UNIT 5

TIME VALUE OF MONEY

The time value of money (TVM) is the concept that money available at the present time is worth more than the identical sum in the future due to its potential earning capacity.

Reasons for time preference for money

1. ***Risk and Uncertainty*** – *As we know future is never certain and we can't determines the risk involved in future because outflow of cash is in our hand as payment where as there is no certainty for future cash inflows.*
2. ***Inflation*** - *In an inflationary economy, the money received today, has more purchasing power than the money to be received in future. In other words, a rupee today represents a greater real purchasing power than a rupee in future.*
3. ***Consumption*** - *Individuals generally prefer current consumption to future consumption.*
4. ***Investment opportunities*** - *An investor can profitably use the received money today to get higher return tomorrow or after a certain period of time.*

Time Value Adjustment

- Two most common methods of adjusting cash flows for time value of money:
  - **Compounding**—the process of calculating **future values** of cash flows and
  - **Discounting**—the process of calculating **present values** of cash flows.

Future Value

- **Compounding** is the process of finding the future values of cash flows by applying the concept of compound interest.
- **Compound interest** is the interest that is received on the original amount (principal) as well as on any interest earned but not withdrawn during earlier periods.
- **Simple interest** is the interest that is calculated only on the original amount (principal), and thus, no compounding of interest takes place.

Future Value

- The general form of equation for calculating the future value of a lump sum after *n* periods may, therefore, be written as follows:

$$F_n = P(1+i)^n$$

- The term $(1 + i)^n$ is the **compound value factor** (*CVF*) of a lump sum of Re 1, and it always has a value greater than 1 for positive *i*, indicating that *CVF* increases as *i* and *n* increase.

$$F_n = P \times \mathrm{CVF}_{n,i}$$

Future Value of an Annuity

- **Annuity** is a fixed payment (or receipt) each year for a *specified* number of years. If you rent a flat and promise to make a series of payments over an agreed period, you have created an annuity.

$$F_n = A\left[\frac{(1+i)^n - 1}{i}\right]$$

- The term within brackets is the **compound value factor for an annuity** of Re 1, which we shall refer as *CVFA*.

$$F_n = A \times \mathrm{CVFA}_{n,i}$$

Present Value

- **Present value** of a future cash flow (inflow or outflow) is the amount of current cash that is of equivalent value to the decision-maker.
- **Discounting** is the process of determining present value of a series of future cash flows.
- The *interest rate* used for discounting cash flows is also called the *discount rate*.

Present Value of a Single Cash Flow

- The following general formula can be employed to calculate the present value of a lump sum to be received after some future periods:

$$P = \frac{F_n}{(1+i)^n} = F_n\left[(1+i)^{-n}\right]$$

- The term in parentheses is the **discount factor** or **present value factor** (*PVF*), and it is always less than 1.0 for positive *i*, indicating that a future amount has a smaller present value.

$$PV = F_n \times \mathrm{PVF}_{n,i}$$

Present Value of an Annuity

- The computation of the present value of an annuity can be written in the following general form:

$$P = A\left[\frac{1}{i} - \frac{1}{i(1+i)^n}\right]$$

- The term within parentheses is the **present value factor of an annuity** of Re 1, which we would call *PVFA*, and it is a sum of single-payment present value factors.

$$P = A \times \text{PVAF}_{n,i}$$

Present Value of Perpetuity

- **Perpetuity** is an annuity that occurs *indefinitely*. Perpetuities are not very common in financial decision-making:

$$\text{Present value of a perpetuity} = \frac{\text{Perpetuity}}{\text{Interest rate}}$$

Present Value of Growing Annuities

- The present value of a constantly growing annuity is given below:

$$P = \frac{A}{i-g}\left[1-\left(\frac{1+g}{1+i}\right)^{n}\right]$$

- Present value of a constantly growing perpetuity is given by a simple formula as follows:

$$P = \frac{A}{i-g}$$