2.1. TIME VALUE OF MONEY (TVM)

2.1.1. Meaning of Time Value of Money

The concept of TVM refers to the fact that the money received today is different in its worth from the money receivable at some other time in future. In other words, the same principle can be stated as that the money receivable in future is less valuable than the money received today. **For example,** if an individual is given an option to receive ₹1,000 today or to receive the same amount after one year, he will definitely choose to receive the amount today (of course he is presumed to be a rational being). The obvious reason for this reference for receiving the money today is that the rupee received today has a higher value than the rupee receivable in future. This preference for current money as against future money is known as **the time preference for money or simply TVM.**

This concept of TVM is applicable in equal strength to individuals as well as to the business firms. In case of most of the decision particularly those taken by a firm, the financial implications may occur over a period of time and even up to ten years or more. Therefore, TVM becomes an important consideration for any financial decision.

For example, a firm is selling a machine for ₹25,000. The buyer offers to pay ₹ 25,000 either now or after one year. The seller firm will naturally accept the first offer, i.e., to receive ₹25,000 now. In this case, if the firm reinvests the amount of ₹25,000 in fixed deposit account for one year at 10% p.a. interest, then after one year the firm will be having total money of ₹27,500 (₹25,000 + interest of ₹2,500). In the second option, the firm will receive only ₹25,000 after one year. Therefore, in the first option the firm will be better off by ₹2,500.

On the other hand, if the buyer of the machine is ready to pay ₹27,500 instead of ₹25,000 after one year, then the firm may be indifferent. In this situation, the firm will be having ₹27,500 after one year either:

1) By receiving ₹25,000 now and reinvesting to get interest of ₹2,500 or
2) To get ₹27,500 from the buyer after one year. This interest amount of ₹2,500 is the TVM.

Thus, the TVM for the money is its rate of return which the firm can earn by reinvesting its present money. This rate of return can also be expressed as a required rate of return to make equal the worth of money of two different time periods. In simpler terms, the value of a certain amount of money today is more valuable than its value tomorrow. The difference in the value of money today and tomorrow is referred as time value of money.

2.1.2. Reasons for Time Value of Money

Money has time value because of the following reasons:

1) **Risk and Uncertainty:** Future is always uncertain and risky. Outflow of cash is in our control as payments to parties are made by us. There is no certainty

for future cash inflows. Cash inflow is dependent out on our creditor, bank, etc. As an individual or firm is not certain about future cash receipts, it prefers receiving cash now.

2) **Preference for Consumption:** Most people have subjective preference for present consumption over future consumption of goods and services either because of the urgency of their present wants or because of the risk of not being in a position to enjoy future consumption that may be caused by illness or death, or because of inflation. As money is the means by which individuals acquire most goods and services, they may prefer to have money now.

3) **Investment Opportunities:** An investor can profitably employ a rupee received today, to give him a higher value to be received tomorrow or after a certain period of time.

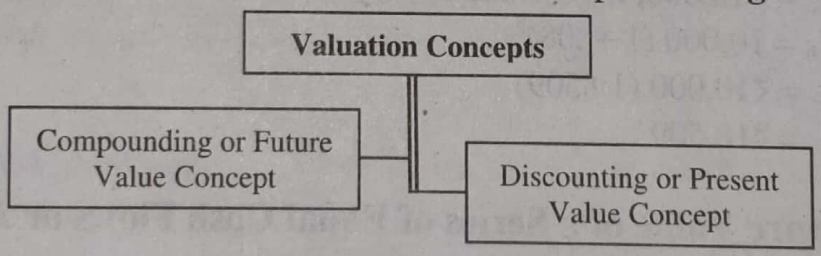
4) **Inflationary Economy:** In an inflationary economy, the money received today, has more purchasing power than the money to be received in future. In other words, a rupee today represents a greater real purchasing power than a rupee a year hence.

2.1.3. Basic Valuation Concepts

The above discussion establishes that there is a preference of having money at present than at a future point of time. This automatically means:

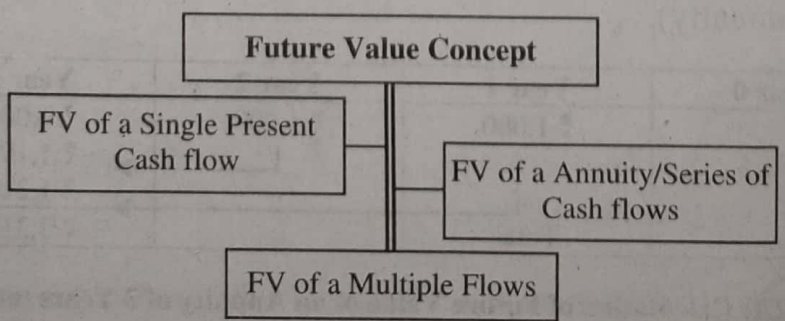
1) That a person will have to pay in future more for a rupee received today; and
2) A person may accept less for a rupee to be received in future.

The above statement relates to two different concepts as in **figure below**:



2.1.4. Compounding/Future Value Concept

The concept of compounding is used to find out the FV of present money. It is the same as the concept of compound interest, wherein the interest earned in a preceding year is reinvested at the prevailing rate of interest for the remaining period. Thus, the accumulated amount (principal + interest) at the end of a period becomes the principal amount for calculating the interest for the next period. The compounding technique to find out the FV of present money is shown in **figure below:**



2.1.4.1. Future Value of a Single Cash Flow

The future value of a single cash flow is defined in term of equation as follows:

$$FV = PV (1 + r)^n$$

Where, FV = Future value
PV = Present value (given)
r = % Rate of interest, and
n = Time gap after which FV is to be ascertained.

The above equation explains that the FV depends upon the combination of three variables i.e., the PV, the r, and n. If any one of these three variables changes, the FV will also change. There can be an almost infinite number of combinations of these three variables and therefore there can be corresponding infinite number of FVs. **For example,** one may be interested to find out then FV of ₹1,000 at 10% after 7 years or of ₹5,000 at 11% after 9 years or ₹50,000 at 16% after 3 years and so on. Every time the tedious calculations as per Equation are to be to find out the future value.

Example 1: Govind makes a deposit of ₹10,000 in a bank which pays 8% interest compounded annually for 8 years. You are required to find out the amount to be received by him after 8 years.

Solution:

$FV_n = PV (1 + r)^n$
PV_n = ₹10,000, r = 8% and n = 8 years.
$FV_n = 10,000 (1 + .08)^8$
= ₹10,000 (1.8509)
= ₹18,509

2.1.4.2. Future Value of a Series of Equal Cash Flows or Annuity of Cash Flows

Quite often a decision may result in the occurrence of cash flows of the same amount every year for a number of years consecutively, instead of a single cash flow. **For example,** a deposit of ₹1,000 each year is to be made at the end of each of the next 3 years from today. This may be referred to as an annuity of deposit of ₹1,000 for 3 years. An **annuity** is thus, a finite series of equal cash flows made at regular intervals. Calculation of the FV of an annuity can also be presented graphically as in **figure 2.1** (rate of interest 10% compounded annually).

Year 0	Year 1	Year 2	Year 3
	₹ 1,000	₹ 1,000	₹ 1,000
			₹ 1,100
			₹ 1,210
	Total		₹ 3,310

Figure 2.1: Calculation of Future Value of an Annuity of 3 Years (at r = 10%)

In this case, each cash flow is to be compounded to find out its FV. The total of these FVs of all these cash flows will be the total FV of the annuity. The FV of an annuity also depends upon three variables, i.e., the annual amount, the rate of interest and the time period. In order to find out the FV of an annuity, the pre-calculated mathematical table is available for various combinations of the rate of interest, r, and the time period, n.

In general terms, the future value of an annuity is given as:

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

where,

FA_n = Future value of an annuity which has duration of n years.
A = Constant periodic flow.
r = Interest rate per period.
n = Duration of the annuity.

It is evident from the above that future value of an annuity depends upon three variables, A, r and n. The future value will vary if any of these three variables changes. For computation purposes, tables or calculators can be made use of.