, factors to be considered in replacement studies, comparison of defender and challenger, determining the economic life of a challenger, determining the economic life of a defender, comparison in which the defender's useful life differs from that of challenger.

Unit 6: Depreciation **7hrs**

Asset depreciation (economic and accounting depreciation), factors inherent to asset depreciation (cost basis, salvage value, depreciable life), depreciation methods: book and tax depreciation, book depreciation method (straight line method, accelerated method: declining balance and sum of the year's digit method), Tax depreciation method (MACRS depreciation, MACRS depreciation rates, Half year convention, Switching from declining balance to straight line method), depletion (cost depletion and percentage depletion)

Unit 7: Inflation in Engineering Economics **5hrs**

Meaning and measure of inflation, actual versus constant dollars, equivalence calculation under inflation: market and inflation free interest rates, constant dollar analysis, actual dollar analysis mixed dollar analysis, rate of return analysis under inflation.

Unit 8: Economic decision under risk and uncertainty **7hrs**

Introduction to risk, uncertainty, Origin of project risk, method of describing project risks: sensitivity analysis, break even analysis (single project and mutually exclusive project), evaluation of alternatives using decision tree,

Text Book:

1. Chan S. Park (1997), Contemporary Engineering Economics, Contemporary Engineering Economics, 2nd edition, Addison-wesley Publishing Company, Inc.
2. William G Sullivan, James A Bontadelli and Elin M. Wicks (2001), Engineering Economy, 11thEdition , Pearson Education, Inc.
3. Blank, L. and Tarquin, A. (2005), "Engineering Economy", Sixth Edition,McGraw Hill, Singapore.