

DSE 6.2 A FINANCIAL MANAGEMENT

Unit -1

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Introduction

A business firm is considered as the 'resource converter'. It collects raw materials from the nature and human resources from the society to produce goods and services. These goods and services are sold to meet the needs and wants of consumers. In this way, the firm earns profit which is one of its primary objectives. To carry out all these activities, the firm requires finance because finance holds the key to all activities. For, it is compared with the blood of human body. In our body, the blood needs to be circulated and regulated to ensure healthy survival. Likely, the finance flow needs to be circulated and regulated through the veins of the firm for its survival and growth.

Financial Management comprises of two words- 'Financial' and 'Management', where 'financial' stands for affairs relating to finance and 'management' stands for doing the right thing at right time by right person through right means. In short, it denotes managing the money of the firm through profitable ventures. Financial Management is concerned mainly with the planning and controlling of the financial resources of the business firm. So, the collection of finance from different sources and investment of finance in profitable way are its two primary functions.

It is mainly concerned with the following activities:

- (i) *Fund raising: it involves primarily the determination of the quantum of fund, selection of sources of funds and to procure funds at the least possible cost.*
- (ii) *Use of funds: procurement of funds will be useless unless the fund is invested in a profitable manner. So, various investment proposals are evaluated in which money can be deployed to ensure expected and reasonable return.*
- (iii) *Financial information: it is mainly concerned with the decision relating to finance i.e. financial planning and financial reporting. So, it involves collection of information for right decision including the analysis and interpretation of financial statements, and also formulation of suitable financial control technique to maximize wealth of the shareholders.*

It can be stated that the major responsibility of financial management is to ensure that every rupee invested gives effective return and takes care of effective expectation of the investors of that rupee. Every financial decision is required to be viewed in the light of the financial results. It is the dynamic decision making process involving a series of inter-related activities-

- (i) Financial analysis
- (ii) Financial decision-making
- (iii) Financial planning and
- (iv) Financial control.

Definition of Financial Management

Financial management can be defined as the management of finance and financial resources of a business firm. It is also termed as 'money management' because money is the media of exchange and everything required for the business activities can be procured for money.

“Financial management is concerned with the efficient use of an important economic resource, namely capital funds.” - *Solomon Ezra & J. John Pringle*.

“Financial Management is concerned with the acquisition, financing and management of assets with some overall goal in mind.” - *Van Horne*

“Financial Management deals with procurement of funds and their effective utilization in the business.”- *S.C. Kuchal*

“Financial management is broadly concerned with the acquisition and use of funds by a business firm”- *Prasanna Chandra*

If the above definition are analysed, we get the following elements of financial management: (i) Financing, (ii) Investing, (iii) Balancing between risk and return, (iv) Profit maximization, (v) Wealth maximization, (vi) Overall value increase.

• Important functions of Financial Management

Van Horne in his book Financial Management and Policy stated that the functions of financial management are concerned with the following three financial decisions:

- (1) *Financing decision;*
- (2) *Investment decision and*
- (3) *Dividend decision.*

(1) *Financing Decision*

The second important function is financing decision. The financing decision is concerned with capital – mix, financing – mix or capital structure of a firm. The term capital structure refers to the proportion of debt capital and equity share capital. Financing decision of a firm relates to the financing – mix. This must be decided taking into account the cost of capital, risk and return to the shareholders. Employment of debt capital implies a higher return to the share holders and also the financial risk. There is a conflict between return and risk in the financing decisions of a firm. So, the financial manager has to bring a trade – off between risk and return by maintaining a proper balance between debt capital and equity share capital. On the other hand, it is also the responsibility of the financial manager to determine an appropriate capital structure.

(2) *Investment Decision*

The investment decision is concerned with the selection of assets in which funds will be invested by a firm. The assets of a business firm includes long term assets (fixed assets) and short term assets (current assets). Long term assets will yield a return over a period of time in future whereas short term assets are those assets which are easily convertible into cash within an accounting period i.e. a year. The long term investment decision is known as capital budgeting and the short term investment decision are identified as working capital management. Capital Budgeting may be defined as long – term planning for making and financing proposed capital outlay. In other words Capital Budgeting means the long-range planning of allocation of funds among the various investment proposals. Another important element of capital budgeting decision is the analysis of risk and uncertainty. Since, the return

on the investment proposals can be derived for a longer time in future, the capital budgeting decision should be evaluated in relation to the risk associated with it.

On the other hand, the financial manager is also responsible for the efficient management of current assets i.e. working capital management. Working capital constitutes an integral part of financial management. The financial manager has to determine the degree of liquidity that a firm should possess. There is a conflict between profitability and liquidity of a firm. Working capital management refers to a trade – off between liquidity (Risk) and profitability. Insufficiency of funds in current assets results liquidity and possessing of excessive funds in current assets reduces profits. Hence, the finance manager must achieve a proper trade – off between liquidity and profitability. In order to achieve this objective, the financial manager must equip himself with sound techniques of managing the current assets like cash, receivables and inventories etc.

(3) Dividend Decision

The third major function is the dividend policy decision. Dividend policy decisions are concerned with the distribution of profits of a firm to the shareholders. How much of the profits should be paid as dividend? i.e. dividend pay-out ratio. The decision will depend upon the preferences of the shareholder, investment opportunities available within the firm and the opportunities for future expansion of the firm. The dividend pay out ratio is to be determined in the light of the objectives of maximizing the market value of the share. The dividend decisions must be analysed in relation to the financing decisions of the firm to determine the portion of retained earnings as a means of direct financing for the future expansions of the firm.

• Objectives of the firm: Profit maximisation vs. Value maximisation

OBJECTIVES OF FINANCIAL MANAGEMENT

The earlier objective of profit maximization is now replaced by wealth maximization. Since profit maximization is a limited one it cannot be the sole objective of a firm. The term profit is a vague phenomenon and if given undue importance problems may arise whereas wealth maximization on the other hand overcomes the drawbacks of profit maximization. Therefore in the context of financial management, there are two approaches regarding objectives. According to the traditional approach, it is called Profit Maximisation objective. But according to the modern approach it is known as Wealth Maximisation objective. These two are discussed below in details.

I. Profit maximization

II. Wealth maximization or Value maximisation.

I. Profit maximization

Under this approach, actions that increase profits should be undertaken and those that decrease profits are to be avoided. In specific operational terms, the profit maximization criterion implies that the investment, financing and dividend policy decisions of a firm should be oriented towards the maximization of profits. The rationale behind profit maximization as a guide to financial decision-making is due to following reasons:

- (i) Profit is a test of economic efficiency. It provides the yardstick by which economic performance can be judged.
- (ii) It leads to efficient allocation of resources tend to be directed to uses, which in terms of profitability are the most desirable.
- (iii) It ensures maximum social welfare. This is so because the quest for value drives scarce resources to their most productive uses and their most efficient users. The more effectively resources are deployed, the more robust will be the economic growth and the rate of improvement in the standard of living.

The profit maximization criterion, however, has been questioned and criticized on several grounds. It suffers from the following limitations:

- (i) Profit in absolute terms is not a proper guide to decision-making. It has no precise connotation. It can be expressed either on a per share basis or in relation to investment. Also, profit can be long term or short term, before tax or after tax; it may be the return on total capital employed or total assets or shareholder's equity and so on. If profit maximization is taken to be the objective, which of these variants of profit should a firm try to maximize? Therefore, a loose term like profit cannot form the basis of operational criterion for financial management.
- (ii) It leaves considerations of timing and duration undefined. There is no guide for comparing profit now with profit in future or for comparing profit streams of different durations.
- (iii) It ignores risk factor. It cannot, for example, discriminate between an investment project, which generates a certain profit of ` 50 lakhs and an investment project, which has a variable/uncertain profit outcome of ` 50 lakhs. It does not take into account level of risk.

II. Wealth Maximization or Value maximisation

This is also known as value maximization or net present worth maximization. The focus of financial management is on the value to the owners or suppliers of equity capital. The wealth of the owners is reflected in the market value of the shares. So, wealth maximization implies the maximization of the market price of shares. It has been universally accepted as an appropriate operational decision criterion for financial management decisions as it removes the technical limitations, which characterize the earlier profit maximization criterion. Its operational features satisfy all the three requirements of a suitable operational objective of financial courses of action, namely exactness, quality of benefits and the time value of money. Maximization of the wealth of shareholders (as reflected in the market value of equity) appears to be the most appropriate goal for financial decision-making.

Wider than profit maximization is the principle of corporate governance. The fundamental objective of corporate governance is the "the enhancement of the long-term shareholder value while at the same time protecting the interests of other stakeholders." As such, this definition emphasizes the need for a company to strike a balance at all times between the need to enhance shareholders' wealth and protecting the interest of other stakeholders in the company such as suppliers, customers, creditors, bankers, employees of the company, government and society at large.

If these factors are ignored, a company cannot survive for long. Profit maximization at the cost of legal, social and moral obligations is a short-sighted policy [e.g., Sahara].

Hence, it is commonly agreed that the objective of a firm is to maximize its value or wealth. Value is represented by the market price of the company's common stock. The market price of a firm's stock represents the judgement of all market participants as to what the value of the particular firm is. The market price serves as a performance index of the firm's progress; it indicates how well management is doing on behalf of shareholders.

An increasingly popular measure of wealth is EVA (Economic Value Added). **Economic Value Added (EVA)** can be defined as the net operating profit that a company earns above its costs of capital. It is a trademark of Stern Stewart & Co. EVA can be calculated as follows:

$$\begin{aligned} \text{EVA} &= \text{Net operating profit after taxes} - (\text{Weighted average cost of capital} \times \text{Capital invested}) \\ &= \text{NOPAT} - (\text{WACC} \times \text{Capital}) \end{aligned}$$

Conceptually, EVA is superior as a measure of value creation because it recognizes the cost of capital and, hence, the riskiness of a firm's operations. There is a strong correlation between EVA and the market price of a company's stock. Maximizing any accounting profit or accounting rate of return as a way of increasing shareholder's wealth often leads to an undesired outcome. A company should aim at long-term wealth maximization and not short-term. Therefore, wealth maximization should be the objective of financial management since it:

1. Considers risk.
2. Uses cash flows and not profits.
3. Considers time value of money.
4. Implies taking care of interest of both shareholders and other stakeholders (Corporate governance).

• **Role of Chief Financial Officer**

The chief financial manager is commonly known as Chief Financial Officer (CFO), is the leader of the management group that guides the financial affairs of the firm. In order to maximise the firm's market value, the funds must be widely utilized. This involves raising funds from the various alternative sources at the least possible cost and allocating them among the various prospective projects to get reasonable return. The roles of the CFO in a modern business firm were as follows:

- (i) **Forecasting Financial Requirements:** It is the primary function of the CFO. He is responsible to estimate the financial requirement of the business concern. He should estimate, how much finances required to acquire fixed assets and forecast the amount needed to meet the working capital requirements in future.
- (ii) **Acquiring Necessary Capital After deciding the financial requirement:** the CFO should concentrate how the finance is mobilized and where it will be available. It is also highly critical in nature.
- (iii) **Investment Decision :** The CFO must carefully select best investment alternatives and consider the reasonable and stable return from the investment. He must be well versed in the field of capital budgeting techniques to determine the effective utilization of investment. The CFO must concentrate to principles of safety, liquidity and profitability while investing capital.
- (iv) **Interrelation with Other Departments:** CFO deals with various functional departments such as marketing, production, personnel, system, research, development, etc. CFO should have sound knowledge not only in finance related area but also well versed in other areas. He must maintain a good relationship with all the functional departments of the business organization.
- (v) **Managing the Flow of Internal Funds:** Here the Manager has to keep a track of the surplus in various bank accounts of the organisation and ensure that they are properly utilised to meet the requirements of the business. This will ensure that liquidity position of the company is maintained intact with the minimum amount of external borrowings.
- (vi) **To Facilitate Cost Control:** The CFO is generally the first person to recognise when the costs for the supplies or production processes are exceeding the standard costs/budgeted figures. Consequently, he can make recommendations to the top management for controlling the costs.
- (vii) **To Facilitate Pricing of Product, Product Lines and Services:** The CFO can supply important information about cost changes and cost at varying levels of production and the profit margins needed to carry on the business successfully. In fact, CFO provides tools of analysis of information in pricing decisions and

contribute to the formulation of pricing policies jointly with the marketing manager.

- (viii) **Forecasting Profits:** The CFO is usually responsible for collecting the relevant data to make forecasts of profit levels in future.
- (ix) **Measuring Required Return:** The acceptance or rejection of an investment proposal depends on whether the expected return from the proposed investment is equal to or more than the required rate of return. An investment project is accepted if the expected return is equal or more than the required rate of return. Determination of required rate of return is the responsibility of the CFO and is a part of the financing decision.
- (x) **Managing Assets:** The function of asset management focuses on the decision-making role of the CFO. Finance personnel meet with other officers of the firm and participate in making decisions affecting the current and future utilisation of the firm's resources. As an example, managers may discuss the total amount of assets needed by the firm to carry out its operations. They will determine the composition or a mix of assets that will help the firm best achieve its goals. They will identify ways to use existing assets more effectively and reduce waste and unwarranted expenses. The decision-making role crosses liquidity and profitability lines. Converting the idle equipment into cash improves liquidity. Reducing costs improves profitability.
- (xi) **Managing Funds:** Funds may be viewed as the liquid assets of the firm. In the management of funds, the CFO acts as a specialised staff officer to the Chief Executive of the company. The CFO is responsible for having sufficient funds for the firm to conduct its business and to pay its bills. Money must be located to finance receivables and inventories, to make arrangements for the purchase of assets, and to identify the sources of long-term financing. Cash must be available to pay dividends declared by the board of directors. The management of funds has therefore, both liquidity and profitability aspects. If the firm's funds are inadequate, the firm may default on the payment of liabilities and may have to pay higher interest. If the firm does not carefully choose its financing methods, it may pay excessive interest costs with a subsequent decline in profits.

• **Financial environment in which a firm has to operate**

Each and every business firm, be it small or large, sole-trader, partnership or corporation, local, regional, national, or multinational is to operate within a business environment. One of the constitutes of business environment is the financial environment. We cannot think of a business without finance. A business firm is the means of earning finance by employing finance known as capital. A business firm is an artificial person having no capital of its own initially. But to carry out the business activities they require finance which is collected from various sources.

All business firms operate within a financial system which consists of a number of institution and markets. Most of the big firms collect finance from the financial market to invest in profitable projects or assets. While business firm compete with each other in the product markets, they must interact with the financial markets. Because of the importance of this environment to the financial manager, as well as to the consumer of financial services, we should review the financial system including the financial markets which gives rise to the financial environment. The basic components of financial environment of a business firm are-

1. **Financial institutions**
2. **Financial market**

3. *Financial services*
4. *Financial assets*
5. *Financial regulators.*

1. *Financial institutions*

These financial institutions or intermediaries collect savings from the savers (or from the surplus-spending units) and channelize the mobilised fund to different investment projects. That is to say, they allocate the pooled fund to the investors or the business houses (or the seekers of fund or the deficit spending units). Hence, these financial institutions can be considered as the ‘mobilize or depositories of savings, and as the purveyors of credit or finance’.

These financial institutions can be classified into the following three broad groups:

a) *Financial Intermediaries and Non-intermediaries*

The financial intermediaries intermediate between the ultimate savers and investors. They act as a bridge between the savers and the investors. They accept deposits from the savers and hence, these saving deposits are the liabilities of these financial intermediaries towards those savers. The mobilised savings are then used for lending to the ultimate borrowers (or the business firms/ investors).

Different commercial banks, non-banking financial companies (such as hire purchase companies, lease finance companies, housing finance companies, etc.), insurance companies and mutual funds are considered as financial intermediaries.

On the other hand, the financial non intermediaries are also engaged in lending operations but their resources are not collected directly from the ultimate savers. For instance, the financial resources of these non-intermediaries may be raised either by borrowing from the government from the Central Bank of the country or through the participation of the government in the share capital of these financial non-intermediaries (e.g., Industrial Finance Corporation of India, the Industrial Development Bank of India, etc.).

b) *Banking and non banking financial institutions*

Banking financial institutions are those financial institutions which carry on banking activities. Banking business is carried on by these institutions after obtaining an approval under Banking Regulation Act, 1949 and RBI. It accepts deposits from the public. It lends money to people engaged in commerce, industry and agriculture. It finances foreign trade and deals in foreign exchange. It provides short, medium and long term credit. It acts as an agent of RBI. It deals in stocks and shares, trusteeship, executorships etc. In short, the bank can be aptly described, as ‘department store of finance’ because it engages itself in every form of banking business. Banking financial institutions mainly comprise of commercial banks.

On the other hand, these are the financial institutions which are not permitted to carry on the banking activities as per Banking Regulation Act, 1949 and RBI regulations. These institutions have been established by special legislations to provide finance to specified categories of industries or persons. Examples: the life insurance corporation of India, the general insurance corporation etc.

c) *Other financial institutions*

The primary objective of this type of institution is to assist different segments of the financial system so that it can operate in a smooth way. Mobilisation of savings and lending of funds to business firms are not their basic objectives. For instance, the financial institutions like National Securities Depositories Ltd. (NSDL), National Securities Clearing Corporation Ltd. (NSCCL), etc., have been established in India to facilitate the process of stock trading and quick settlement

of such transactions in the stock market. In a similar fashion, the Discount and Finance House of India (DFHI) has been established to facilitate money market transactions (or short-term financial transactions). Again, the Export Credit and Guarantee Corporation (ECGC) was established in India to facilitate the export houses in availing credit facilities from different financial institutions.

2. *Financial market*

Generally speaking, there is no specific place or location to indicate a financial market. Wherever a financial transaction takes place, it is deemed to have taken place in the financial market. Hence, financial markets are pervasive in nature since financial transactions are themselves very pervasive throughout the economic system. For instance, issue of equity shares, granting of loan by term lending institutions, deposit of money into a bank, purchase of debentures, sale of shares and so on.

However, financial markets can be referred to as those centres and arrangements which facilitate buying and selling of financial assets, claims and services under a particular policy framework. Sometimes, we do find the existence of a specific place or location for a financial market as in the case of stock exchange.

There are different ways of classifying financial markets. There are mainly three ways of classifying financial markets.

a) ***Classification on the basis of maturity of claims: On this basis, financial markets may be classified into money market and capital market.***

Money market: A market where short term funds are borrowed and lend is called money market. It deals in short term monetary assets with a maturity period of one year or less. Liquid funds as well as highly liquid securities are traded in the money market. Examples of money market are Treasury bill market, call money market, commercial bill market etc. The main participants in this market are banks, financial institutions and government. In short, money market is a place where the demand for and supply of short term funds are met.

Capital market: Capital market is the market for long term funds. This market deals in the long term claims, securities and stocks with a maturity period of more than one year. It is the market from where productive capital is raised and made available for industrial purposes. The stock market, the government bond market and derivatives market are examples of capital market. In short, the capital market deals with long term debt and stock.

b) ***Classification on the basis of types of securities traded: On this basis, financial markets are classified into primary market and secondary market.***

Primary market: Primary markets are those markets which deal in the new securities. Therefore, they are also known as new issue markets. These are markets where securities are issued for the first time. In other words, these are the markets for the securities issued directly by the companies. The primary markets mobilise savings and supply fresh or additional capital to business units. In short, primary market is a market for raising fresh capital in the form of shares and debentures.

Secondary market: Secondary markets are those markets which deal in existing securities. Existing securities are those securities that have already been issued and are already outstanding. Secondary market consists of stock exchanges. Stock exchanges are self regulatory bodies under the overall regulatory purview of the Govt. /SEBI.

c) **Classification on the basis of control of regulators: On this basis, financial markets can be classified into organised markets and unorganized markets.**

Organised markets: These are financial markets in which financial transactions take place within the definite set of rules and regulations exist for controlling financial transactions.

Unorganised markets: These are financial markets in which financial transactions take place outside the well established exchange or without systematic and orderly structure or arrangements or there may be the absence of regulations to govern the financial dealings.

3. Financial service

It can be defined as activities, benefits and satisfactions connected with the transaction of financial assets, which offers financial value to the users of such financial services. These financial services can be both fund-based and free-based.

The financial services provided by any financial institution to its customers by its funds, are considered as fund based services which includes lease finance, hire purchase finance, venture capital finance, housing finance, insurance service, etc. However in any growing economy, business enterprises also require some financial consultancy services from expert bodies for issue management, loan syndication, project evaluation, portfolio management, etc. These services are provided by some financial institutions to their client against some service charges or fees. Several financial institutions such as the merchant bankers, credit rating agencies(e.g., the credit rating information services of India Ltd., or CRISIL), stock broking agencies, etc., emerge in an efficient financial system for providing such fee-based financial services to the business houses.

4. Financial Assets or Instruments

A financial claim against the person or an organisation for payment, at a specified future date of a sum of money or a periodic payment (such as, interest or dividend) is known as financial instrument. Financial instruments are the financial assets or financial securities negotiable and tradable in the market. The financial assets (such as different shares, debentures, units of mutual fund, insurance policies, etc.,) are often held by the business firms as a store of value as well as for an expected future return. With the development of a financial system, the business houses get the opportunity of investing not only in direct financial assets (such equity shares, debentures, etc.,) but also in derivative instruments such as, 'future', 'option', etc. For instance in the Indian stock market, the stock index future are traded on the basis of different share price indices (e.g., Bank Nifty, Nifty Midcap 50 etc., in the National Stock Exchange). Again, commodity futures are also traded in the National Commodity and Derivatives Exchange Ltd. (NCDEX) and Multi-Commodity Exchange (MCX) in India.

5. Financial Regulators

The institutions which perform surveillance and monitoring upon the functioning of a financial system through some well-defined rules and regulations are considered as financial regulators.

There may be separate regulatory institutions (or authorities) for controlling and monitoring different segments of a financial system. For instance, in case of India, the money market is regulated by the Reserve Bank of India (RBI), while the capital market

is regulated by the Securities and Exchange Board of India (SEBI) and Insurance Sector is regulated by the Insurance Regulatory and Development Authority (IRDA).

Basic Concepts

• Time Value of Money

Concept

One of the most fundamental concepts in finance is that money has a “time value.” That is to say that money in hand today is worth more than money that is expected to be received in the future. The reason is straightforward: A rupee that you receive today can be invested in such a way that you will have more than a rupee at some future time. Suppose “A” win a Prize in a contest and he has got two options.

A. Receive ₹10,000 now OR

B. Receive ₹10,000 in three years

Which option should “A” choose?

If A is a rational person he would choose to receive ₹10,000 now. After all, three years is a long time to wait. Why would any rational person defer payment into the future when he or she could have the same amount of money now? For most of us, taking the money in the present is just natural. So at the most basic level, the time value of money demonstrates the concept of time value: “A rupee today is worth more than a rupee tomorrow.”

Time value of money results from the concept of interest.

Reasons:

Why ₹ 1 received today is worth more than ₹ 1 received after a time period.

There are four primary reasons why a rupees to be received in the future is worth less than a rupees to be received immediately.

- (i) **Inflation:** Presence of positive rates of inflation which reduce the purchasing power of rupees through time. Suppose rate of petrol about one year back was ₹ 65 per litre and now it is ₹ 72 per litre. This may be observed that in this example purchase power of rupee in terms of petrol purchased has decreased from $1/65$ to $1/72$.
- (ii) **Re-investment opportunity :** A rupee today is worth more today than in the future because of the opportunity cost of lost earnings — that is, it could have been invested and earned a return between today and a point in time in the future.
- (iii) **Uncertainty:** Thirdly, all future values are in some sense only promises, and contain some uncertainty about their occurrence. As a result of the risk of default or non-performance of an investment, a rupee in hand today is worth more than an expected rupee in the future.
- (iv) **Preference for present consumption:** Finally, human preferences typically involve impatience, or the preference to consume goods and services now rather than in the future.

Techniques of Time Value of Money

For the sake of logical and meaningful comparison for all cash inflows and outflows of a firm are converted to a value at a point of time. Since the determination of present value is comparatively easy, all future inflows are converted into their present value. This conversion process is done with the help of two techniques:

1. Compounding

2. Discounting

I. Compounding

(a) When interest is paid annually

In such a situation, total amount available at the end of the period is calculated with the help of the following:

$$\text{Formula: } A = P (1+i)^n$$

where, A = Amount i.e. Principal+interest receivable at the end of the period.

P= Principal i.e. the amount invested.

i= Rate of interest

n= Number of years

Example:

Arun deposited Rs. 1,000 in a bank at an interest rate of 5% compounded annually. How much will he get after 3 years?

Solution:

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

where, A = Amount i.e. Principal+interest receivable at the end of the period.

P= Principal i.e. the amount invested = Rs. 1,000

i= Rate of interest = 5%

n= Number of years = 3

$$\begin{aligned} A &= \text{Rs. } 1,000(1 + 0.05)^3 \\ &= \text{Rs. } 1,000(1.05)^3 \\ &= \text{Rs. } 1,000 \times 1.15762 \\ &= \text{Rs. } 1,157.62 \end{aligned}$$

Therefore, he will get Rs. 1,157.62 after 3 years.

Note: the calculation becomes difficult when the n is greater say 8, 10, 12, 20, 30 or more years.

Because in such a case it is very difficult to find out the value of $(1 + i)^n$. In such a cases, Compound Value Interest Factor table is of great help. In this table the future value of Re. 1 at different interest rate (i) for different years (n) has been given. The table has been given at the end of this study material.

(b) When interest is paid half-yearly

In such cases the interest is payable twice in a year. The interest is calculated at the end of six months and the interest is added with the principal. The accumulated amount is considered as the principal at the beginning of the next period of six months. This result to increase of effective rate of interest. In such cases, the formula for calculation of the amount will be the following:

$$\text{Formula: } A = P (1+i/m)^{mn}$$

where, A = Amount i.e. Principal+interest receivable at the end of the period.

P= Principal i.e. the amount invested.

i= Rate of interest

m= number of interest reckoned in a year

n= Number of years

Example: Arun deposited Rs. 1,000 in a bank at an interest rate of 6% bi-annually. How much will he get at the end of second year?

Solution:

$$A = P (1+i/m)^{mn}$$

where, A = Amount i.e. Principal+interest receivable at the end of the period.

P= Principal i.e. the amount invested. = Rs. 1,000

i= Rate of interest = 6%

m= number of interest reckoned in a year = 2

n= Number of years = 2

$$= \text{Rs. } 1,000 (1+0.06/2)^{2 \times 2}$$

$$= \text{Rs. } 1,000 (1.03)^4$$

$$= \text{Rs. } 1,000 \times 1.126$$

$$= \text{Rs. } 1,126$$

Therefore, he will get Rs. 1,126 /- at the end of second year.

(c) where interest is paid quarterly

When the interest is reckoned at an interval of three months and the amount is changed in every three months. This increases the effective rate of interest. To find out the amount after the specific period, the following formula is applied.

$$\text{Formula: } A = P (1+i/m)^{mn}$$

where, A = Amount i.e. Principal+interest receivable at the end of the period.

P= Principal i.e. the amount invested.

i= Rate of interest

m= 4

n= Number of years

Example: If interest is paid on the deposit of Rs. 1,000 at 6% rate of compound interest at an interval of 3 months then how much Bimal will get from the bank at the end of second year?

Solution:

$$A = P (1+i/m)^{mn}$$

where, A = Amount i.e. Principal+interest receivable at the end of the period.

P= Principal i.e. the amount invested. = Rs. 1,000

i= Rate of interest = 6%

m= number of interest reckoned in a year = 4

n= Number of years = 2

$$= \text{Rs. } 1,000 (1+0.06/4)^{4 \times 2}$$

$$= \text{Rs. } 1,000 (1.015)^8$$

$$= \text{Rs. } 1,000 \times 1.127$$

$$= \text{Rs. } 1,127$$

Therefore, he will get Rs. 1,127/- at the end of second year

(d) Determination of future value of a series of payments

Sometimes it is required to determine the future value of a series of payments at different times. Suppose Bimal deposits some amount into the bank at the end of every year. Let, he deposited into bank in the last 5 years Rs. 500, Rs. 1,000, Rs. 1,500, Rs. 1800 and Rs. 2,000 respectively. If the rate of interest is 5% p.a., how much will he get at the end of the fifth year?

Since he deposited at the end of the every year, so he would get interest on Rs. 500 for 4 years, on Rs. 1,000 for 3 years, on Rs 1,500 for 2 years, on Rs 1,800 for 1 year and no interest on Rs. 2,000. So, how much he will get at the end of the fifth year is presented in the table below.

<u>Time</u>	<u>Amount deposited</u>	<u>No. of years compounded (n)</u>	<u>FVIF (i, n)</u>	<u>Future Value</u>
At the end of year 1	500	4	1.216	608.00
At the end of year 1	1,000	3	1.158	1,158.00
At the end of year 1	1,500	2	1.103	1,654.50
At the end of year 1	1,800	1	1.050	1,890.00
At the end of year 1	2,000	0	1,000	2,000.00
Value of deposit at the end of 5th year				7,310.50

Where, $FVIF_{(i, n)} = (1+i)^n$,

Here, i is rate of interest and n is number of years compounded.

So, the principal Rs. 6,800 deposited in five years comes to Rs. 7,310.50 at the end of fifth year.

(e) Future value of an Annuity

Most financial decisions involve evaluation of a series of payments and receipts. The series of cash flow may be even or uneven. When the cash flows are equal and the time between each cash flow is identical, we have the special case known as an annuity. Therefore, annuity can be defined as ‘a sequence of uninterrupted, equal cash flows occurring periodically’. Because of this special feature, a new interest factor called the Future Value of Interest Factor for an Annuity, $FVFA_{(i, n)}$ is applied to find out the future value of cash flows. The factor represents the sum of a series of future value interest factors. Life insurance premium paid by a person is an example of annuity. In common, an annuity means that the cash flows occur at the end of each period unless indicated otherwise. But there is also another type of annuity called an

annuity due, which is a sequence of uninterrupted, equal cash flows occurring at the beginning of each period.

The only difference between the ordinary annuity and an annuity due is the timing of cash flows. In case of former, cash flows occur at the end of the period whereas in case of later cash flows occur at the beginning of the period. Therefore, in annuity due, each cash flow will receive one more period of compound interest. To find out the future value of both types of annuity the following formulas are used.

To determine the future value of a regular or ordinary annuity for n years at the interest rate i, the formula will be –

$$FVA_n = A \left[\frac{(1+i)^n - 1}{i} \right] \text{ where, } FVA_n = \text{Total amount deposited in the annuity after n year.}$$

A = Amount paid at the end of each period for n years.

i = Rate of interest

n = Number of years

$\frac{(1+i)^n - 1}{i}$ is expressed by $FVIFA_{(i, n)}$. $FVIFA$ stands for Future value Interest Factor for Annuity and the table is given at the end of this study material.

Finally the Formula stands as:

$$FVA_n = A \times FVIFA_{(i,n)}$$

Example: Ordinary or regular annuity

Arun deposit Rs. 1,000 yearly in a bank account at 6% rate of compound interest for 5 years.

What will be the amount after the end of fifth year?

Solution:

Since, Arun deposits Rs 1,000 yearly i.e. at the end of every year it is a case of ordinary annuity.

So, to find out the amount i.e. principal plus interest we can take help of the following formula.

$$FVA_n = A \times FVIFA_{(i,n)}$$

Where, FVA_n = Future value of annuity at the end of n year

A = Amount deposited yearly during n years

$FVIFA_{(i,n)}$ = Future value interest factor of an annuity at interest i and for n years.

Here, A = Rs. 1,000

i = 6%

and n = 5 years.

So, $FVA_n = A \times FVIFA_{(i,n)}$

$$FVA_n = \text{Rs. } 1,000 \times FVIFA_{(i,n)}$$

$$= \text{Rs. } 1,000 \times 5.6371$$

$$= \text{Rs. } 5637.10$$

Therefore, Rs. 5637.10 be the amount after the end of fifth year.

Where the annuity is not a regular or ordinary one, but an annuity due, the formula stands as below :

$$FVA_n(\text{due}) = A \times (1+i)FVIFA_{(i,n)}$$

Example:

Arun took a life insurance policy from LIC of India paying Rs. 10,000 towards first instalment. the policy is for 10 years and the bonus will be paid @ 7% p.a. compounded annually. find out the sum he will get after 10 years.

Solution:

Since instalment is paid at the beginning of each year, it is a case of annuity (due). so, the following formula is to be applied to find out the maturity value at the end of 10th year.

$$FVA_n(\text{due}) = A \times (1+i)FVIFA_{(i,n)}$$

Here, A = Amount paid each year =Rs. 10,000

i = Rate of interest = 7% = 0.07

n = Number of years = 10

FVA_n (due) = Future value Interest Factor of an annuity at interest rate 7% for 10 years = 13.816 (from the table)

$$\begin{aligned} \text{Therefore, } FVA_n(\text{due}) &= \text{Rs. } 10,000 \times (1+0.07) \times 13.816 \\ &= \text{Rs. } 10,000 \times 1.07 \times 13.816 \\ &= \text{Rs. } 1,47,831.20 \end{aligned}$$

So, Arun will get Rs. 1,47,831.20 after 10 years.

(f) Period required for doubling a cash flow

There are three rules to determine the time required for becoming double of a sum of money available at present. These rules are presented below,

(i) Rule 1 : $FVIFA_{(i,n)} = 2$
From the FVIF table and applying interpolation formula, the value of n can be worked out.

(ii) Rule of 72: Doubling period (n) = $\frac{72}{\text{Rate of interest}} = \frac{72}{i}$

(iii) Rule of 69 : Doubling period (n) = $0.35 + \frac{69}{\text{Rate of interest}} = 0.35 + \frac{69}{i}$

Example:

A company gives 9% compound interest p.a. on the deposit. Arun wants to know after how many days the deposit will be double.

Solution:

Applying Rule of 72: Doubling period (n) = $\frac{72}{i} = \frac{72}{9} = 8$ years.

$$\begin{aligned} \text{Applying Rule of 69: Doubling period (n)} &= 0.35 + \frac{69}{i} \\ &= 0.35 + \frac{69}{9} \\ &= 0.35 + 7.666 \\ &= 8.0166 \text{ years.} \end{aligned}$$

✓ **Effective Rate of Interest versus Nominal Rate of Interest:**

Nominal rate of interest implies that rate which is used to calculate interest on the principal amount. It usually remains constant. In case, where a sum of money carries simple interest, there will be no difference between the two rates. But in case of compound interest the effective rate of interest becomes higher than the nominal rate. The effective rate will be higher when interest is compounded at 3 months or 6 months interval in a year. For example, if the nominal rate of interest in a deposit scheme is 10% p.a. compounded annually, the effective rate will be 10.25% when interest is compounded half-yearly.

Suppose, Harka deposited Rs. 100 at 10% compound interest in a bank. Tek also deposited Rs. 100 in another bank at 10 % compound interest. The bank pays yearly interest on Harka's deposit but the other bank pays half-yearly interest on Tek deposit. What will be the effective rate of interest in both the cases?

In both the cases, the nominal rate of interest is 10 % but one bank pays interest yearly and the other bank half-yearly. The effective rate of interest in both the cases are presented in the following table:

Particulars	Harka	Tek
Initial deposit (p)	Rs. 100	Rs. 100
Nominal rate of interest (i)	10%	10%
Interest accrued after 6 months	Nil	Rs. 5
Principal plus interest after 6 months	-	Rs. 105
Interest at the end of the year	Rs. 10	Rs. 5.25
Total amount	Rs. 110	Rs. 110.25
Effective rate of interest	10%	10.25%

From the above table, it becomes evident that in case of Harka, since interest is paid yearly, the nominal rate and effective rate are equivalent i.e. 10%. But in case of Tek, since interest is paid half yearly, the effective rate becomes higher than the nominal rate i.e. 10.25 %.

Formula: Effective rate of interest (r) = $\left[\left(1 + \frac{i}{m} \right)^m - 1 \right]$

Where, i= Nominal rate of interest

m = number of interest paid in a year.

Example:

If the nominal rate of interest is 12 % p.a. and interest is paid four times in a year on compound basis, what will be the effective rate of interest?

Solution:

We know that,

Effective rate of interest (r) = $\left[\left(1 + \frac{i}{m} \right)^m - 1 \right]$

Here, $i = 12\% = 0.12$

$m = 4$

$$\begin{aligned}\text{So, } r &= \left[\left(1 + \frac{0.12}{4} \right)^4 - 1 \right] \\ &= [(1 + 0.03)^4 - 1] \\ &= [(1.03)^4 - 1] \\ &= 1.126 - 1 \\ &= 0.126 \\ &= 12.6\% \text{ p.a.}\end{aligned}$$

2. Discounting Technique

Discounting technique helps in finding out the present value of future money. It is the reverse of compounding technique which helps in finding out the future value of present money.

(i) Present value of a single Cash Flow

$$\text{Formula: } P = \frac{A}{(1+i)^n} \quad \text{or,} \quad P = A \times \frac{1}{(1+i)^n} \quad \left[\frac{1}{(1+i)^n} \text{ is called the discounting factor} \right]$$

Here, P = Present value

A = Sum to be received or to be paid in future

r = rate of interest

n = Number of years

In the formula above, if the value of n is high then the calculation becomes difficult and we have to use the scientific calculator or to apply logarithm or to take help of Present Value Interest Factor (PVIF) from the PVIF_(i,n) table (Table at the end of this study material) where the present value of Re. 1 at different combination of i and n have been given. Applying the value of PVIF, the above formula can be re-written as-

$$P = A \times \text{PVIF}_{(i, n)}$$

Or, $PV = FV_n \times \text{PVIF}_{(i, n)}$ where, FV_n = Future value at the end of year n

$\text{PVIF}_{(i, n)}$ = Present value interest factor for i and n

Example :

Arun will get Rs. 5,000 after 5 years. If the rate of interest is 10 % p.a. what is the present value of Rs 5,000 ?

Solution:

We know that,

$$P = A \times \text{PVIF}_{(i, n)}$$

Here, A = Rs. 5,000

$$P = ?$$

$$i = 10\%$$

$$n = 5 \text{ years}$$

$$PVIF_{(i, n)} = .621 \text{ (From table)}$$

$$\therefore P = \text{Rs. } 5000 \times 0.621 = \text{Rs. } 3,105$$

So, the present value of Rs. 5000 to be received after 5 years at 10 % interest comes to Rs. 3,105.

(ii) Present value of Multiple Cash Flows

$$\text{Formula: } P = \sum_{t=1}^n C_t \times PVIF_t$$

Where, P = Present Value

C_t = Cash flows of different years i.e. $C_t = 1, 2, 3, \dots, t$

$PVIF_t$ = Present value factor in years 1, 2, 3, \dots, t

Example:

If the specified amount is deposited at present, Arun expect to get Rs. 10,000, Rs. 15,000 and Rs. 20,000 at the end of the year 1 to 3 respectively. What is the present value of the cash inflow if the rate of interest is 10 % p.a.

Solution:

The above problem can be solved by applying formula:

$$P = \sum_{t=1}^n C_t \times PVIF_t$$

Where, P = Present Value

C_t = Cash flows of different years i.e. $C_t = 1, 2, 3, \dots, t$

$PVIF_t$ = Present value factor in years 1, 2, 3, \dots, t

Year (1)	Cash flow Rs. (2)	Present value factor (3)	Present value Rs. 4=(2×3)
1	10,000	0.9090	9,090
2	15,000	0.8264	12,396
3	20,000	0.7513	15,026
Total amount	45,000	Total Present value	36,512

(iii) Short-cut Method to Determine the Present Value of an Annuity

To determine the present value of an annuity, the formula given below is used.

$$\text{Present value of an annuity } P = C \times \left[\sum_{t=1}^n \frac{1}{(1+i)^t} \right]$$

When C = Specified amount of cash flow

i = Interest rate

t = time

The above formula can also be written briefly as-

$$P = C \times ADF \left[\text{since, } \sum_{t=1}^n \frac{1}{(1+i)^t} = ADF \right]$$

ADF stands for Appropriate Annuity Discounting Factor. It is actually the summation of the discount factors of each year.

Example :

Arun will get Rs. 5,000 at the end of each year for 4 years if he takes a single premium insurance policy. If the market rate of interest is 10% p.a., what will be the present value of his future cash flows ?

Solution:

It is an ordinary annuity as Bimal will get a fixed amount of Rs. 5,000 at the end of every year for 4 years. In such a case, the ADF is to be calculated.

Here, ADF = Present value factors of year 1 to year 4 i.e.

$$= ADF_1 + ADF_2 + ADF_3 + ADF_4$$

We know that, Present value factor = $\frac{1}{(1+i)^n}$ [n= 1, 2, 3, 4]

$$\therefore ADF_1 = \frac{1}{(1+0.1)^1} = \frac{1}{1.01} = 0.9090$$

$$ADF_2 = \frac{1}{(1+0.1)^2} = \frac{1}{1.21} = 0.8264$$

$$ADF_3 = \frac{1}{(1+0.1)^3} = \frac{1}{1.331} = 0.7513$$

$$ADF_4 = \frac{1}{(1+0.1)^4} = \frac{1}{1.464} = 0.6030$$

$$\therefore ADF = 3.0897$$

So, the present value of Rs. 5,000 received through year 1 to year 4

$$= C \times ADF \quad [\text{Here, } C = \text{Rs. } 5,000]$$

$$= \text{Rs. } 5,000 \times 3.0897$$

$$= \text{Rs. } 15,448.50$$

• Concepts of Annuity and Perpetuity

In case of annuity, it has a specific time period, say, 5 years, 10 years, 20 years and so on. Depending upon the time of the receipt or payment of an equal amount of money, it is called either ordinary or regular or deferred annuity or annuity due. But, where there is no specific time period of an annuity, i.e. for unlimited period, it is called perpetuity. Therefore, it can be defined as ‘an ordinary annuity whose payment or receipts continue forever’. So, perpetuity is an annuity which continues for indefinite period i.e., for infinity. To determine the present value of perpetuity, the following formula is used.

$$P_{\infty} = A \times PVIFA (i, \infty)$$

$$\text{Or, } P_{\infty} = \frac{A}{i}$$

Where, P = Present value of the perpetuity

A = Amount received or paid periodically

$$PVIFA (i, \infty) = \frac{1}{i}$$

Example:

Miss Tanu wants to know the amount to be invested @ 10% interest rate to get Rs. 1,000 each year for her whole life.

Solution:

We know that the present value of perpetuity

$$P_{\infty} = A \times PVIFA_{(i, \infty)}$$

$$[\text{Here, } A = \text{Rs. } 1,000]$$

$$PVIFA_{(i, \infty)} = \frac{1}{i} = \frac{1}{0.1} = 10]$$

$$= \text{Rs. } 1,000 \times 10$$

$$= \text{Rs. } 10,000$$

• Risk-return relationship (concepts only)

Risk and return are two major considerations in the discussion of financial management. Business is risky event and profit is the prize of bearing the risk. In financial management, risk and return are reviewed before taking any financial decision. The amount of finance collected from various sources and their investment in different projects are associated with risk and return. For instance, if the capital of the business is loaned capital, the business firm have to pay interest on capital timely. If the firm cannot earn profit adequately to pay the debt and interest accrued cannot be met the debtors may seek justice in the court of law or may pray for liquidation of the firm. So, the firm must invest in those projects only where return is almost guaranteed to pay the debt and interest on debt. Apart from that the return should be such that the owners should get their expected return. Financial management explores the risk and return associated with each investment.

Definition of Return

The source of return is the investment. The surplus which is generated over a period from the investment is called return. Prassana Chandra stated in this regard that ‘ the return from an investment is the realisable cash flow earned by its owner during a given period of time’. Another definition of return states that it is simply cash inflows from an investment over some period due to ownership plus the change in market price, divided by the beginning price.

Measurement of Return

Measurement of return is a difficult task. Usually, there are five methods to measure the return from an investment projects. These are-

- (i) **Profit method:** Under this method return of profit is measured by deducting purchase value from the sale value. So, if the sales value is Rs. 1,00,000 and purchase value is 70,000, the profit or return amounts to Rs. 30,000.
- (ii) **Cash flow method :** In this method, return is measured by deducting cash outflows from the cash inflows of an investment project. It is actually the cash basis of measuring revenue. For instance, a firm’s total sale was Rs. 5,00,000 of which Rs. 3,60,000 was cash sales and Rs. 1,40,000 credit sales. On the other hand total purchase was Rs. 3,80,000 of which cash purchase was Rs. 3,20,000 and rest Rs. 60,000 was due. According to cash flow method, the return is
$$\text{Rs. } 3,60,000 - \text{Rs. } 3,20,000 = \text{Rs. } 40,000.$$
- (iii) **Income method:** It is akin to the profit method where income is measured by differentiating total sales and total purchase. The income is expressed in different ways viz. Income before interest and tax, income before tax, income after tax etc.

- (iv) **Ratio method:** ratio is defined as when one number is expressed in terms of another number, it is known as ratio. This method is used to measure the percentage of return in respect of capital employed.
- (v) **Weighted average return method:** there is potentiality of income from each investment. However it varies from project to project. In some project it is high, in some cases it is moderate and in some other cases, it is low. All these potentialities are called weights. When the return from different projects are multiplied with the weight of respective project and the sum of the product is divided by the total weights, the result is the weighted average return.

Definition of Risk

Future is uncertain. The finance manager has to accept that the expected return may or may not be realised. The prime considerations in financial management are – (a) Procurement of finance and (b) investment of finance. There are risks in both these areas.

Risk refers to the variability of the possible returns in respect of an investment proposal. The risk associated with an investment arises because it is hard to estimate expected returns accurately due to the uncertainty of future events. Risk is defined as the variability which are likely to accrue in future between the expected returns and the actual returns. In other way, it is the degree of uncertainty attached to an income. The greater the variability, the higher will be the degree of risk attached to the project and vice-versa.

Hampton stated that “the risk is defined as the possibility that the actual return from an investment will be less than the expected return”. Some other definition of the risk are- “Risk is the possibility of deviation of actual returns from the expected returns as a result of investment.”

“Risk is an investment project may be defined as the variability in the prospective returns or future streams of benefits that are likely to occur from the investment.”

A business is exposed to a number of risks since there are many factors which are beyond its control. Some examples of such factors are fiscal or monetary policy of the government, new competitive pressure, technological change, non-availability of fund, inflation and so on. The uncertainty results in prediction of cash flows going wrong. The deviation of the actual cash flows reflects the risk associated with the project.

Type of Risk

The common type of Risk are-

- (i) **Investment risk:** the probability of emerging loss from a single financial or capital asset is termed as investment risk. Such risk arises when the chance of actual return from an investment be less than the expected return.
- (ii) **Systematic risk:** The uncontrollable risks are called the systematic risks. All firms of the country has to bear such risk. The examples of such risk are inflation, industrial policy of the government, credit policy of the Reserve Bank of India, state of money supply in the market etc. Since the firm has no control over these risks, the firm cannot earn the expected return.
- (iii) **Unsystematic risk:** such risk arises due to the internal problems of the firm. When the firm suffers from various mismanagement internally, the unsystematic risk rises. Due to such risk, the firm cannot earn the expected return. The examples of such risk are breakdown of machines, scarcity of raw materials, labour problem, legal constraints etc.
- (iv) **Portfolio risk:** portfolio refers to the combination of investment in different instruments with a view to minimise the risk. However, risk cannot be totally set off.

Thus the risk involved in investment of different projects or assets are called portfolio risk. Such risk can be minimised by diversification of investment.

Risk-Return Trade off

Financial decisions incur different degree of risk. An investor's decision to invest in risk free government bonds has less risk as interest rate is known and the risk of default is very less. On the other hand, an investor would incur more risk if he decides to invest in shares, as the return is not certain. However, the investor can expect a lower return from government bond and higher from shares. Risk and expected return move in tandem; the greater the risk the greater would be the expected return.

The finance manager has to take various types of decision- investment decisions, financing decisions and dividend decisions. A finance manager takes these decisions in the light of the objective of wealth maximisation as reflected in the market price of the shares. The finance manager should also know as to what are the factors which may affect the market price of the shares. The various decisions will be taken in the light of these factors; otherwise any attempt to achieve the objective of maximisation of market price of the shares may not be achieved. A finance manager cannot avoid the risk altogether nor can he make a decision by considering the return aspect only. Usually, as the return from an investment increases, the risk associated with it also increases. In an attempt to increase the return, the finance manager will have to undertake greater degree of risk also. Therefore, a finance manager is often required to trade-off between the risk and return. At the time of taking any decision, the finance manager tries to achieve the proper balance between the consideration of risk and return associated with various financial management decisions to maximise the market value of the firm. A particular combination of risk and return where both are optimized may be known as Risk-return trade off and at this level of risk-return, the market price of the shares will be maximised. The figure below demonstrates the relationship between market value of the firm, return and risk, on the one hand and financial management decision on the other.

The figure below demonstrates the relationship between market value of the firm, return and risk, on the one hand and financial management decision on the other.

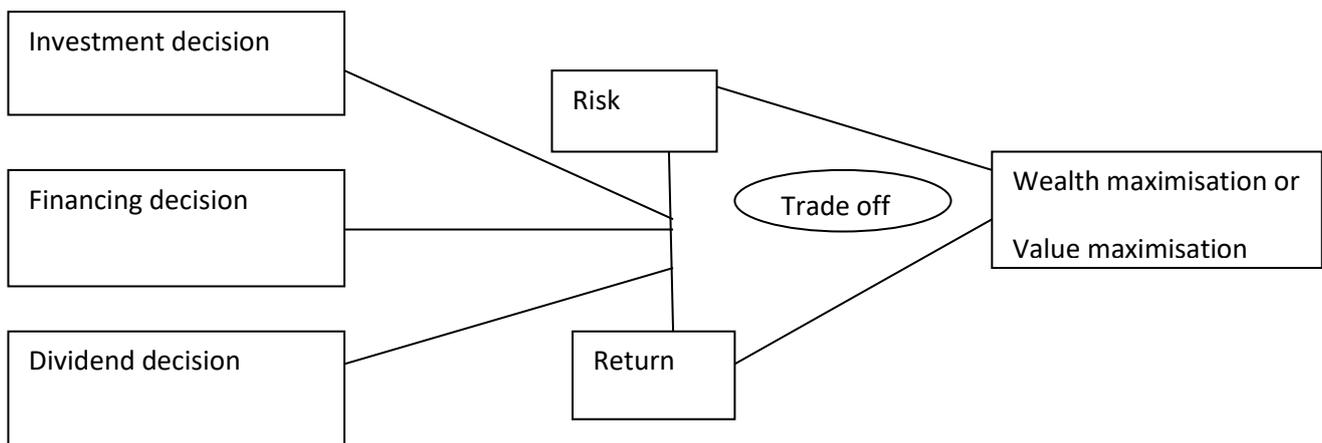


Table-1

Compound Value of Re. 1

FVIF (i,n)

INTEREST RATE (i)

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	25%	30%
1	1.0100	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000	1.1100	1.1200	1.1300	1.1400	1.1500	1.1600	1.2000	1.2400	1.2500	1.3000
2	1.0201	1.0404	1.0609	1.0816	1.1025	1.1236	1.1449	1.1664	1.1881	1.2100	1.2321	1.2544	1.2769	1.2996	1.3225	1.3456	1.4400	1.5376	1.5625	1.6900
3	1.0303	1.0612	1.0927	1.1249	1.1576	1.1910	1.2250	1.2597	1.2950	1.3310	1.3676	1.4049	1.4429	1.4815	1.5209	1.5609	1.7280	1.9066	1.9531	2.1970
4	1.0406	1.0824	1.1255	1.1699	1.2155	1.2625	1.3108	1.3605	1.4116	1.4641	1.5181	1.5735	1.6305	1.6890	1.7490	1.8106	2.0736	2.3642	2.4414	2.8561
5	1.0510	1.1041	1.1593	1.2167	1.2763	1.3382	1.4026	1.4693	1.5386	1.6105	1.6851	1.7623	1.8424	1.9254	2.0114	2.1003	2.4883	2.9316	3.0518	3.7129
6	1.0615	1.1262	1.1941	1.2653	1.3401	1.4185	1.5007	1.5869	1.6771	1.7716	1.8704	1.9738	2.0820	2.1950	2.3131	2.4364	2.9660	3.6352	3.8147	4.8268
7	1.0721	1.1487	1.2299	1.3159	1.4071	1.5036	1.6058	1.7138	1.8280	1.9487	2.0762	2.2107	2.3526	2.5023	2.6600	2.8262	3.5832	4.5077	4.7684	6.2749
8	1.0829	1.1717	1.2668	1.3686	1.4775	1.5938	1.7182	1.8509	1.9926	2.1436	2.3045	2.4760	2.6584	2.8526	3.0590	3.2784	4.2998	5.5895	5.9605	8.1573
9	1.0937	1.1951	1.3048	1.4233	1.5513	1.6895	1.8385	1.9990	2.1719	2.3579	2.5580	2.7731	3.0040	3.2519	3.5179	3.8030	5.1598	6.9310	7.4506	10.604
10	1.1046	1.2190	1.3439	1.4802	1.6289	1.7908	1.9672	2.1589	2.3674	2.5937	2.8394	3.1058	3.3946	3.7072	4.0456	4.4114	6.1917	8.5944	9.3132	13.786
11	1.1157	1.2434	1.3842	1.5395	1.7103	1.8983	2.1049	2.3316	2.5804	2.8531	3.1518	3.4785	3.8359	4.2262	4.6524	5.1173	7.4301	10.657	11.642	17.922
12	1.1268	1.2682	1.4258	1.6010	1.7959	2.0122	2.2522	2.5182	2.8127	3.1384	3.4985	3.8960	4.3345	4.8179	5.3503	5.9360	8.9161	13.215	14.552	23.298
13	1.1381	1.2936	1.4685	1.6651	1.8856	2.1329	2.4098	2.7196	3.0658	3.4523	3.8833	4.3635	4.8900	5.4924	6.1528	6.8858	10.699	16.386	18.190	30.288
14	1.1495	1.3195	1.5126	1.7317	1.9799	2.2609	2.5785	2.9372	3.3417	3.7975	4.3104	4.8871	5.5348	6.2613	7.0757	7.9875	12.839	20.319	22.737	39.374
15	1.1610	1.3459	1.5580	1.8009	2.0789	2.3966	2.7590	3.1722	3.6425	4.1772	4.7846	5.4736	6.2543	7.1379	8.1371	9.2655	15.407	25.196	28.422	51.186
16	1.1726	1.3728	1.6047	1.8730	2.1829	2.5404	2.9522	3.4259	3.9703	4.5950	5.3109	6.1304	7.0673	8.1372	9.3576	10.748	18.488	31.243	35.527	66.542
17	1.1843	1.4002	1.6528	1.9479	2.2920	2.6928	3.1588	3.7000	4.3276	5.0545	5.8951	6.8660	7.9861	9.2765	10.761	12.468	22.186	38.741	44.409	86.504
18	1.1961	1.4282	1.7024	2.0258	2.4066	2.8543	3.3799	3.9960	4.7171	5.5599	6.5436	7.6900	9.0243	10.575	12.375	14.463	26.623	48.039	55.511	112.455
19	1.2081	1.4568	1.7535	2.1068	2.5270	3.0256	3.6165	4.3157	5.1417	6.1159	7.2633	8.6128	10.197	12.056	14.232	16.777	31.948	59.568	69.389	146.192
20	1.2202	1.4859	1.8061	2.1911	2.6533	3.2071	3.8697	4.6610	5.6044	6.7275	8.0623	9.6463	11.523	13.743	16.367	19.461	38.338	73.864	86.736	190.050
21	1.2324	1.5157	1.8603	2.2788	2.7860	3.3996	4.1406	5.0338	6.1088	7.4002	8.9492	10.804	13.021	15.668	18.822	22.574	46.005	91.592	108.420	247.065
22	1.2447	1.5460	1.9161	2.3699	2.9253	3.6035	4.4304	5.4365	6.6586	8.1403	9.9336	12.100	14.714	17.861	21.645	26.186	55.206	113.574	135.525	321.184
23	1.2572	1.5769	1.9736	2.4647	3.0715	3.8197	4.7405	5.8715	7.2579	8.9543	11.026	13.552	16.627	20.362	24.891	30.376	66.247	140.831	169.407	417.539
24	1.2697	1.6084	2.0328	2.5633	3.2251	4.0489	5.0724	6.3412	7.9111	9.8497	12.239	15.179	18.788	23.212	28.625	35.236	79.497	174.631	211.758	542.801
25	1.2824	1.6406	2.0938	2.6658	3.3864	4.2919	5.4274	6.8485	8.6231	10.835	13.585	17.000	21.231	26.462	32.919	40.874	95.396	216.542	264.698	705.641
30	1.3478	1.8114	2.4273	3.2434	4.3219	5.7435	7.6123	10.063	13.268	17.449	22.892	29.960	39.116	50.950	66.212	85.850	237.376	634.820	807.794	*
35	1.4166	1.9999	2.8139	3.9461	5.5160	7.6861	10.677	14.785	20.414	28.102	38.575	52.800	72.069	98.100	133.176	180.314	590.668	1544.176	1997.176	*
36	1.4308	2.0399	2.8983	4.1039	5.7918	8.1473	11.424	15.968	22.251	30.913	42.818	59.136	81.437	111.834	153.152	209.164	708.802	1847.176	2411.176	*
40	1.4889	2.2080	3.2620	4.8010	7.0400	10.286	14.974	21.725	31.409	45.259	65.001	93.051	132.782	188.884	267.864	378.721	*	*	*	*
50	1.6446	2.6916	4.3839	7.1067	11.467	18.420	29.457	46.902	74.358	117.391	184.565	289.002	450.736	700.233	*	*	*	*	*	*

Table-3

Present Value of Re. 1

PVIF_(i,n)

INTEREST RATE (i)

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	25%	30%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333	0.8065	0.8000	0.7692
2	0.9803	0.9612	0.9426	0.9246	0.9070	0.8900	0.8734	0.8573	0.8417	0.8264	0.8116	0.7972	0.7831	0.7695	0.7561	0.7432	0.6944	0.6504	0.6400	0.5917
3	0.9706	0.9423	0.9151	0.8890	0.8638	0.8396	0.8163	0.7938	0.7722	0.7513	0.7312	0.7118	0.6931	0.6750	0.6575	0.6407	0.5787	0.5245	0.5120	0.4552
4	0.9610	0.9238	0.8885	0.8548	0.8227	0.7921	0.7629	0.7350	0.7084	0.6830	0.6587	0.6355	0.6133	0.5921	0.5718	0.5523	0.4823	0.4230	0.4096	0.3501
5	0.9515	0.9057	0.8626	0.8219	0.7835	0.7473	0.7130	0.6806	0.6499	0.6209	0.5935	0.5674	0.5428	0.5194	0.4972	0.4761	0.4019	0.3411	0.3277	0.2693
6	0.9420	0.8880	0.8375	0.7903	0.7462	0.7050	0.6663	0.6302	0.5963	0.5645	0.5346	0.5066	0.4803	0.4556	0.4323	0.4104	0.3349	0.2751	0.2621	0.2072
7	0.9327	0.8706	0.8131	0.7599	0.7107	0.6651	0.6227	0.5835	0.5470	0.5132	0.4817	0.4523	0.4251	0.3996	0.3759	0.3538	0.2791	0.2218	0.2097	0.1594
8	0.9235	0.8535	0.7894	0.7307	0.6768	0.6274	0.5820	0.5403	0.5019	0.4665	0.4339	0.4039	0.3762	0.3506	0.3269	0.3050	0.2326	0.1789	0.1678	0.1226
9	0.9143	0.8368	0.7664	0.7026	0.6446	0.5919	0.5439	0.5002	0.4604	0.4241	0.3909	0.3606	0.3329	0.3075	0.2843	0.2630	0.1938	0.1443	0.1342	0.0943
10	0.9053	0.8203	0.7441	0.6756	0.6139	0.5584	0.5083	0.4632	0.4224	0.3855	0.3522	0.3220	0.2946	0.2697	0.2472	0.2267	0.1615	0.1164	0.1074	0.0725
11	0.8963	0.8043	0.7224	0.6496	0.5847	0.5268	0.4751	0.4289	0.3875	0.3505	0.3173	0.2875	0.2607	0.2366	0.2149	0.1954	0.1346	0.0938	0.0859	0.0558
12	0.8874	0.7885	0.7014	0.6246	0.5568	0.4970	0.4440	0.3971	0.3555	0.3186	0.2858	0.2567	0.2307	0.2076	0.1869	0.1685	0.1122	0.0757	0.0687	0.0429
13	0.8787	0.7730	0.6810	0.6006	0.5303	0.4688	0.4150	0.3677	0.3262	0.2897	0.2575	0.2292	0.2042	0.1821	0.1625	0.1452	0.0935	0.0610	0.0550	0.0330
14	0.8700	0.7579	0.6611	0.5775	0.5051	0.4423	0.3878	0.3405	0.2992	0.2633	0.2320	0.2046	0.1807	0.1597	0.1413	0.1252	0.0779	0.0492	0.0440	0.0254
15	0.8613	0.7430	0.6419	0.5553	0.4810	0.4173	0.3624	0.3152	0.2745	0.2394	0.2090	0.1827	0.1599	0.1401	0.1229	0.1079	0.0649	0.0397	0.0352	0.0195
16	0.8528	0.7284	0.6232	0.5339	0.4581	0.3936	0.3387	0.2919	0.2519	0.2176	0.1883	0.1631	0.1415	0.1229	0.1069	0.0930	0.0541	0.0320	0.0281	0.0150
17	0.8444	0.7142	0.6050	0.5134	0.4363	0.3714	0.3166	0.2703	0.2311	0.1978	0.1696	0.1456	0.1252	0.1078	0.0929	0.0802	0.0451	0.0258	0.0225	0.0116
18	0.8360	0.7002	0.5874	0.4936	0.4155	0.3503	0.2959	0.2502	0.2120	0.1799	0.1528	0.1300	0.1108	0.0946	0.0808	0.0691	0.0376	0.0208	0.0180	0.0089
19	0.8277	0.6864	0.5703	0.4746	0.3957	0.3305	0.2765	0.2317	0.1945	0.1635	0.1377	0.1161	0.0981	0.0829	0.0703	0.0596	0.0313	0.0168	0.0144	0.0068
20	0.8195	0.6730	0.5537	0.4564	0.3769	0.3118	0.2584	0.2145	0.1784	0.1486	0.1240	0.1037	0.0868	0.0728	0.0611	0.0514	0.0261	0.0135	0.0115	0.0053
21	0.8114	0.6598	0.5375	0.4388	0.3589	0.2942	0.2415	0.1987	0.1637	0.1351	0.1117	0.0926	0.0768	0.0638	0.0531	0.0443	0.0217	0.0109	0.0092	0.0040
22	0.8034	0.6468	0.5219	0.4220	0.3418	0.2775	0.2257	0.1839	0.1502	0.1228	0.1007	0.0826	0.0680	0.0560	0.0462	0.0382	0.0181	0.0088	0.0074	0.0031
23	0.7954	0.6342	0.5067	0.4057	0.3256	0.2618	0.2109	0.1703	0.1378	0.1117	0.0907	0.0738	0.0601	0.0491	0.0402	0.0329	0.0151	0.0071	0.0059	0.0024
24	0.7876	0.6217	0.4919	0.3901	0.3101	0.2470	0.1971	0.1577	0.1264	0.1015	0.0817	0.0659	0.0532	0.0431	0.0349	0.0284	0.0126	0.0057	0.0047	0.0018
25	0.7798	0.6095	0.4776	0.3751	0.2953	0.2330	0.1842	0.1460	0.1160	0.0923	0.0736	0.0588	0.0471	0.0378	0.0304	0.0245	0.0105	0.0046	0.0038	0.0014
30	0.7419	0.5521	0.4120	0.3083	0.2314	0.1741	0.1314	0.0994	0.0754	0.0573	0.0437	0.0334	0.0256	0.0196	0.0151	0.0116	0.0042	0.0016	0.0012	*
35	0.7059	0.5000	0.3554	0.2534	0.1813	0.1301	0.0937	0.0676	0.0490	0.0356	0.0259	0.0189	0.0139	0.0102	0.0075	0.0055	0.0017	0.0005	0.0005	*
36	0.6989	0.4902	0.3450	0.2437	0.1727	0.1227	0.0875	0.0626	0.0449	0.0323	0.0234	0.0169	0.0123	0.0089	0.0065	0.0048	0.0014	*	*	*
40	0.6717	0.4529	0.3066	0.2083	0.1420	0.0972	0.0668	0.0460	0.0318	0.0221	0.0154	0.0107	0.0075	0.0053	0.0037	0.0026	0.0007	*	*	*
50	0.6080	0.3715	0.2281	0.1407	0.0872	0.0543	0.0339	0.0213	0.0134	0.0085	0.0054	0.0035	0.0022	0.0014	0.0009	0.0006	*	*	*	*

Table-4

Present Value of an Annuity of Re. 1:

PVIFA (i,n)

INTEREST RATE (i)

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	25%	30%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333	0.8065	0.8000	0.7692
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355	1.7125	1.6901	1.6681	1.6467	1.6257	1.6052	1.5278	1.4568	1.4400	1.3609
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	2.4437	2.4018	2.3612	2.3216	2.2832	2.2469	2.1065	1.9813	1.9520	1.8161
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699	3.1024	3.0373	2.9745	2.9137	2.8550	2.7982	2.5887	2.4043	2.3616	2.1662
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908	3.6959	3.6048	3.5172	3.4331	3.3522	3.2743	2.9906	2.7454	2.6893	2.4356
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.4859	4.3553	4.2305	4.1114	3.9975	3.8887	3.7845	3.6847	3.3255	3.0205	2.9514	2.6427
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330	4.8684	4.7122	4.5638	4.4226	4.2883	4.1604	4.0386	3.6046	3.2423	3.1611	2.8021
8	7.6517	7.3255	7.0197	6.7327	6.4632	6.2098	5.9713	5.7466	5.5348	5.3349	5.1461	4.9676	4.7988	4.6389	4.4873	4.3436	3.8372	3.4212	3.3289	2.9247
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952	5.7590	5.5370	5.3282	5.1317	4.9464	4.7716	4.6065	4.0310	3.5655	3.4631	3.0190
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177	6.1446	5.8892	5.6502	5.4262	5.2161	5.0188	4.8332	4.1925	3.6819	3.5705	3.0915
11	10.368	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.8052	6.4951	6.2065	5.9377	5.6869	5.4527	5.2337	5.0286	4.3271	3.7757	3.6564	3.1473
12	11.255	10.575	9.9540	9.3851	8.8633	8.3838	7.9427	7.5361	7.1607	6.8137	6.4924	6.1944	5.9176	5.6603	5.4206	5.1971	4.4392	3.8514	3.7251	3.1903
13	12.134	11.348	10.635	9.9856	9.3936	8.8527	8.3577	7.9038	7.4869	7.1034	6.7499	6.4235	6.1218	5.8424	5.5831	5.3423	4.5327	3.9124	3.7801	3.2233
14	13.004	12.106	11.296	10.563	9.8986	9.2950	8.7455	8.2442	7.7862	7.3667	6.9819	6.6282	6.3025	6.0021	5.7245	5.4675	4.6106	3.9616	3.8241	3.2487
15	13.865	12.849	11.938	11.118	10.380	9.7122	9.1079	8.5595	8.0607	7.6061	7.1909	6.8109	6.4624	6.1422	5.8474	5.5755	4.6755	4.0013	3.8593	3.2682
16	14.718	13.578	12.561	11.652	10.838	10.106	9.4466	8.8514	8.3126	7.8237	7.3792	6.9740	6.6039	6.2651	5.9542	5.6685	4.7296	4.0333	3.8874	3.2832
17	15.562	14.292	13.166	12.166	11.274	10.477	9.7632	9.1216	8.5436	8.0216	7.5488	7.1196	6.7291	6.3729	6.0472	5.7487	4.7746	4.0591	3.9099	3.2948
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.3719	8.7556	8.2014	7.7016	7.2497	6.8399	6.4674	6.1280	5.8178	4.8122	4.0799	3.9279	3.3037
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.6036	8.9501	8.3649	7.8393	7.3658	6.9380	6.5504	6.1982	5.8775	4.8435	4.0967	3.9424	3.3105
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.8181	9.1285	8.5136	7.9633	7.4694	7.0248	6.6231	6.2593	5.9288	4.8696	4.1103	3.9539	3.3158
21	18.857	17.011	15.415	14.029	12.821	11.764	10.836	10.017	9.2922	8.6487	8.0751	7.5620	7.1016	6.6870	6.3125	5.9731	4.8913	4.1212	3.9631	3.3198
22	19.660	17.658	15.937	14.451	13.163	12.042	11.061	10.201	9.4424	8.7715	8.1757	7.6446	7.1695	6.7429	6.3587	6.0113	4.9094	4.1300	3.9705	3.3230
23	20.456	18.292	16.444	14.857	13.489	12.303	11.272	10.371	9.5802	8.8832	8.2664	7.7184	7.2297	6.7921	6.3988	6.0442	4.9245	4.1371	3.9764	3.3254
24	21.243	18.914	16.936	15.247	13.799	12.550	11.469	10.529	9.7066	8.9847	8.3481	7.7843	7.2829	6.8351	6.4338	6.0726	4.9371	4.1428	3.9811	3.3272
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.8226	9.0770	8.4217	7.8431	7.3300	6.8729	6.4641	6.0971	4.9476	4.1474	3.9849	3.3286
30	25.808	22.396	19.600	17.292	15.372	13.765	12.409	11.258	10.274	9.4269	8.6938	8.0552	7.4957	7.0027	6.5660	6.1772	4.9789	4.1601	3.9950	3.3321
35	29.409	24.999	21.487	18.665	16.374	14.498	12.948	11.655	10.567	9.6442	8.8552	8.1755	7.5856	7.0700	6.6166	6.2153	4.9915	4.1644	3.9984	3.3330
36	30.108	25.489	21.832	18.908	16.547	14.621	13.035	11.717	10.612	9.6765	8.8786	8.1924	7.5979	7.0790	6.6231	6.2201	4.9929	4.1649	3.9987	3.3331
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.7791	8.9511	8.2438	7.6344	7.1050	6.6418	6.2335	4.9966	4.1659	3.9995	3.3332
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.9148	9.0417	8.3045	7.6752	7.1327	6.6605	6.2463	4.9995	4.1666	3.9999	3.3333

