

MCE 413 ENGINEERING ECONOMY

INTRODUCTION

Why do Engineers Study Engineering Economy?

- i. Engineers' involvement in manufacturing from conceptual design to shipping.
- ii. Engineering decisions account for about 85% of product costs
- iii. Effective use of capital assets such as building and machinery
- iv. Engineers tasks of planning for the acquisition of equipment (capital expenditure) that will enable the firm to design and manufacture products economically
- v. Need to estimate profits (cash flows) that the asset will generate during its service life
- vi. Equipment maintenance and replacement decision, project selection, capital budgeting, etc... involves making intelligent choice among alternatives.

Engineers are expected to:

- i. Be able to make intelligent economic decisions
- ii. Be proficient in comparing alternatives
- iii. Be able to see and assess trade-offs

Basic principles:

- i. An economic decision is no better than the alternatives considered
- ii. An economic decision is no better than the forecasts describing each alternative
- iii. An economic decision should be based on the differences among alternatives
- iv. An economic decision should be based on the objective of making the best use of limited resources

CONCEPT OF EQUIVALENCE

- i. Time value of money
- ii. Compound interest and capital growth

TIME VALUE OF MONEY AND INTEREST FORMULAE

- i. Money is a commodity and like other goods that are bought or sold, money costs money
- ii. Money has earning power and purchasing power.
- iii. The cost of money is established and measured by an interest rate. **Interest rate (i)** is defined as the amount accrued per time. It is the cost of having money available for use. There are **two view points of interest**, namely **borrower's** viewpoint and **investor's** viewpoint. **Borrowers Viewpoint:** Interest is money paid for use of borrowed funds/assets (money costs money) **Investor's viewpoint:** interest is the return or capital growth, from the productive investment of capital.

- iv. In an inflationary economy, your purchasing power decreases as you further delay purchases. Interest rate is earning rate and it is protection from loss in the future purchasing power of money because of inflation. Market interest rate considers the earning power of money as well as the effect of inflation perceived.
- v. The way interest operates reflects that fact that money has time value. The amount of interest depends on length of time.
- vi. Interest formulas allow us to place different cash flow received at different times in the same time frame and to compare them.
- vii. When deciding among alternative proposals, we must take into account the operation of interest and the time value of money in order to make valid comparison of different amount at various times.

Elements of Transactions Involving Interest

Many types of transactions involve interest-e.g,

- borrowing money,
- investing money,
- purchasing machinery on credit-

Certain elements are common to all of these types of transactions:

1. The initial amount of money invested or borrowed in transactions is called the **principal (P)**
2. The **interest rate (i)** measures the cost or price of money and is expressed as a percentage per period of time.
3. A period of time called the **interest period (n)** determines how frequently interest is calculated. (Note that, even though the length of time of an interest period can vary, interest rates are frequently quoted in terms of an annual percentage rate.
4. A specified length of time marks the duration of the transaction and thereby establishes a certain **number of interest periods (N)**.
5. **A plan for receipts or disbursements (A_n)** that yields a particular cash flow pattern over a specified length of time. (For example, we might have a series of equal monthly payments that repay a loan.)
6. A **future amount of money (F)** results from the cumulative effects of the interest rate over a number of interest periods.