Unit-1

NATURE AND SCOPE OF FINANCIAL MANAGEMENT

Unit Structure:

1.0 LEARNING OBJECTIVES

The present chapter attempts to:

- Provide familiarisation with financial objectives and goals of a firm.
- Develop conceptual framework of financial management.
- Focus on nature, and scope of financial management.
- Explaining the role of finance function.
- Discuss the role of finance manager.

1.1 INTRODUCTION

Finance touches every aspect of our life and holds the key to all activities. It has been described as the life blood of any business. The blood in our body needs to be regulated to ensure smooth circulation for healthy survival. Management of finance in an optimal manner is inevitable for success of any business. The finance function has been defined differently by different writers and differently over time. According to G.L. Jones, the simplest way of understanding finance is to say that finance is what finance does. L.J. Gitman has defined finance as the art and science of managing money. The only conclusion one may make with respect to finance is that it has a marvellous ability to evoke different concepts in the minds of men.

1.2 MEANING AND DEFINITION OF FINANCIAL MANAGEMENT

Financial management means money management. Financial management is concerned with the planning and controlling of the financial resources of the business firm. The term financial management has emerged from the generic discipline of management. As an academic discipline, the subject of financial management has undergone radical changes in relation to its scope, functions and objectives. In the past, the financial management was confined to rising of the funds and its procedural aspects. In the broader sense, it is now concerned with the optimum use of financial resources in addition to its procurement. Therefore, financial management is that part of management which is concerned mainly with:

1. Fund Raising: raising the right type of funds in the most economic and suitable manner.

2. Use of Funds: using the funds in the most profitable and safest possible manner.

According to James Van Horne,

"Financial management connotes responsibility for obtaining and effectively utilizing funds necessary for the efficient operation of an enterprise."

According to I.M. Pandey:

"Financial management is that managerial activity which is concerned with the planning and controlling of the firm's financial resources".

Financial management provides the best guide for future resource allocation by the firm. It performs facilitation, reconciliation and control function in an organisation. It permits and recommends investment where the opportunity is greatest. Financial management produces relatively uniform yardsticks for judging most of the enterprise's operations and projects. It is continually concerned with an adequate rate of return on investment which is necessary to assure the successful survival of an enterprise. The problem of attracting new capital and providing funds for capital needs is solved if the return on investments is adequate. Because it Is continuing drawing attention to such matters, financial management is essential to effective top management.

Definitions of Financial Management

The simple definition of Financial Management is `the ways and means of managing money'. This statement can be further

expanded to define Financial Management: the determination, acquisition, allocation and utilization of the financial resources with the aim of achieving the goals and objectives of the enterprise.

According to Archer and Ambrosia:

"Financial management is the application of the planning and Control functions to the finance function".

Joseph and Massie:

"Financial management is the operational activity of a business that is responsible for obtaining and effectively utilizing the funds necessary for efficient operation".

Raymond Chambers:

"Financial management may be considered to be the management of the finance function. It may be described as making decisions on financial matters and facilitating and reviewing their execution. It may be used to designate the field of study which lie beneath these processes".

1.3 SCOPE OF FINANCIAL MANAGEMENT

All decisions that have monetary benefits come under the purview of financial management. There are basically, two approaches for understanding the scope of financial management: one is traditional approach and the second one is the modern approach.

1. Traditional approach: Traditional approach views the scope of finance function in a narrow sense of arrangement of funds by business firm to meet their financing needs. Hence, the following three inter-related aspects of raising and administering financial resources were covered:

a) Arrangement of finance from institution;

b) Raising funds in the capital market through financial instruments including the procedural aspects;

c) Legal and accounting aspects involved for raising finance for the firm.

The traditional approach was criticized for the reasons:

a) It emphasis only the issues relating to procurement of funds and ignored the issues related to internal financial decisions.

b) It focused only on the problems related to corporate entities ignoring the non-corporate bodies. The scope of financial

management was confined only to a particular segment of business enterprises.

c) It laid more emphasis on the onetime events (episode) such as promotion, incorporation, reorganization, etc., taking place in the corporate life of the concern/ignoring the day-to-day financial problems of the concern.

d) The focus was more on long term financing. Working capital management was considered to be outside the purview of finance function.

According to Solomon, the traditional approach has ignored the central issues of financial management which comprise the following:

i) Should the enterprise commit capital funds to certain purpose?

ii) Do the expected returns meet financial standards of performance?

iii) How should these standards be set and what is the cost of capital funds to the enterprise?

iv) How does the cost vary with the mixture of financing methods used?

Therefore, the traditional approach while ignoring the above crucial aspects implied a very narrow scope for financial management. These defects were taken care by the Modern approach.

2. Modern Approach: The traditional approach focused on sources of funds and was too often largely concerned with specific procedural details. Experts pointed out the following two defects of traditional approach:

i) It does not recognize the relationship between financing mix and the cost of capital and fails to solve the problems relating to optimum combination of finance, and

ii) It also fails to deal with the problems relating to the valuation of the firm and the cost of capital.

The modern approach aims at formulating rational policies for the optimal use, procurement and allocation of funds; unlike the traditional approach which has focused only on the sources of funds and their procedural details. The modern approach apart for covering the acquisition of external funds; includes the efficient and wise allocation of funds for various uses. Emphasis has shifted from a detailed analysis, of operating procedures in the acquisition, custody and disbursement of funds to the formulation of rational

decisions on the optimal use and allocation of funds. Financial decision making has become fully integrated in more advanced companies with top management policy formulation via capital budgeting, loan range planning, evaluation of alternate uses of funds, and establishment of measurable standards of performance in financial terms.

In the words of Solomon, a financial manager should know the following:

i) How large should an enterprise be and how fast should it grow?

ii) In what form should it hold its assets?

iii) What should be the composition of its liabilities?

Thus, the modern approach views the term financial management in a broad sense and provides a conceptual and analytical framework for financial decision making. Therefore, financial management, in the modern sense of the term, can be related to three major decision making areas. They are as follows:

1. Investment Decision i.e. Where to invest funds and in what amounts?
2. Financing Decisions i. e .Where to raise funds from and in what amount?
3. Dividend Decisions i. e how much of profits should be paid by way of dividends and how much should be retained in the business?

All the above three decisions contribute towards the goal of wealth maximization.

1. Investment Decisions: Investment decisions involve identifying the asset or projects in which the firms limited resources should be invested. It involves the major task of measuring the prospective profitability of investment in assets of the company or in new projects. The decisions relating to acquisition of fixed assets investment are known as capital budgeting decisions and the decisions relating to current assets investment are known as working capital management decisions. Capital budgeting decisions relate to selection of an asset or investment proposal or course of action which have hot long term implications on the cash flows and profitability of such investment. It helps in judging whether it is financial feasible to commit funds in future. An important aspect of working capital, the profitability would be adversely affected, whereas with too inadequate working capital, it would be unable to meet its financial commitment on time and thereby invite the risk of insolvency. The investment in the fixed assets of the company

determines the production capacity of the company. The production should be sufficient to demand in the market. Production should not fall short or be too excessive in relation to the demand for the product in the market. Further, the fixed assets must be productive enough to ensure the returns expected from such investment. This should be supported by sufficient investment in the working capital assets. The working capital assets should be adequate enough to maintain sufficient liquidity to augment the sales level. Investment decisions yield returns in future. Future performance is subject to uncertainty and risk. Therefore, investment decisions require careful analysis before substantial amounts are committed in fixed assets. The investment decisions having long term implications and affects the cash inflows in the years to come. Hence any wrong decision taken in the initial year, would adversely affect the future profitability and growth. Hence appropriate techniques need to be adopted for proper evaluation of investment decisions.

2. Financing Decisions: Financing decisions involve deciding on the most cost effective method of financing the chosen investments. Financing decisions relate to the financing pattern of the firm. It involves in deciding as to when, where and how to acquire the funds to meet the firm's investment needs. Different sources of finance have different advantages with different degree of risks. Hence it becomes imperative to decide as to how much finance is to be raised and from which sources. The prime objective of financing decisions is to keep the cost of finance at the minimum with maximum utilization of funds. Primarily, there are two main sources of finance: one is the owned funds and second is the borrowed funds. Owned funds are the shareholder's monies on which dividend are paid. Dividend payment depends upon the profitability of the company and is not binding. There is no commitment involved in the shareholders funds. On the other hand, borrowed funds involve fixed commitments; their repayments are secured by a charge created on the assets and interest payments are obligatory irrespective of the profits or losses of the company. Hence, it increases the financial risk of the company. The borrowed funds are relatively cheaper, but entail a certain degree of risk, therefore, due prudence must be exercised while determining the mix of owned and borrowed funds.

3. Dividend Decision: Dividend Decisions involve the decisions as regards what amount of profits earned should be distributed by way of dividends and what amount should be retained in the business. Dividend policy is to be decided having regard to it's implicate on the shareholder wealth in the firm. The aim is to decide an optimum dividend policy which would maximize the market price of shares. This is a crucial decision as it determines the reputation of the management of the company and therefore, the market value of the shares. If the management decides to retain profits, it should be

able to generate adequate returns (by investing such retained profits), which should be much more that what the, shareholders could have got, had they received the dividends and invested the amount elsewhere. If the management is not able to generate adequate returns on reinvestment of retained profits, then it should prefer to pay dividends rather than retaining the profits. Therefore, the two important factors which affect the dividend decisions are: firstly, the investment opportunities available to the firms and secondly, the opportunity rate of return of the shareholders. The topic has been dealt in more details in the subsequent chapters of this book.

1.4 IMPORTANCE OF FINANCIAL MANAGEMENT IN BUSINESS

The importance of financial management is known from the following aspects:

1. Applicability – The principles of finance is applicable wherever there is cash flow. The concept of cash flow is one of the central elements of financial analysis, planning, control and resource allocation decisions. Cash flow is important because financial health of the firm depends on its ability to generate sufficient amounts of cash to pay its employees, suppliers, creditors and owners. Any organization, whether motivated with earning of profit or not, having cash flow requires to be viewed from the angle of financial discipline. Therefore, financial management is equally applicable to all forms of business like sole traders, partnerships, companies. It is also applicable to non profit organizations like trusts, societies, governmental organizations, public sector enterprises etc.

2. Chances of Failure – A firm having latest technology, sophisticated machinery; high calibre marketing and technical experts etc. may fail to succeed unless its finances are managed on sound principles of financial management. The strength of business likes in its financial discipline. Therefore, finance function is treated as primary, which enable the other functions like production, marketing, purchase, personnel etc. to be more effective in achievement of organizational goals and objectives.

3. Return on investment – Anybody invests his money will mean to earn a reasonable return on his investment. The owners of business try to maximize their wealth. It depends on the amount of cash flows expected to be generated for the benefit of owners, the timing of these cash flows and the risk attached to these cash flows. The greater the time and risk associated with the expected cash flow, the greater is the rate of return required by the owners.

The Financial management study the risk-return perception of the owners and the time value of money.

1.5 QUALITIES OF A SUCCESSFUL FINANCE MANAGER

The job of a finance manager is full of duties and responsibilities. He has to perform various duties connected with finance. In order to perform the finance duties successfully, a finance manager should be competent. He should possess the following qualities:

1. Personality is the sum total of physical and mental qualities. A finance manager should have a pleasing personality. Good height, good physique, good appearance would be an asset to a finance manager. He should be physically and mentally healthy enough to bear the strain of finance in an organization.

2. The job of a finance manager involves analytical work. He should have a high degree of intelligence to understand the finance problems immediately. An intelligent finance manager can control the finance properly.

3. A finance manager should take initiative in performance of work. He should do the job at his own i.e. without being told by others.

4. A finance manager should have vast fund of power of imagination to his credit. He should have a research mind which is very creative. He should be able to bring innovation in financial management of an organization.

5. A finance manager should have self confidence to face the challenges involved in his job.

6. A finance manager is a leader of financial administration. He should have an effective Communication Skill. He should understand the problems of his subordinates and communicate instructions to solve them.

7. The job of a finance manager involves decision making. He has to take various decisions which have financial implications on the working of the organization. He should have the quality to judge the situation and take right decision accordingly.

8. He should be honest in his job. Finance requires utmost honesty on the part of the manager and the subordinates also.

9. He should have an administrative skill to administer the finance function. He should be able to plan, organize, direct, control and coordinate the activities of the finance area. He has to see that the financial decisions are properly implemented.

10. A finance manager should be self-disciplined. He should be able to enforce discipline in the organization.

11. A finance manager should have patience. He should not take hasty decisions which have adverse impact on the financial health of the organization. He should listen to the views of others.

1.6 FUNCTIONS OF FINANCIAL CONTROLLER

The important functions of a financial controller in a large business firm consist of the following:

1. Provision of Capital – To establish and execute programmes for the provision of capital required by the business.

2. Investor Relations – To establish and maintain an adequate market for the company's securities and to maintain adequate liaison with investment bankers, financial analysis and shareholders.

3. Short-term Financing – To maintain adequate sources for company's current borrowing from commercial banks and other lending institutions.

4. Banking and Custody – To maintain banking arrangement, to receive, have custody of and disburse the company's monies and securities.

5. Credit and Collections – To direct the granting of credit and the collection of accounts due to the company, including the supervision of required special arrangements for financing sales, such as time payment and leasing plans.

6. Insurance – To provide insurance coverage as required.

7. Investments – To achieve the company's funds required and to establish policies for investment in pension and other similar trusts.

8. Planning for Control – To establish, coordinate and administer an adequate plan for the control of operations.

9. Reporting and interpreting – To compare performance with operating plans and standards, and to report and interpret the results of operations to all levels of management and to the owners of the business.

10. Evaluating and Consulting – To consult with all segments of management responsible for policy or action concerning any phase of the operation of the business as it relates to the attainment of objectives and the effectiveness of policies, organization structure and procedures.

11. Tax Administration – To establish and administer tax policies and procedures.

12. Government Reporting – To supervise or coordinate the preparation of reports to government agencies.

13. Protection of Assets – To ensure protection of assets for the business through internal control, internal auditing and proper insurance coverage.

14. Economic Appraisal – To appraise continuously economic, social forces and government influences, and to interpret their effect upon the business.

15. Managing Funds – To maintain sufficient funds to meet the financial obligations.

16. Measuring of Return – To determine required rate of return for investment proposals.

17. Cost control – To facilitate cost control and cost reduction by establishment of budgets and standards.

18. Price Setting – To supply necessary information for setting of prices of products and services of the concern.

19. Forecasting Profits – To collect relevant data to make forecast of future profit levels.

20. Forecast Cash flow – To forecast the sources of cash and its probable payments and to maintain necessary liquidity of concern.

1.7 GOALS / OBJECTIVES OF FINANCE MANAGEMENT

Many of the well known authors on the subject have highlighted the following two important goals of financial management. They are as follows:

1. PROFIT MAXIMIZATION:

The objective of making profit is a commercial imperative. Profit generation is essential for survival and growth of the business. Profit generation is also regarded as a measure of success of the business. Profit is an important yardstick for measuring the economic efficiency of any firm. Any business would be making the use of economic and human resources available to generate profits. The cost of these resources is required to be met from the revenue generated from the use of these resources and the surplus remaining would be needed for the growth and expansion of the company. It is only an efficiently run business which can afford to meet the cost of resources and generate profits. Therefore, the survival and growth of any business depends upon its ability in earnings profits. It is therefore contended that profit maximization is one of the primary goals of the organization without which the survival of the organization itself is threatened.

- **THE DRAWBACKS OF THE GOAL OF PROFIT MAXIMIZATION**

Although profit is an important yardstick for measuring the economic efficiency of any firm, yet it has got certain limitations which are listed below:

1. It ignores the risk which is associated with the investment in such profitable ventures. It ignores the risk or uncertainty of expected returns or benefits. Risk is defined as the chance that the actual outcome of a decision may differ from the expected outcome and in finance; risk investment is one whose potential returns are expected to have a high degree of variation or volatility. Some investments with high profits potential, having a high degree of risk associated with it. When profit maximization is aimed as the main objective, all profitable investment projects are accepted without having regard to the risk factor. An investment may have profit potential but may not be worth the risk.

2. The objective of profit-maximization assumes the existence of perfect market conditions in which various resources are efficiently managed. However, modern markets suffer from many imperfections. It leads to inequitable distribution of income and wealth.

3. It ignores the time value of money without having any regard to the timings of costs and returns. It takes into account only the size of the profits without considering the timings of the prospective earnings.

4. Profit maximization as an objective is considered to be vague and ambiguous. It does not define adequately as to what profits are what profits to be considered, whether from the point of view of

funds employed or from the shareholders point of view, or short term or long term profits etc.

5. Profit maximization as an objective ignores other important aspects of financing e.g. borrowing capacity etc.

6. The objective of profit maximization focuses on interests of the owners alone and ignores the interest of other interested parties such as employees, consumers, government and society in general.

7. The perception of the management as regards profit maximization substantially differs from the perception of the shareholders.

Another variant of profit maximization is to consider the rate of return on investment. If the rate of return on investment is higher than the cost of funds, then such investment opportunities can be undertaken.

2. Wealth Maximisation:

According to this objective, the owners of the company i.e. the shareholders are more interested in maximizing their wealth rather than in profit maximization. Maximization of the wealth of the shareholders means maximizing the net worth of the company for its shareholders. This reflected in the market price of the shares held by them. Therefore, wealth maximization means creation of maximum value for company's shareholders which mean maximizing the market price of the share. Wealth maximization refers to the gradual increase in value of the net assets of the organization. Profit generation adds to the increase in the value of the net assets of the organization. With greater profits, the EPS (earnings per share) goes up; resulting in an increase in the value of the net assets belonging to the shareholders of the company.

The market price of the shares is an important indicator of the wealth maximization of the organization. Wealth maximization is the net present value of a financial decision. Net present value is the difference between the gross present value of the revenue generated from such decision and the cost of such decision. A financial action with a positive net present value creates wealth and therefore is desirable. The total cash inflows over the years in terms of present value must be greater the outflows of cash invested for generating such cash inflows. This results in financial advantage leading to increase in the value of net assets. The increase in the value of net wealth should in turn help in generating greater volume of profits. This action results in financial gains to the shareholders increasing the earnings per share.

Prof. Solomon has suggested wealth maximization as the best criterion. According to him “Wealth or net present worth is the difference between gross present worth and the amount of capital investment required to achieve the benefits. Any financial action which creates wealth or which has a net present worth above zero is a desirable one and should be undertaken. Any financial action which does meet this test should be rejected”.

Solomon states that wealth maximization provides an unambiguous measure of what financial management should seek to maximize in making investment and financing decisions.

Future earnings of a company are subject to uncertainties and exposed to risk. Financial decisions for which the consequences are known at a later date may either result in increasing or decreasing the net wealth of the shareholders. Unforeseen economic and social conditions may adversely affect the company. Hence the process of wealth generation is a difficult task.

Therefore, the goal of wealth maximization implies a long term perspective of the goal. The interest of the management in maximizing the market price of the share is compatible with that of the shareholders’ interest. This helps the management in allocating the resources in the best possible manner balancing the risks and the returns.

- THE MERITS OF THE GOAL OF WEALTH MAXIMIZATION ARE AS FOLLOWS:

1. It is a very effective and meaningful criterion to measure the performance of the company.
2. The objective of wealth maximization is consistent with the objective of maximization of the shareholders’ economic welfare.
3. The objective is also consistent with the objective of perpetual survival of the company and its long term profitability.
4. It is operationally feasible and logical.
5. It includes the motive of profit maximization as it emphasis on maximization of long term profitability and ensures maximum return on owners’ investment.
6. The objectives allow for timings of profits and also consider the timings of perspective benefits.
7. It ensures fait return on the investments, and takes into account the uncertainty of the benefit also.

8. It offers rational guidelines for effective use of the resources available.

- **THE DRAWBACKS OF THE GOAL OF WEALTH MAXIMIZATION**

i) The basic assumption is that there an efficient capital market wherein the market price of the share is truly reflected. This assumption seldom holds in real practice.

ii) The market price is influenced by various economic and political factors which are difficult to anticipate and judge.

iii) The various parties having their stake in the company have conflicting interests and therefore difficult to reconcile their divergent views.

- **OTHER GOALS OR OBJECTIVES OF FINANCIAL MANAGEMENT:**

i) To ensure adequate returns to the shareholders which should be fair in the given market conditions.

ii) To contribute to the operational efficiency of all other areas of management.

iii) To infuse financial discipline in the organization.

iv) To build up a strong financial base so that the enterprise can fall back upon its reverses during lean years and withstand the shocks of the business.

1.8 EXERCISES

1. Define the scope of financial management. What role should the financial manager plan in the modern enterprise?
2. How should the finance function of an enterprise be organized? What functions are performed by the financial officers?
3. State the scope of Financial Management.
4. State and explain the main functions of a finance manager.
5. Explain the role of finance manager in a large corporate enterprise.
6. What are the functions of Financial Management?
7. “The goal of profit maximization does not provide us with an operationally useful criterion.” Comment on this statement.
8. What is objective of profit maximization pool? How is its different from objective of profit maximization?

9. How does the modern finance manager differ from the traditional finance manager?
10. Discuss the contents of modern finance functions.
11. Discuss the nature and scope financial management.
12. Discuss the nature of financial management as a staff of line functions?
13. Describe the functions of finance. In what ways, are these functions related to possible finance objectives of a company?
14. Explain the nature and scope of finance function. What are the basic objectives of decision-making in corporate finance?
15. Discuss the functions of a Chief Financial Officer.

Multiple Choice Questions

1) The investment decisions should aim at investment in assets only when they are expected to earn a return greater than a minimum acceptable return is termed as …….
   a) Interest rate
   b) Hurdle rate
   c) growth rate
   d) internal rate of return

(2) The traditional view of financial management looks at:
   a) Arrangement of short-term and long-term funds from financial institutions.
   b) Mobilization of funds through financial instruments.
   c) Orientation of finance functions with accounting function.
   d) All of the above

3) The modern approach to financial management view:
   a) the total funds requirement of the firm
   b) the assets to be acquired
   c) the pattern of financing the assets.
   d) All of the above

4) The financing of long-term assets should be made from:
   a) Short-term fund
   b) Debt funds
   c) long-term funds
   d) equity funds

5) In fund raising decisions, one should keep in view:
   a) Cost of various funds and financial risk.
   b) Advantages and disadvantages of debt component in capital mix.
   c) Impact of taxation on EPS
   d) All of the above.

6) The financial health of the firm depends on its ability to generate sufficient _____ to pay its employees, suppliers, creditors and owners:
   a) Profit
   b) Cash
   c) growth
   d) wealth

7) Liquidity and profitability are _____ goals for the Finance manager.
   a) Different
   b) Separate
   c) competing
   d) finance

8) Wealth maximization means maximizing the ____ of a course of action.
   a) NPV
   b) IRR
   c) profit
   d) growth

9) _____ maximization objective considers the risk and time value of money.
   a) Profit
   b) Wealth
   c) value
   d) growth

Unit-2

TIME VALUE OF MONEY

Unit Structure:

2.0 OBJECTIVES

After going through this chapter, you will able to:

- Understand the concept of time value of money
- Compute the time value of money
- Calculate the future value as well as the present value of money
- Understand the concept of present value and future value of annuities

2.1 INTRODUCTION

In our economics life, money is not free. Money has time value. Interest rates give money its time value. If the investor has some spare cash or funds, he can invest it in savings deposit in a bank and receive more money later. If the investor wants to borrow money, he must repay a larger amount in the future due to interest. The result is that Rs. 100 in hand today, is worth more than Rs. 100 to be received a year from now. This is because Rs. 100 today can be invested to provide Rs. 100 plus interest after a year. The interest rates in the economy provide money with its time value.

There are two types of decisions which require some consideration of time value. The first decision involves investing money now in order to receive future cash benefits. The other decision involves borrowing now to take current expenditure at a cost of having less money in the future. The intelligent investor requires familiarity with the concepts of compound interest.

2.2 TIME VALUE OF MONEY:

In the world of finance and investment, time does have a value, Rs. 100 today are more valuable than Rs. 100 a year later. This is because capital can be employed productively to generate positive returns. Again, individuals normally prefer current consumption to future consumption. Even in case of inflation, Rs. 100 today represents greater real purchasing power as compared to Rs. 100 one year later. The longer the term of a loan, the greater will be the amount that must be paid due to interest. Bonds are worthless to an investor, if the maturity is longer. Therefore, this makes sense under the general framework of the time value of money.

2.3 BASIC CONCEPTS:

a) **PRESENT VALUE:** A present value is the discounted value of one or more future cash flows.

b) **FUTURE VALUE:** A future value is the compounded value of a present value.

c) **DISCOUNT FACTOR:** The discount factor is the present value of a rupee received in the future.

d) **COMPOUNDING FACTOR:** The compounding factor is the future value of a rupee.

Discount and compounding factors are functions of two things: (i) the interest rate used, and (ii) the time between the present value and the future value. The discount factor decreases as time increases. The discount factor also decreases as interest rate increases.

2.4 TIME VALUE OF MONEY RELATIONSHIP:

The basic time value of money relationships are presented in the following equations:

(1) PV = FV x DF
(2) FV = PV XCF

Whereas, PV = Present value
FV = Future value
DF = Discounting factor = $\left(\frac{1}{1}+R\right)t$
CF = Compounding factor = (1 + R) t
R = Rate of interest
T = time in years.

2.5 FUTURE VALUE OF SINGLE AMOUNT:

The future value of an amount invested or borrowed at a given rate of interest can be calculated if the maturity period is given. Suppose, a deposit of Rs. 5,000 gets 10 percent interest compounded annually for a period of 3 years, the future value will be:

PV X CF = 5,000 (1.10)3 = 5,000 x 1.331 = Rs. 6,655.

Illustration 1:
Mr Shashikant deposit □ 1,00,000 with a bank which pays 10 percent interest compounded annually, for a period of 3 years. How much amount he would get a maturity?

Solution

FV = PV X CF
= 1,00,000 x $(1.10)^3$
= 1,00,000 x 1.331
= □ 1,33,100

Mr. Shashikant will get □ 1,33,100 after 3 years.

2.6 FUTURE VALUE OF ANNUITY :

An annuity is a series of payments of a fixed amount for a specified number of periods. When payments are made at the end of each year, it is called ordinary annuity. On the other hand when the payments are made at the beginning of the year, it is called an annuity due. Normally, it is assumed that the first annuity payment occurs at the end of the first year.

$$FVa = A\frac{(1+R)t-1}{R}$$

Where A = Periodic cash payments
R = Annual interest rate
T = time in years / duration of annuity

The value of $\frac{(1+R)t-1}{R}$ can be determined by using the Time value of money tables.

The Future value Interest Factors (FVIFA) for various years are a shown in table:

Year	FVIF @ 8%	FVIF @ 10%	FVIF @ 12%	FVIF @14%
1	1,0000	1,0000	1,0000	1,0000
2	2,0800	2,1000	2,1200	2,1400
3	3,2464	3,3100	3,3744	3,4396
4	4,5061	4,6410	4,7793	4,9211
5	5,8666	6,1051	6,3528	6,6101
6	7,3359	7,7156	8,1152	8,5355
7	8,9228	9,4872	10,089	10,730
8	10,636	11,435	12,299	13,232
9	12,487	13,579	14,775	16,085
10	14,486	15,937	17,548	19,337

Illustration 2:
Four equal annual payments of Rs. 5,000 are made into a deposit account that pays 8 percent interest per year. What is the future value of this annuity at the end of 4 years?

Solution

The future value of annuity $FVa = A\frac{(1+R)t-1}{R}$

= □ 5,000 x FVIFA @ 8%
= □ 5,000 x 4.5061
= □ 22530.50.

2.7 DOUBLING PERIOD

Sometimes, investor should know how long it will take to double his money at a given rate of interest. In this case, a rule of thumb called the rule of 72, can be used. This rule works pretty well for most of the interest rates. The rule of 72 says that it will take seventy-two years to double your money at 1 percent interest. You can calculate the doubling by dividing 72 by the interest rate. You can also estimate the interest rate required to double your money in the given number of years by dividing number of years into 72.

For example, if the interest rate is 12 percent, it will take 6 years to double your money (72+23). On the other hand, if you want to double your money in 6 years, the interest rate should be 12 percent (72+6).

A more accurate method used for doubling your money is using the rule of 69. According to this rule, the doubling period of an investment is = 0.35 + 69 Thus the doubling period of Interest rate investment of different rates of interest can be determined as follows :

As per rule of 69, the doubling period will be

1) Interest rate 12%

$$0.35+\frac{69}{12}=0.35+5.75=6.1 \text{ years}$$

2) Interest rate 15%

$$0.35+\frac{69}{15}=0.35+4.60=4.95 \text{ years}$$

Illustration 3:

If the interest rate is 10%, what is the doubling periods of an investment at this rate?

Solution

a) As per rule of 72, the doubling period will be

$\frac{72}{10}=7.2$ years

b) As per the rule of 69, the doubling period will be

$0.35+\frac{69}{15}=0.35+6.9=7.25$ years

PRESENT VALUE:

Many times, investors like to know the present value which grows to a given future value. Suppose you want to save some money from your salary to buy a scooter after 5 years. You should know how much money should be put into bank now in order to get the future value after 5 years. The present value is simply the inverse of compounding used in determining future value. The general relationship between future value and present value is given in the following formula:

$$PV = FV \times DF = FV \times \frac{1}{(1+R)}$$

Illustration 4:

Find the present value of □ 50,000 to be received at the end of four years at 12 percent interest compounding quarterly.

PV = FV 1

PV = FV x PVIF at 12%

= ₹ 50,000 x 0.623

= ₹ 31,150

2.8 PRESENT VALUE OF AN UNEVEN SERIES OF PAYMENTS:

The annuity includes the constant amount in which cash flows are identical in every period. Many financial decisions involve constant cash-flow, however, some important decisions are concerned with uneven cash flows. For example, investment in shares is expected to pay an increasing series of dividends over time. The capital budgeting projects also do not normally provide constant cash flows.

In order to deal with uneven payment streams, we have to multiply each payment by the appropriate PVIF and then sum these products to obtain the present value of an uneven series of payments.

Illustration 5:
Mr Shah has invested ₹ 50,000 on Xerox machine on 1st Jan. 2002. He estimates net cash income from Xerox machine in next 5 years as under.

Year	Estimated inflows
2002	12,000
2003	15,000
2004	18,000
2005	25,000
2006	30,000

At the end of 5th year Machine will be sold at Scarp value of ₹ 5,000. Advice him whether his project to viable, considering interest rate of 10% p.a.

Solution:
Calculation of Present Value of Future Cash Flows :

Year	Inflows (Rs)	PVIF at 10%	PV of Inflows (Rs.)
2002	12,000	0.9091	10909
2003	15,000	0.8264	12396
2004	18,000	0.7513	13523
2005	25,000	0.6830	17075
2006 2006	30,000 5,000	0.6209	21732
			75635

Note: It is assumed that the net cash income is received at the end of the year.

Considering 10% interest rate, the net present value of all future cash flows is ₹ 75,635 which is higher than present net cash flow of ₹ 50,000. Thus, the project is viable.

2.9 PRESENT VALUE OF ANNUITY:

Many times investors want to know the present value which must be invested today in order to provide an annuity for several future periods. For example, A grandfather wants to deposit enough money today to meet the tuition fees of his grand-son for the next three years. The interest rate is 8%. The present value of this annuity is the sum of the present values of all the future inflow of the annuities. The present value of an annuity can be expressed in the following formula:

$$PVA1 = A\frac{1}{(1+R)} + \frac{1}{(1+R)2} + \frac{1}{(1+R)1}$$
$$= \frac{(1+R)t-1}{R(1+R)t}$$

Where PVA1 = Present value of an annuity with a duration of 't' periods

A = Constant periodic flow

R = Interest Rate

The present value interest factors for an annuity (PVIF) can be determined by using the Time Value of Money Tables. The (PVIF) for various years are given below :

Year	PVIF @ 8%	PVIF @ 10%	PVIF @ 12%	PVIF @ 14%
1	0.9259	0.9091	0.8929	0.8772
2	1.7833	1.7355	1.6901	1.6467
3	2.5771	2.4869	2.4018	2.3216
4	3.3121	3,1700	3.0373	2.9140
5	3.9927	3.7908	3.6048	3.4331
6	4.6229	4.3553	4.1114	3.8887
7	5.2064	4.8684	4.5638	4.2883
8	5,7466	5.3349	4.9676	4.6389
9	6.2469	5.7590	5.3282	4.9464
10	6,7101	6.1446	5.6502	5.2161

For all positive interest rates, PVIFA for the present value of an Annuity is always less than the number of periods the annuity

runs, whereas FVIFA for the future value of an annuity is equal to or greater than the number of periods.

Illustration 6:

What is the present value of a 4 years annuity of ₹ 8,000 at 12% interest?

Solution:

$$PVA = A\frac{(1+R)t-1}{R(1+R)t}$$

The value of $\frac{(1+R)t-1}{R(1+R)t}$ as per table is 3.0373

= □ 8,000 x PVIF at 12%
= □ 8,000 X 3.0373
= □ 24,298

2.10 NET PRESENT VALUE:

Net Present Value (NPV) is the most suitable method used for evaluating the capital investment projects. Under this method, cash inflow and outflows associated with each project are worked out. The present value of cash inflows is calculated by discounting the cash flows at the rate of return acceptable to the management. The cash outflows represent the investment and commitments of cash in the project at various points of time. It is generally determined on the basis of cost of capital suitably adjusted to allow for the risk element involved in the project. The working capital is taken as a cash outflow in the initial year. The cash inflow represents the net profit after tax but before depreciation. A depreciation is a non-cash expenditure hence it is added back to the net profit after tax in order to determine the cash inflows. The Net Present Value of cash inflows and the present value of cash outflows. If the NPV is positive the project is accepted, and if it is negative, the project is rejected.

Discounted cash flow is an evaluation of the future net cash flows generated by a project. This method considers the time value of money concept and hence it is considered better for evaluation of investment proposals. If these are mutually exclusive projects, this method is more useful. The Net Present Value is determined as follows:

NPV = Present value of future cash inflows – Present value of cash outflows.

Illustration 7:

An investment of ₹ 40,000 made on 1/4/2002 provides inflows as follows:

Date	Alternative I	Alternative II
01/04/03	20,000	10,000
01/04/04	10,000	20,000
01/04/05	10,000	10,000
01/04/06	10,000	10,000

Which alternative would you prefer in the investor's expected return is 10%? Give reason(s) for your preference.

Solution
Calculation of Present Values:
Alternative I

Date	Amount	Discount Factor	PV (Rs)
01/04/03	20,000	0.9091	18182
01/04/04	10,000	0.8264	8264
01/04/05	10,000	0.7513	7513
01/04/06	10,000	0.6830	6830
			40,789

Alternative II

Date	Amount	Discount Factor	PV (Rs)
01/04/03	10,000	0.9091	9091
01/04/04	20,000	0.8264	16528
01/04/05	10,000	0.7513	7513
01/04/06	10,000	0.6830	6830
			39,962

The net present value of all future cash flows is ₹ 40,789 in case of 'alternative I' and ₹ 39,962 in case of 'alternative II'. The NPV in case of 'alternative I' is higher at 10% discounting factor. Hence, 'alternative I' is preferred for investment.

Illustration 8:
A Finance company has introduced a scheme of investment of ₹ 40,000. The returns would be ₹ 8,000, ₹ 10,000, ₹ 11,000 and ₹ 12,000 in the next five years. The indicated rate of interest is 10% Compute the present value of the investment and advise regarding the investment.

Solution:

i) Present value of investment = ₹ 40,000.

ii) Present value of returns:

Year	Returns (Rs)	PVIF (10%)	Present Value (Rs.)
1	8,000	0.9091	7273
2	9,000	0.8264	7438
3	10,000	0.7513	7513
4	11,000	0.6830	7513
5	12,000	0.6209	7451
			37188

iii) Present value of investment is ₹ 37,188 which is lower than investment of ₹ 40,000. The net present value (i.e. 37,188-40,000 = ₹ 2,812) is negative. Hence the investment is not profitable at 10% interest.

Illustration 9:

The share of Ridhi Ltd (F.V. of ₹ 10) was quoted at ₹ 102 on 01.04.2002 and the price rose to ₹ 132 on 01.04.2005. Dividends were received at 10% on 30th June each year. Cost of funds was 10%. Is it a worth-while investment, considering the time value of money? (Present value factor at 10% were 0.909, 0.826 and 0.751)

Solution

Calculation of Present Value of Cash inflows:

Year	Inflow (Rs)	Present Value Factor	Present Value (Rs.)
1	1	0.909	0.909
2	1	0.826	0.826
3	1 + 132 = 133	0.751	99.883
		Present Value	101.618
		(-) Present Value of Cash Outflow	102.000
		Net Present Value	-0.382

Considering the time value of money, the NPV is negative, hence, it is not a wise investment.

Illustration 10:
XYZ & Co. is considering investing in a project requiring a capital outlay of ₹ 2,00,000. Forecast for annual income after tax is as follows:

Year	1	2	3	4	5
Profit After Tax (Rs.)	1,00,000	1,00,000	80,000	80,000	40,000
Depreciation is 20% on Straight line Basis					

Evaluate the project on the basis of Net Present Value taking 14% discounting factor and advise whether XYZ & Co. should invest in the project or not ? The Present value of Re. 1 at 14% discounting rate are 0.8772, 0.7695, 0.6750, 0.5921 and 0.5194.

Depreciation = 20% of 2,00,000 = ₹ 40,000

Profit after tax is given.

The cash inflow after tax (CFAT) = Profit After Tax (PAT + Depreciation.

Year	PAT	+ Depreciation	CFAT	DF	P.V.
1	1,00,000	40,000	1,40,000	0.8772	1,22,808
2	1,00,000	40,000	1,40,000	0.7695	1,07,730
3	80,000	40,000	1,20,000	0.6750	81,000
4	80,000	40,000	1,20,000	0.5921	71,052
5	40,000	40,000	80,000	0.5194	41,552
				Present Value of Cash Inflow	4,24,142
				Present Value of Cash Outflow	2,00,000
				Net Present Value	2,24,142

Net Present Value is positive; hence XYZ & Co should invest in the project.

Illustration 11:
Find out the present value of a debenture from the following :

Face value of debenture	□ 1,000
Annual Interest Rate	15%
Expected return	12%
Maturity Period	5 years

(Present values of Re. 1 at 12% are, 0.8929, 0.7972, 0.7118, 0.6355 and 0.5674)

Solution

PV = I (PVAF) + F (DF)
= I(PVAF 12% for 5 years) + F (DF 12% for 5 years)
= 150 (3,6048) + 1,000 (0.5674)
= ₹ 540.72 + 567.40
= ₹ 1108.12

Illustration 12:

Mr Vishwanathan is planning to buy a machine which would generate cash flow as follows:

Year	0	1	2	3	4
Cash Flow	(25000)	6000	8000	15000	8000

If discount rate is 10%, is it worth to invest in machine?

Year	1	2	3	4
Discount Factor	0.909	0.826	0.751	0.683

Solution:

Calculation of Net Present Value

Year	Cash Flow (Rs.)	Discount Factor	Present Value (Rs.)
1	6,000	0.909	5454
2	8,000	0.826	6608
3	15,000	0.751	11265
4	8,000	0.683	5464
		Present value of cash inflow	28791
		(-) Present Value of cash outflow	25000
		Net Present Value	3791

As the NPV is positive, it is worth investing in the machine.

Illustration 13:

A machine cost ₹ 80,000 and is expected to produce the following cash flows:

Year	1	2	3	4	5	6	7
Cash Flow (Rs)	50000	57000	35000	60000	40000	30000	60000

If the cost of capital is 12 percent, is it worth buying the machine?

Solution:

Calculation of Net Present Value

Year	Cash Inflow	D.F. @ 12%	Present Value (Rs.)
1	50,000	0.8929	44645
2	57,000	0.7972	45440
3	35,000	0.7118	24913
4	60,000	0.6355	38130
5	40,000	0.5674	22696
6	30,000	0.5066	15198
7	60,000	0.4523	27138
		Present Value of Cash Inflow	218160
		Present Value of outflow	280000
		Net Present Value	**-61840**

As the Net Present Value is negative, it is not worth buying the machine.

Illustration 14:

Find the compounded value of annuity where three equal yearly payments of ₹ 2000 are deposited into an account that yields 7% compound interest.

Solution

The future value of annuity FVa = $A \frac{(1+R)t-1}{R}$

= ₹ 2,000 (FVAFA @ 7% for 3 years)

= ₹ 2,000 x 3.215

= ₹ 6,430

Illustration 15:

Calculate the compound value when ₹ 10,000 are invested for 3 years and the interest on it is compounded at 10% p.a. semi annually.

FV = PV x CF

FV = PV x (1 + R)t

= 10,000 X $\left(1+\frac{10}{2}\right)2\times3$

= 10,000 (1.05) 6

= ₹ 10,000 x 1.340

= ₹ 13,400

2.11 MATHEMATICAL TABLES

Tale A- 1 Present Value of Re. 1:

$$PVIF = \frac{1}{(1+K)n}$$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	.9901	.9804	.9709	.9615	.9524	.9434	.9346	.9259	.9174	.9091
2	.9803	.9612	.9426	.9246	.9070	.8900	.8734	.8573	.8417	.8264
3	.9706	.9423	.9151	.8890	.8638	.8396	.8163	.7938	.7722	.7513
4	.9610	.9238	.8885	.8548	.8227	.7921	.7629	.7350	.7084	.6830
5	.9515	.9057	.8626	.8219	.7835	.7473	.7130	.6806	.6499	.6209
6	.9420	.8880	.8375	.7903	.7462	.7050	.6663	.6302	.5963	.5645
7	.9327	.8706	.8131	.7599	.7107	.6651	.6227	.5835	.5470	.5132
8	.9235	.8535	.7894	.7307	.6768	.6274	.5820	.5403	.5019	.4665
9	.9143	.8368	.7664	.7026	.6446	.5919	.5439	.5002	.4604	.4241
10	.9053	.8203	.7441	.6756	.6139	.5584	.5083	.4632	.4224	.3855
11	.8963	.8043	.7224	.6496	.5847	.5268	.4751	.4289	.3875	.3505
12	.8874	.7885	.7014	.6246	.5568	.4970	.4440	.3971	.3555	.3186
13	.8787	.7730	.6810	.6006	.5303	.4688	.4150	.3677	.3262	.2897
14	.8700	.7579	.6611	.5775	.5051	.4423	.3878	.3405	.2992	.2633
15	.8613	.7430	.6419	.5553	.4810	.4173	.3624	.3152	.2745	.2394
16	.8528	.7284	.6232	.5339	.4581	.3936	.3387	.2919	.2519	.2176
17	.8444	.7142	.6050	.5134	.4363	.3714	.3166	.2703	.2311	.1978
18	.8360	.7002	.5874	.4936	.4155	.3503	.2959	.2502	.2120	.1799
19	.8277	.6864	.5703	.4746	.3957	.3305	.2765	.2317	.1945	.1635
20	.8195	.6730	.5537	.4564	.3769	.3118	.2584	.2145	.1784	.1486
21	.8114	.6598	.5375	.4388	.3589	.2942	.2415	.1987	.1637	.1351
22	.8034	.6468	.5219	.4220	.3418	.2775	.2257	.1839	.1502	.1228
23	7954	.6342	.5067	.4057	.3256	.2618	.2109	.1703	.1378	.1117
24	.7876	.6217	.4919	.3901	.3101	.2470	.1971	.1577	.1264	.1015
25	.7798	.6095	.4776	.3751	.2953	.2330	.1842	.1460	.1160	.0923
26	.7720	.5976	.4637	.3607	.2812	.2198	.1722	.1352	.1064	.0839
27	.7644	.5859	.4502	.3468	.2678	.2074	.1609	.1252	.0976	.0763
28	.7568	.5744	.4371	.3335	.2551	.1956	.1504	.1159	.0895	.0693
29	.7493	.5631	.4243	.3207	.2429	.1846	.1406	.1073	.0882	.0630
30	.7419	.5521	.4120	.3083	.2314	.1741	.1314	.0994	.0754	.0573

Table A - 1 (continued)

Period	12%	14%	15%	16%	18%	20%	24%	28%	32%	36%
1	.8929	.8772	.8696	.8621	.8475	.8333	.8065	.7813	.7576	.7353
2	.7972	.7695	.7561	.7432	.7182	.6944	.6504	.6104	.5739	.5407
3	.7118	.6750	.6575	.6407	.6086	.5787	.5245	.4768	.4348	.3975
4	.6355	.5921	.5718	.5523	.5158	.4823	.4230	.3725	.3294	.2923
5	.5674	.5194	.4972	.4761	.4371	.4019	.3411	.2910	.2495	.2149
6	.5066	.4556	.4323	.4104	.3704	.3349	.2751	.2274	.1890	.1580
7	.4523	.3996	.3759	.3538	.3139	.2791	.2218	.1776	.1432	.1162
8	.4039	.3506	.3269	.3050	.2660	.2326	.1789	.1388	.1085	.0854
9	.3606	.3075	.2843	.2630	.2255	.1938	.1443	.1084	.0822	.0628
10	.3220	.2697	.2472	.2267	.1911	.1615	.1164	.0847	.0623	.0462
11	.2875	.2366	.2149	.1954	.1619	.1346	.0938	.0662	.0472	.0340
12	.2567	.2076	.1869	.1685	.1372	.1122	.0757	.0517	.0357	.0250
13	.2292	.1821	.1625	.1452	.1163	.0935	.0610	.0404	.0271	.0184
14	.2046	.1597	.1413	.1252	.0985	.0779	.0492	.0316	.0205	.0135
15	.1827	.1401	.1229	.1079	.0835	.0649	.0397	.0247	.0155	.0099
16	.1631	.1229	.1069	.0930	.0708	.0541	.0320	.0193	.0118	.0073
17	.1456	.1078	.0929	.0802	.0600	.0451	.0258	.0150	.0089	.0054
18	.1300	.0946	.0808	.0691	.0508	.0376	.0208	.0118	.0068	.0039
19	.1161	.0829	.0703	.0596	.0431	.0313	.0168	.0092	.0051	.0029
20	.1037	.0728	.0611	.0514	.0365	.0261	.0135	.0072	.0039	.0021
21	.0926	.0638	.0531	.0443	.0309	.0217	.0109	.0056	.0029	.0016
22	.0826	.0560	.0462	.0382	.0262	.0181	.0088	.0044	.0022	.0012
23	.0738	.0491	.0402	.0329	.0222	.0151	.0071	.0034	.0017	.0008
24	.0659	.0431	.0349	.0284	.0188	.0126	.0057	.0027	.0013	.0006
25	.0588	.0378	.0304	.0245	.0160	.0105	.0046	.0021	.0010	.0005
26	.0525	.0331	.0264	.0211	.0135	.0087	.0037	.0016	.0007	.0003
27	.0469	.0291	.0230	.0182	.0115	.0073	.0030	.0013	.0006	.0002
28	.0419	.0255	.0200	.0157	.0097	.0061	.0024	.0010	.0004	.0002
29	.0374	.0224	.0174	.0135	.0082	.0051	.0020	.0008	.0003	.0001
30	.0334	.0196	.0151	.0116	.0070	.0042	.0016	.0006	.0002	.0001

Table A - 2 Present Value of an Annuity of Re. 1 per period for n periods.

$$\frac{\frac{1}{(1+k)n}}{k}$$

$$PVIF = \frac{1}{(1+k)1}$$

No. of payments	1%	2%	3%	4%	5%	6%	7%	8%	9%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.4859
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330
8	7.6517	7.3255	7.0197	6.7327	6.4632	6.2098	5.9713	5.7466	5.5348
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177
11	10.3676	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.8052
12	11.2551	10.5753	9.9540	9.3851	8.8633	8.3838	7.9427	7.5361	7.1607
13	12.1337	11.3484	10.6350	9.9856	9.3936	8.8527	8.3577	7.9038	7.4869
14	13.0037	12.1062	11.2961	10.5631	9.8986	9.2950	8.7455	8.2442	7.7862
15	13.8651	12.8493	11.9379	11.1184	10.3797	9.7122	9.1079	8.5595	8.0607
16	14.7179	13.5777	12.5611	11.6523	10.8378	10.1059	9.4466	8.8514	8.3126
17	15.5623	14.2919	13.1661	12.1657	11.2741	10.4773	9.7632	9.1216	8.5436
18	16.3983	14.9920	13.7535	12.6593	11.6896	10.8276	10.0591	9.3719	8.7556
19	17.2260	15.6785	14.3238	13.1339	12.0853	11.1581	10.3356	9.6036	8.9501
20	18.0456	16.3514	14.8775	13.5903	12.4622	11.4699	10.5940	9.8181	9.1285
21	18.8570	17.0112	15.4150	14.0292	12.8212	11.7641	10.8355	10.0168	9.2922
22	19.6604	17.6580	15.9369	14.4511	13.1630	12.0416	11.0612	10.2007	9.4424
23	20.4558	18.2922	16.4436	14.8568	13.4886	12.3034	11.2722	10.3711	9.5802
24	21.2434	18.9139	16.9355	15.2470	13.7986	12.5504	11.4693	10.5288	9.7066
25	22.0232	19.5235	17.4131	15.6221	14.0939	12.7834	11.6536	10.6748	9.8226
26	22.7952	20.1210	17.8768	15.9828	14.3753	13.0032	11.8258	10.8100	9.9290
27	23.5596	20.7069	18.3270	16.3296	14.6430	13.2105	11.9867	10.9352	10.0266
28	24.3164	21.2813	18.7641	16.6631	14.8981	13.4062	12.1371	11.0511	10.1161
29	25.0658	21.8444	19.1885	16.9837	15.1411	13.5907	12.2777	11.1584	10.1983
30	25.8077	22.3965	19.6004	17.2920	15.3725	13.7648	12.4090	11.2578	10.2737

Table A - 2 (continued)

No. of payments	10%	12%	14%	15%	16%	18%	20%	24%	28%	32%
1	0.9091	0.8929	0.8772	0.8696	0.8621	0.8475	0.8333	0.8065	0.7813	0.7576
2	1.7355	1.6901	1.6467	1.6257	3.6052	1.5656	1.5278	1.4568	1.3916	1.3315
3	2.4869	2.4018	2.3216	2.2832	2.2459	2.1743	2.1065	1.9813	1.8684	1.7663
4	3.1699	3.0373	2.9137	2.8550	2.7982	2.6901	2.5887	2.4043	2.2410	2.0957
5	3.7908	3.6048	3.4331	3.3522	3.2743	3.1272	2.9906	2.7454	2.5320	2.3452
6	4.3553	4.1114	3.8887	3.7845	3.6847	3.4976	3.3255	3.0205	2.7594	2.5342
7	4.8684	4.5638	4.2883	4.1604	4.0386	3.8115	3.6046	3.2423	2.9370	2.6775
8	5.3349	4.9676	4.6389	4.4873	4.3436	4.0776	3.8372	3.4212	3.0758	2.7860
9	5.7590	5.3282	4.9464	4.7716	4.6065	4.3030	4.0310	3.5655	3.1842	2.8681
10	6.1446	5.6502	5.2161	5.0188	4.8332	4.4941	4.1925	3.6819	3.2689	2.9304
11	6.4951	5.9377	5.4527	5.2337	5.0286	4.6560	4.3271	3.7757	3.3351	2.9776
12	6.8137	6.1944	5.6603	5.4206	5.1971	4.7932	4.4392	3.8514	3.3868	3.0133
13	7.1034	6.4235	5.8424	5.5831	5.3423	4.9095	4.5327	3.9124	3.4272	3.0404
14	7.3667	6.6282	6.0021	5.7245	5.4675	5.0081	4.6106	3.9616	3.4587	3.0609
15	7.6061	6.8109	6.1422	5.8474	5.5755	5.0916	4.6755	4.0013	3.4834	3.0764
16	7.8237	6.9740	6.2651	5.9542	5.6685	5.1624	4.7296	4.0333	3.5026	3.0882
17	8.0216	7.1196	6.3729	6.0472	5.7487	5.2223	4.7746	4.0591	3.5177	3.0971
18	8.2014	7.2497	6.4674	6.1280	5.8178	5.2732	4.8122	4.0799	3.5294	3.1039
19	8.3649	7.3658	6.5504	6.1982	5.8775	5.3162	4.8435	4.0967	3.5386	3.1090
20	8.5136	7.4694	6.6231	6.2593	5.9288	5.3527	4.8696	4.1103	3.5458	3.1129
21	8.6487	7.5620	6.6870	6.3125	5.9731	5.3837	4.8913	4.1212	3.5514	3.1158
22	8.7715	7.6446	6.7429	6.3587	6.0113	5.4099	4.9094	4.1300	3.5558	3.1180
23	8.8832	7.7184	6.7921	6.3988	6.0442	5.4321	4.9245	4.1371	3.5592	3.1197
24	8.9847	7.7843	6.8351	6.4338	6.0726	5.4510	4.9371	4.1428	3.5619	3.1210
25	9.0770	7.8431	6.8729	6.4642	6.0971	5.4669	4.9476	4.1474	3.5640	3.1220
26	9.1609	7.8957	6.9061	6.4906	6.1182	5.4804	4.9563	4.1511	3.5656	3.1227
27	9.2372	7.9426	6.9352	6.5135	6.1364	5.4919	4.9636	4.1542	3.5669	3.1233
28	9.3066	7.9844	6.9607	6.5335	6.1520	5.5016	4.9697	4.1566	3.5679	3.1237
29	9.3696	8.0218	6.9830	6.5509	6.1656	5.5098	4.9747	4.1585	3.5687	3.1240
30	9.4269	8.0552	7.0027	6.5660	6.1772	5.5168	4.9789	4.1601	3.5693	3.1242

Table A - 3 Future Value of Re. 1 at the end of n Periods.
PVIF = (1 + k) n

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	1.0100	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000
2	1.0201	1.0404	1.0609	1.0816	1.1025	1.1236	1.1449	1.1664	1.1881	1.2100
3	1.0303	1.0612	1.0927	1.1249	1.1576	1.3910	1.2250	1.2597	1.2950	1.3310
4	1.0406	1.0824	1.1255	1.1699	1.2155	1.2625	1.3108	1.3605	1.4116	1.4641
5	1.0510	1.1041	1.1593	1.2167	1.2763	1.3382	1.4026	1.4693	1.5386	1.6105
6	1.0615	1.1262	1.1941	1.2653	1.3401	1.4185	1.5007	1.5869	1.6771	1.7716
7	1.0721	1.1487	1.2299	1.3159	1.4071	1.5036	1.6058	1.7138	1.8280	1.9487
8	1.0829	1.1717	1.2668	1.3686	1.4775	1.5938	1.7182	1.8509	1.9926	2.1436
9	1.0937	1.1951	1.3048	1.4233	1.5513	1.6895	1.8385	1.9990	2.1719	2.3579
10	1.1046	1.2190	1.3439	1.4802	1.6289	1.7908	1.9672	2.1589	2.3674	2.5937
11	1.1157	1.2434	1.3842	1.5395	1.7103	1.8983	2.1049	2.3316	2.5804	2.8531
12	1.1268	1.2682	1.4258	1.6010	1.7959	2.0122	2.2522	2.5182	2.8127	3.1384
13	1.1381	1.2936	1.4685	1.6651	1.8856	2.1329	2.4098	2.7196	3.0658	3.4523
14	1.1495	1.3195	1.5126	1.7317	1.9799	2.2609	2.5785	2.9372	3.3417	3.7975
15	1.1610	1.3459	1.5580	1.8009	2.0789	2.3966	2.7590	3.1722	3.6425	4.1772
16	1.1726	1.3728	1.6047	1.8730	2.1829	2.5404	2.9522	3.4259	3.9703	4.5950
17	1.1843	1.4002	1.6528	1.9479	2.2920	2.6928	3.1588	3.7000	4.3276	5.0545
18	1.1961	1.4282	1.7024	2.0258	2.4066	2.8543	3.3799	3.9960	4.7171	5.5599
19	1.2081	1.4568	1.7535	2.1068	2.5270	3.0256	3.6165	4.3157	5.1417	6.1159
20	1.2202	1.4859	1.8061	2.1911	2.6533	3.2071	3.8697	4.6610	5.6044	6.7275
21	1.2324	1.5157	1.8603	2.2788	2.7860	3.3996	4.1406	5.0338	6.1088	7.4002
22	1.2447	1.5460	1.9161	2.3699	2.9253	3.6035	4.4304	5.4365	6.6586	8.1403
23	1.2572	1.5769	1.9736	2.4647	3.0715	3.8197	4.7405	5.8715	7.2579	8.9543
24	1.2697	1.6084	2.0328	2.5633	3.2251	4.0489	5.0724	6.3412	7.9111	9.8497
25	1.2824	1.6406	2.0938	2.6658	3.3864	4.2919	5.4274	6.8485	8.6231	10.834
26	1.2953	1.6734	2.1566	2.7725	3.5557	4.5494	5.8074	7.3964	9.3992	11.918
27	1.3082	1.7069	2.2213	2.8834	3.7335	4.8223	6.2139	7.9881	10.245	13.110
28	1.3213	1.7410	2.2879	2.9987	3.9201	5.1117	6.6488	8.6271	11.167	14.421
29	1.3345	1.7758	2.3566	3.1187	4.1161	5.4184	7.1143	9.3173	12.172	15.863
30	1.3478	1.8114	2.4273	3.2434	4.3219	5.7435	7.6123	10.062	13.267	17.449

Table A - 3 (continued)

Period	12%	14%	15%	16%	18%	20%	24%	28%	32%	36%
1	1.1200	1.1400	1.1500	1.1600	1.1800	1.2000	1.2400	1.2800	1.3200	1.3600
2	1.2544	1.2996	1.3225	1.3456	1.3924	1.4400	1.5376	1.6384	1.7424	1.8496
3	1.4049	1.4815	1.5209	1.5609	1.6430	1.7280	1.9066	2.0972	2.3000	2.5155
4	1.5735	1.6890	1.7490	1.8106	1.9388	2.0736	2.3642	2.6844	3.0360	3.4210
5	1.7623	1.9254	2.0114	2.1003	2.2878	2.4883	2.9316	3.4360	4.0075	4.6526
6	1.9738	2.1950	2.3131	2.4364	2.6996	2.9860	3.6352	4.3980	5.2899	6.3275
7	2.2107	2.5023	2.6600	2.8262	3.1855	3.5832	4.5077	5.6295	6.9826	8.6054
8	2.4760	2.8526	3.0590	3.2784	3.7589	4.2998	5.5895	7.2058	9.2170	11.703
9	2.7731	3.2519	3.5179	3.8030	4.4355	5.1598	6.9310	9.2234	12.166	15.916
10	3.1058	3.7072	4.0456	4.4114	5.2338	6.1917	8.5944	11.805	16.059	21.646
11	3.4785	4.2262	4.6524	5.1173	6.1759	7.4301	10.657	15.111	21.198	29.439
12	3.8960	4.8179	5.3502	5.9360	7.2876	8.9161	13.214	19.342	27.982	40.037
13	4.3635	5.4924	6.1528	6.8858	8.5994	10.699	16.386	24.758	36.937	54.451
14	4.8871	6.2613	7.0757	7.9875	10.147	12.839	20.319	31.691	48.756	74.053
15	5.4736	7.1379	8.1371	9.2655	11.973	15.407	25.195	40.564	64.358	100.71
16	6.1304	8.1372	9.3576	10.748	14.129	18.488	31.242	51.923	84.953	136.96
17	6.8660	9.2765	10.761	12.467	16.672	22.186	38.740	66.461	112.13	186.27
18	7.6900	10.575	12.375	14.462	19.673	26.623	48.038	85.070	148.02	253.33
19	8.6128	12.055	14.231	16.776	23.214	31.948	59.567	108.89	195.39	344.53
20	9.6463	13.743	16.366	19.460	27.393	38.337	73.864	139.37	257.91	468.57
21	10.803	15.667	18.821	22.574	32.323	46.005	91.591	178.40	340.44	637.26
22	12.100	17.861	21.644	26.186	38.142	55.206	113.57	278.35	449.39	866.67
23	13.552	20.361	24.891	30.376	45.007	66.247	140.83	292.30	593.19	1178.6
24	15.178	23.212	28.625	35.236	53.108	79.496	174.63	374.14	783.02	1602.9
25	17.000	26.461	32.918	40.874	62.668	95.396	216.54	478.90	1033.5	2180.0
26	19.040	30.166	37.856	47.414	73.948	114.47	268.51	612.99	1364.3	2964.9
27	21.324	34.389	43.535	55.000	87.259	137.37	332.95	784.63	1800.9	4032.2
28	23.883	39.204	50.065	63.800	102.96	164.84	412.86	1004.3	2377.2	5483.8
29	26.749	44.693	57.575	74.008	121.50	197.81	511.95	1285.5	3137.9	7458.0
30	29.959	50.950	66.211	85.849	143.37	237.37	634.81	1645.5	4142.0	10143.

Table A - 4 Sum of an Annuity of Re. 1 per period of n Periods :

$$PVIFA\frac{n}{(1+k)t-1}\frac{(1+k)n-1}{k}$$

No. of Periods	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	2.0100	2.0200	2.0300	2.0400	2.0500	2.0600	2.0700	2.0800	2.0900	2.1000
3	3.0301	3.0604	3.0909	3.1216	3.1525	3.1836	3.2149	3.2464	3.2781	3.3100
4	4.0604	4.1216	4.1836	4.2465	4.3101	4.3746	4.4399	4.5061	4.5731	4.6410
5	5.1010	5.2040	5.3091	5.4163	5.5256	5.6371	5.7507	5.8666	5.9847	6.1051
6	6.1520	6.3081	6.4684	6.6330	6.8019	6.9753	7.1533	7.3359	7.5233	7.7156
7	7.2135	7.4343	7.6625	7.8983	8.1420	8.3938	8.6540	8.9228	9.2004	9.4872
8	8.2857	8.5830	8.8923	9.2142	9.5491	9.8975	10.259	10.636	11.028	11.435
9	9.3685	9.7546	10.159	10.582	11.026	11.491	11.978	12.487	13.021	13.579
10	10.462	10.949	11.463	12.006	12.577	13.180	13.816	14.486	15.192	15.937
11	11.566	12.168	12.807	13.486	14.206	14.971	15.783	16.645	17.560	18.531
12	12.682	13.412	14.192	15.025	15.917	16.869	17.888	18.977	20.140	21.384
13	13.809	14.680	15.617	16.626	17.713	18.882	20.140	21.495	22.953	24.522
14	14.947	15.973	17.086	18.291	19.598	21.015	23.550	24.214	26.019	27.975
15	16.096	17.293	18.598	20.023	21.578	23.276	25.129	27.152	29.360	31.772
16	17.257	18.639	20.156	21.824	23.657	25.672	27.888	30.324	33.003	35.949
17	18.430	20.012	21.761	23.697	25.840	28.212	30.840	33.750	36.973	40.544
18	19.614	21.412	23.414	25.645	28.132	30.905	33.999	37.450	41.301	45.599
19	20.810	22.840	25.116	27.671	30.539	33.760	37.379	41.446	46.018	51.159
20	22.019	24.297	26.870	29.778	33.066	36.785	40.995	45.762	51.160	57.275
21	23.239	25.783	28.676	31.969	35.719	39.992	44.865	50.422	56.764	64.002
22	24.471	27.299	30.536	34.248	38.505	43.392	49.005	55.456	62.873	71.402
23	25.716	28.845	32.452	36.617	41.430	46.995	53.436	60.893	69.531	79.543
24	26.973	30.421	34.426	39.082	44.502	50.815	58.176	66.764	76.789	88.497
25	28.243	32.030	36.459	41.645	47.727	54.864	63.249	73.105	84.700	98.347
26	29.525	33.670	38.553	44.311	51.113	59.156	68.676	79.954	93.323	109.18
27	30.820	35.344	40.709	47.084	54.669	63.705	74.483	87.350	102.72	121.09
28	32.129	37.051	42.930	49.967	58.402	68.528	80.697	95.338	112.96	134.20
29	33.450	38.792	45.218	52.966	62.322	73.639	87.346	103.96	124.13	148.63
30	34.784	40.568	47.575	56.084	66.438	73.639	94.460	113.28	136.30	164.49

Table A - 4 (continued)

No. of Period	12%	14%	15%	16%	18%	20%	24%	28%	32%	36%
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	2.1200	2.1400	2.1500	2.1600	2.1800	2.2000	2.2400	2.2800	2.3200	2.3600
3	3.3744	3.4396	3.4725	3.5056	3.5724	3.6400	3.7776	3.9184	4.0624	4.2096
4	4.7793	4.9211	4.9934	5.0665	5.2154	5.3680	5.6842	6.0156	6.3624	6.7251
5	6.3528	6.6101	6.7424	6.8771	7.1542	7.4416	8.0484	8.6999	9.3983	10.146
6	8.1152	8.5355	8.7537	8.9775	9.4420	9.9299	10.980	12.135	13.405	14.798
7	10.089	10.730	11.066	11.413	12.141	12.915	14.615	16.533	18.695	21.126
8	12.299	13.232	13.726	14.240	15.327	16.499	19.122	22.163	25.678	29.731
9	14.775	16.065	16.785	17.518	19.085	20.798	24.712	29.369	34.895	41.435
10	17.548	19.337	20.303	21.321	23.521	25.958	31.643	38.592	47.061	57.351
11	20.654	23.044	24.349	25.732	28.755	32.150	40.237	50.398	63.121	78.998
12	24.133	27.270	29.001	30.850	34.931	39.580	50.894	65.510	84.320	108.43
13	28.029	32.088	34.351	36.786	42.218	48.496	64.109	84.852	112.30	148.47
14	32.392	37.581	40.504	43.672	50.818	59.195	80.496	109.61	149.23	202.92
15	37.279	43.842	47.580	51.659	60.965	72.035	100.81	141.30	197.99	276.97
16	42.753	50.980	55.717	60.925	72.939	87.442	126.01	181.86	262.35	377.69
17	48.883	59.117	65.075	71.673	87.068	105.93	157.25	233.79	347.30	514.66
18	55.749	68.394	75.836	84.140	103.74	128.11	195.99	300.25	459.44	700.93
19	63.439	78.969	88.211	98.603	123.41	154.74	244.03	385.32	607.47	954.27
20	72.052	91.024	102.44	115.37	146.62	186.68	303.60	494.21	802.86	1298.8
21	81.698	104.76	118.81	134.84	174.02	225.02	377.46	633.59	1060.7	1767.3
22	92.502	120.43	137.63	157.41	206.34	271.03	469.05	811.99	1401.2	2404.6
23	104.60	138.29	159.27	183.60	244.48	326.23	582.62	1040.3	1850.6	3271.3
24	118.15	158.65	184.16	213.97	289.49	392.48	723.46	1332.6	2443.8	4449.9
25	133.33	181.87	212.79	249.21	342.60	471.98	898.09	1706.8	3226.8	6052.9
26	150.33	208.33	245.71	290.08	405.27	567.37	1114.6	2185.7	4260.4	8223.0
27	169.37	238.49	283.56	337.50	479.22	681.85	1383.1	2798.7	5624.7	11197.9
28	190.69	272.88	327.10	392.50	566.48	819.22	1716.0	3583.3	7425.6	15230.2
29	214.58	312.09	377.16	456.30	669.44	984.06	2128.9	4587.6	9802.9	20714.1
30	241.33	356.78	434.74	530.31	790.94	1181.8	2640.9	5873.2	12940.	28172.2

2.13 BONDS VALUATION

What is Bond?

Bonds are financial instrument which represents the borrowings of the issuing authority and pays a fixed amount of interest at a rate specified at the time of issue. From an investors point of view it is a fixed return earning instruments.

Terms related to Bonds

a. **Principal Value or Face Value:** It is the nominal or principal value of the Bond. It is the price printed on the face of the Bonds issued by the company.

b. **Interest rate or Coupon rate:** A coupon rate is the specific interest rate which is paid at specific intervals to the bond holders.

c. **Maturity Period:** It the total time period for which a bond is issued.

d. **Net Proceeds:** It is the total amount of funds raised by the company by the issue of the bonds.

e. **Redemption:** It is the repayment of the amount to the bond holders at the time of maturity.

f. **Redemption Value:** It is the total amount that is paid to the holders of the bond at the time of maturity.

Valuation of Bonds:

The bond is to be valued based on the present value of the expected cash inflows from such bonds in the form of Principal amount repayment and interest received over the life time of the bonds.

V = I (PVIFA r, n) + P (PVIF r, n)

Where,

V = value of the bond

I = Annual interest payable on the bond

P = Principal amount of the bond repayable at the time of maturity (at Par/Premium/Discount)

r = Discount rate or expected rate of return

n = maturity period of the bond.

PVIFA = Present Value Annuity Factor

PVIF = Present Value Interest Factor

Alternatively one can use table to find the value of the Bonds:

Statement showing Valuation of Bond			
	A	B	C = A x B
Year (n)	Cash Inflow	DF @ r%	
1	XX (I)	X	XXX
2	XX (I)	X	XXX
3	XX (I)	X	XXX
4	XX (I)	X	XXX
5	XX (P + I)	X	XXX
	Value of the Bond (Sum of Column 'C')		XXX

I = Annual interest payable on the bond

P = Principal amount of the bond repayable at the time of maturity (at Par/Premium/Discount)

r = Discount rate or expected rate of return

n = maturity period of the bond.

Illustration 1:

A bond having par value of ₹ 100 bears a coupon rate of 14% and has maturity period of 5 years. The required rate of return on the bond is 12%. What should be the value of the bond?

What will be the answer if the required rate of return if?

a. 12%

b. 14%

b. 16%

Solution:

a. V = I (PVIFA r, n) + P (PVIF r, n)
V = 14(3.6048) +100(0.5674)
V = 50.47 + 56.74
V = 107.21

OR

a.

Year	Cash Inflow	DF @ 12%	
1	14	0.8929	12.50
2	14	0.7972	11.16
3	14	0.7118	9.97
4	14	0.6355	8.90
5	114 (100 + 14)	0.5674	64.68
		Value of the Bond	107.21

b. V = I (PVIFA r, n) + P (PVIF r, n)
V = 14(3.4332) +100(0.5194)
V = 48.06 + 51.94
V = 100.00

OR

b.

Year	Cash Inflow	DF @ 14%	
1	14	0.8772	12.28
2	14	0.7695	10.77
3	14	0.6750	9.45
4	14	0.5921	8.29
5	114 (100 + 14)	0.5194	59.21
		Value of the Bond	100.00

c. V = I (PVIFA r, n) + P (PVIF r, n)
V = 14(3.2744) + 100(0.5194)
V = 45.84 + 47.61
V = 93.45

OR

c.

Year	Cash Inflow	DF @ 16%	
1	14	0.8621	12.07
2	14	0.7432	10.40
3	14	0.6407	8.97
4	14	0.5523	7.73
5	114 (100 + 14)	0.4761	54.28
		Value of the Bond	93.45

Illustration 2:

Lion Ltd. has issued a debenture with face value of ₹ 100 bearing coupon @ 10% p.a. maturing after 6 years at par. The expected rate of return of investor is 15%. Should investor buy the debentures if the current market price of debenture is ₹ 85? (TYBAF, May 2016 (Adapted))

Solution:

Statement showing Valuation of Bond:

Year	Cash Inflow	DF @ 15%	Amount
1	10	0.8696	8.70
2	10	0.7561	7.56
3	10	0.6575	6.58
4	10	0.5718	5.72
5	10	0.4972	4.97
6	110 (100 + 10)	0.4323	47.55
		Value of the Debentures	81.08

The value of the Bond is 81.08 and it is priced at 85 in the market, so it is overpriced and therefore the investor is advised **not to buy the debentures**.

Illustration 3

Darshan Ltd. wants to issue debentures redeemable after 7 years at a premium of 10%. Face value of debentures is ₹ 1,000. The company proposes to issue so as to yield a return of 12% p.a. to the investor. The coupon rate for the first three years will be 13% p.a. which will be increased by 2% p.a. for the remaining life. As CFO of the company advice the issue price of the debenture. (TYBAF, Nov 2016)

Solution:

Statement showing Valuation of Bond

Year	Cash Inflow	DF @ 12%	
1	130	0.8929	116.08
2	130	0.7972	103.64
3	130	0.7118	92.53
4	150	0.6355	95.33
5	150	0.5674	85.11
6	150	0.5066	75.99
7	1,250 (1,100 + 150)	0.4523	565.38
		Value of the Bond	1,134.05

- **Redemption at Premium: 1,000 + 100 (1,000 x 10% Premium.)**

Kindly Note:
1. When the interest is fluctuating, we should use Table based format.

Illustration 4:

Sanjana Ltd. has issued bonds with face value of ₹ 1,000 bearing interest @ 24% p.a. payable half yearly maturing after 5 years at par. The expected rate of return of an investor is 12%. Should the investor buy the bonds if the current price of bond listed in the market is ₹ 1,000? (Adapted TYBAF Nov. 2016).

Solution:
Statement showing Valuation of Bond

Year	Cash Inflow	DF @ 6**%	
1	120*	0.9434	113.21
2	120	0.8900	106.80
3	120	0.8396	100.75
4	120	0.7921	95.05
5	120	0.7473	89.68
6	120	0.7050	84.60
7	120	0.6651	79.81
8	120	0.6274	75.29
9	120	0.5919	71.03
10	1,120 (1,000 + 120)	0.5584	625.41
		Value of the Bond	1,441.62

*** Coupon Rate: 24% p.a. therefore 12% for 6 months**
**** Interest Rate: DF @ 12% p.a.**

Illustration 5:

Credit unlimited Ltd. has issued fully convertible bonds with face value of ₹ 100 with coupon rate of 16% p.a. which will convert in 10 equity shares of ₹ 10 each at the end of 6 years. Find out the value of debentures if the expected rate of return of an investor is 20% p.a. and expected market price of one share after 6 years is ₹ 28.50. Interest on debentures will be paid on half yearly basis. (TYBAF Nov. 2016)

Solution:

Statement showing Valuation of Bond

Year	Cash Inflow	DF @ 10%	
1	8	0.9091	7.27
2	8	0.8264	6.61
3	8	0.7513	6.01
4	8	0.6830	5.46
5	8	0.6209	4.97
6	8	0.5645	4.52
7	8	0.5132	4.11
8	8	0.4665	3.73
9	8	0.4241	3.39
10	8	0.3855	3.08
11	8	0.3505	2.80
12	293*	0.3186	93.35
		Value of the Bond	145.31

*Cash Inflow in Last Year = (10 Shares x ₹ 28.50(Converted Value of Debentures + 8)

Yield to Maturity:

Yield to Maturity (YTM) *(alternatively referred as redemption or book yield)* is the speculative rate of return or interest rate of a fixed-rate security, such as a bond. The YTM is based on the belief or understanding that an investor purchases the security at the current market price and holds it until the security has matured (reached its full value), and that all interest and coupon payments are made in a timely fashion. In simple words 'Yield to Maturity' is the rate of return, mostly annualised, that an investor can expect to earn if they hold the bond till maturity.

$$YTM = \frac{I + \frac{R.V. - N.P.}{n}}{\frac{R.V. + N.P.}{2}}$$

Where,
I = Interest
R.V. = Redemption Value
N.P. = Net Proceeds/Market Value
n = no of years/periods

Illustration 1:
Cairo Ltd.'s bond with a par value of ₹ 500 is currently traded at ₹ 435. The coupon rate is 12% and it has a maturity period of 7 years. What is yield to maturity?

Solution:

$$YTM = \left(\frac{I + \left(\frac{R.V. - N.P.}{n} \right)}{\frac{R.V. + N.P.}{2}} \right) x\ 100$$

$$YTM = \frac{60 + \left(\frac{500 - 435}{7} \right)}{\left(\frac{500 + 435}{2} \right)} x\ 100$$

$$YTM = \frac{60 + 9.29}{467}.5\ x\ 100$$

$$YTM = \frac{69.29}{467.5}\ x\ 100$$

YTM = 14.82%

Illustration 2:
What is YTM of each bond? Which bond will you recommend for investment?

Bond	Coupon Rate	Maturity	Price/₹ 100 Par Value
Bond X	11%	10 years	₹ 76
Bond Y	12%	7 years	₹ 69

(TYBAF Nov. 2019)

$Y.T.M. = \left(\frac{Interest + \left(\frac{R.V. + N.P.}{n} \right)}{\left(\frac{R.V. + N.P.}{2} \right)} \right) \times 100$	Bond X	Bond Y
	$\frac{11 + \left(\frac{100 - 76}{10} \right)}{\left(\frac{100 + 76}{2} \right)} \times 100$ $= \frac{13.4}{88} \times 100$ $= 15.23$	$\frac{12 + \left(\frac{100 - 69}{7} \right)}{\left(\frac{100 + 69}{2} \right)} \times 100$ $= \frac{16.43}{84.5} \times 100$ $= 19.44\%$

Duration of Bond

The concept of duration is straightforward. Duration is nothing but the average time taken by an investor to collect his/her investment. If an investor receives a part of his/her investment over the time on specific intervals before maturity, the investment will offer him the duration which would be lesser than the maturity of the instrument. Higher the coupon rate, lesser would be the duration.

It measures how quickly a bond will repay its true cost. The longer the time it takes the greater exposure the bond has to changes in the interest rate environment.

Illustration 3:
Calculate the duration of Bond from the following details.
Face Value = ₹ 1,000
Coupon Rate (payable annually) = 13 %
Years to Maturity = 5 years
Redemption value = ₹ 1,000
Current Market Price = ₹ 1036
Yield to Maturity = 12% (TYBAF. Apr. 2019).

Statement showing calculation of Duration of Bond				
1	2	3	4 = 2 x 3	5 = 1 x 4
Year	Interest @ 13%	YTM @ 12%	PVCF	Year x PVCF
1	130	0.8929	116.08	116.08
2	130	0.7972	103.64	207.28
3	130	0.7118	92.53	277.59
4	130	0.6355	82.62	330.48
5	1130	0.5674	641.16	3,205.80
			1,036.03	4,137.23

$$\text{Duration of Bond} = \frac{\sum \text{Year x PVCF}}{\sum \text{PVCF}}$$

$$= \frac{4,137.23}{1,036.03}$$

Duration of Bond = 3.99 Years

Illustration 4:
The following data is available for a bond. Face value is ₹ 100, Coupon rate is 14%, years to maturity is 5 years, and redemption value is ₹ 100. YTM is l5%. Calculate duration of bond.

(TYBAF, Nov. 2019)

Statement showing calculation of Duration of Bond				
1	2	3	4 = 2 x 3	5 = 1 x 4
Year	Interest @ 14%	DF @ 15%	PVCF	Year x PVCF
1	14	0.8696	12.17	12.17
2	14	0.7561	10.59	21.17
3	14	0.6575	9.21	27.62
4	14	0.5718	8.01	32.02
5	114	0.4972	56.68	283.40
			96.65	376.39

$$\text{Duration of Bond} = \frac{\sum \text{Year x PVCF}}{\sum \text{PVCF}}$$

$$= \frac{376.39}{96.65}$$

Duration of Bond = 3.89 Years

2.13 EXERCISES

1. What do you understand by time value of money?
2. What are the possible reasons that must have time value despite not being put to use?
3. What do you understand by future value and present value of money?
4. What are annuities? And why such values are calculated/
5. How do you determine the equated monthly installments?

2) Indicate the right answer with your reasoning:

a) Which provides money its time value?
   i) Investment
   ii) Interest Rates
   iii) Market Rates
   iv) Call Rates

b) In approximately, how many years would you expect to double your money at 8% per annum?
   i) 8 years
   ii) 12 years
   iii) 9 years
   iv) 10 years

c) When payments are made at the end of each year, it is known as _____ annuity.
   i) Annuity due
   ii) Ordinary annuity
   iii) Perpetuity
   iv) Fixed annuity

d) When compounding is done more frequently than annually, the effective rate of interest is _____.
   i) greater than the nominal rate of interest.
   ii) lower than the normal rate of interest.
   iii) equal to nominal rate of interest.
   v) normal
   Hint (Ans (a) – ii, (b) – iii, (c) – ii (d) – i)

2) Ramesh deposited ₹ 2,000 for 3 years period at 12% interest which is credited at the end of every six months. What will be the total amount credited to Ramesh's Account at the end of 3 years?

3) Mohan plan to send his son for higher studies in America after 5 years. He expects the cost of the study to be ₹ 4,00,000. How much should he save annually to have a sum of ₹ 4,00,000 at the end of 5 years. If the interest rate is 9%

4) A bank promises to give you ₹ 5,000 after 10 years in exchange of ₹ 2,000 today. What is the interest rate involved in this offer?

5) Mukesh deposits ₹ 2,00,000 in Saraswati Co-op Bank which pays 10 per cent interest. How much he withdraw annually for a period of 15 years?

6) Avinash wants to invest @ 8% p.a. compound interest, such amount as will amount to ₹ 50,000 at the end of three years. How much should he invest? (Ans. 39,642)

7) A company has advertised for deposits from the public. If you deposit ₹ 1,000 now, you would receive ₹ 1,464 at the end of 4 years or ₹ 1,611 at the end of 5 years. What rates of interest is the company paying? (Ans. 10%)

8) Four equal annual payments of ₹ 4000 are made into a deposit account that pays and per cent interest per year. What would be the future value of this annuity at the end of 6 years?
   (Ans. ₹ 29,342)

9) You can save ₹ 20,000 a year for 5 years and ₹ 9,000 and ₹ 3,000 a year for 10 years thereafter. What will these saving cumulate to al the end of 15 years if the rate of interest is 10 percent? (Ans. 1,69,913)

10) What is the present value of the following cash stream if the discount rate is 12%?

Year	0	1	2	3	4
Cash Flow	5000	6000	8000	10000	12000

(Ans. ₹ 31,479)

11) Find out the present value of debenture from the following:
Face Value of debentures ₹ 1000
Annual interest rate 12%
Expected Return 10%
Maturity period 5 years

12) A Bank advertise that it will pay a lump sum of ₹ 45,740 at the end of 8 years to the investors who deposit annually ₹ 4,000 for 8 years what is the interest rate bank is paying?

Unit-3

RATIO ANALYSIS

Unit Structure:

3.0 OBJECTIVES

After studying the unit the students will be able to understand:

- Meaning and definition of Ratio.
- Advantages of preparing Ratio.
- Importance of Ration analysis.
- Types of ratios.
- Computation of operating ratio.
- Ratios measuring short-term solvency and liquidity of the firm.
- Ratios indicating long-term financial stability of the firm.
- Ratios indicating debt service capacity.
- Analysis of profitable team ratio.
- Ratios indicating the efficiency of the firm.
- Limitation of Ratio analysis.

3.1 INTRODUCTION

Ratio analysis allow the interested parties like Shareholders, investors, creditors, government, bankers to come to a conclusion about the company's performance. The appraisal of the ratio will make proper analysis about the strength and weakness of the firms. The calculation of ratio is an easy and simple task, but the proper analysis and interpretation can be made only by expose. While interpreting the financial data the analysis has to be careful in the limitations imposed by the accounting concepts and methods. Ratio analysis is a helpful in providing valuable insight when a company is in financial position.

3.2 RATIO MEANING AND DEFINITION

The term ratio is used to describe the relationships between figures in a balance sheet or in a profit and loss account or in a budgetary control system or in any other part of the accounting organization. The accounting ratio indicates the quantitative relationship which is used for analysis and decision making. It gives data for analysis of inter firm and intra firm comparison. A ratio is a quotient of two numbers and the relation expressed between two accounting figures is known as `accounting ratio'. Ratio analysis is a very powerful analysis tools useful for measuring performance of an organization. The ratio analysis concentrates on the internal relationship among the figures in financial statement. The analysis helps the management to make future projections on the basis of the past records.

Definition

"Ratio is a yardstick used to evaluate the financial condition and performance of a firm, relating two pieces of financial data to each other."

- James C. Van Harne

"The relation of one amount, a to another b, expressed as the ratio of a to b".

- Kohler

"Ratio is a fraction whose numerator is the antecedent and denominator the consequent."

"Ratio is the relationship or proportion that one amount bears to another, the first number being the numerator and the later denominator."

- H.G. Guthmann

From the above definitions, we can clearly say that, “ratio is a relationship between two figures or factors or variables”. This relationship helps to analyze, interpretation and the financial condition of the firm. The accounting ratios indicate a quantitative relationship which is used for analysis and decision-making.

3.3 IMPORTANCE OF RATIO ANALYSIS

The major benefits arising from ratio analysis are as follows :

1. Ratio analysis is a very powerful analytical tool, useful for measuring performance of an organization.
2. Ratio analysis concentrates on the inter-relationship among the figures appearing in the financial statements.
3. Ratios make comparison easy. The said ratio is compared with the standard ratio and this shows the degree of efficiency utilization of assets, etc.
4. The results of two companies engaged in the same business can be easily compared (inter-firm comparison) with the help of ratio analysis.
5. Short-term liquidity position and long-term solvency position can be easily ascertained with the help of ratio analysis.
6. Ratio analysis helps the management to analysis the past performance of the firm and to make further projections.
7. Ratio analysis allows interested parties to make evaluation of certain aspects of the firm’s performance.
8. Its importance lies in analyzing the probable casual relationship between two past results.
9. By effectively using the ratios, one can find out the growth or decline of an enterprise with the help of them, future actions can be taken.
10. Ratio analysis helps the management to analyze the past performance of the firm and to make further projection.
11. Ratio analysis allows interested parties, like shareholders, investors, creditors and analysts to make an evaluation of certain aspects of a firm’s performance.
12. The appraisal of the ratios will make proper analysis about the strengths and weaknesses of the firm’s operations.

3.4 ADVANTAGES OF RATIO ANALYSIS AND LIMITATIONS OF RATIO ANALYSIS

3.4.1 ADVANTAGES OF RATIO ANALYSIS

Advantages of ratio analysis for shareholders and prospective investors;

1. Shareholders and prospective investors will analyse ratios for making decisions regarding investment and disinvestment.
2. The credit rating agencies will analyse the ratios of a firm to give the credit rating to the firm.
3. Government agencies will analyse the ratios of a firm for review of its performance.
4. Bankers who provide working capital will analyse ratios for appraising the creditworthiness of the firm.
5. Financial institutions that provide long-term debt will analyse ratios for project appraisal and debt servicing capacity of the firm.
6. Financial analysts will analyse ratios for making comparisons and recommending to the investing public.

3.4.2 LIMITATIONS OF RATIO ANALYSIS

The following limitations of ratio analysis must be taken into account:

1. Over-use of ratios as controls on managers could be dangerous; in the management might concentrate more or simply improving the ratio that one dealing with the significant issues.
2. Ratios can only provide guidelines to the management. They are only the means. However, they scratch surfaces and raise questions. This limitation of ratios may force the management to have detailed investigation of the situation under question.
3. The standards will differ from industry to industry. Comparison of ratios of firms belonging to different industries is not suggested.
4. Since ratios are calculated from past records, there are no indicators of the future.
5. Proper care should be exercised to study only such figures as have a cause and effect relationship, otherwise, ratios will only be meaningless or misleading.
6. The reliability and significance attached to ratios depends on the accuracy of data based on which ratios are calculated.

7. Ratios of a company can have meaning only when they are compared against standard. Past performance of the same company cannot be benchmarked when there is change in circumstances.
8. The change in price levels due to inflation will distort the reliability of ratio analysis.
9. The analyst should have through knowledge of methods of window-dressing.
10. Single accounting ratio is not useful at all, unless it is studied with other accounting ratios. This limitation of ratios necessitates inter-firm and intra-firm comparisons.
11. Ratios are based only on the quantitative information. Hence, qualitative information (i.e. character, managerial ability etc.) places a limit on the ratios.
12. Ratios are subject to arithmetical accuracy of the financial statements. Moreover, financial statements also include estimated data like provision for depreciation, for bad and doubtful debts, etc. Hence, results revealed by ratios are subject to such estimates.
13. Ratios are computed on the basis of financial statements which are historical in nature.
14. Knowledge of ratios alone in meaningless unless their composition is also ascertained.
15. Lack of homogeneity of data, personal judgment, lack of consistency, etc. is the factors that limit the conclusion to be derived on the basis of accounting ratios.
16. Rations are calculated form financial statements which are affected by the financial bases and policies adopted on such matters as depreciation and the valuation of stocks.
17. A ratio is a comparison of two figures, a numerator and a denominator. In comparing ratios, it may be difficult to determine whether differences are due to changes in the numerator, or in the denominator or in both.
18. Ratios are interconnected. They should not be treated in isolation. The effective use of ratios, therefore, depends on being aware of all these limitations and ensuring the following comparative analysis, they are used as a trigger point for investigation and corrective action, rather than being treated as meaningful in them.
19. The analysis of ratios clarifies trends and weaknesses in performance as a guide as long as proper comparisons are made the reasons for adverse treads or deviations from the norm are investigated thoroughly.

20. While making inter-firm comparison, the analyst must keep in mind that different firms follow different accounting policies, e.g., depreciation allowance, valuation of inventory, etc.

3.5 CLASSIFICATION OF RATIOS

a. Calculation according to statement of sources and income statement,
b. Classification according to functions / objectives.
c. Classification according to users,
d. Classification according to time, and
e. Classification according to nature or importance in financial analysis.

The above classifications can be elaborated as follows:

- **CLASSIFICATION ACCORDING TO STATEMENT OF SOURCES AND INCOME STATEMENT**

i) **Balance sheet Ratios:** Where both numerators and denominator figures are taken from he balance sheet, such as current ratio, quick ratio, proprietary ratio, etc.

ii) **Profit and Loss (Revenue) Ratios:** Ratios calculated from the figures in the profit and loss account. At times they are also called operating ratios. Some of them are the profit and loss ratios, gross profit ratio, net profit ratio, expenses ratio, etc.

iii) **Position-cum-Revenue ratios:** Where ratios are calculated by taking one figure from Balance sheet and another from Profit and Loss Account, they are known as combined or consolidated or complex or position-cum-revenue ratios. For example, return on proprietor's fund, return on capital employed, turnover of debtors and creditors separately, earnings ratio, etc.

CLASSIFICATION ACCORDING TO FUNCTIONS / OBJECTIVES

i) Financial ratios: Include solvency and liquidity ratios.

ii) Profitability ratios: For example, gross profit ratio, net profit ratio, operating ratio, return on capital employed, expense rations, etc.

iii) Turnover or Activity ratios: For example, turnover of stock, turnover or debtors, turnover of creditors etc.

iv) Market Test Ratios: For example, Earnings per share (EPS), price earning ratio, and dividend yield ratio, equity dividend cover, net cash inflow, book value per share, etc.

CLASSIFICATION ACCORDING TO USERS

In view of the requirements of the various uses of ratios, we may classify them into the following four important categories.

i) Liquidity ratios
ii) Leverage ratios
iii) Activity ratios
iv) Profitability ratios.

CLASSIFICATION ACCORDING TO TIME

i) Structural ratios: It means the ratios computed from data referring to the same point of time, e.g., ratios of a particular month or year.
ii) Trend ratios: It means the ratios computed between the items referred to different periods of time.

CLASSIFICATION ACCORDING TO NATURE OR IMPORTANCE IN FINANCIAL ANALYSIS

i) Primary ratio: e.g., Operating profit to Capital employed.
ii) Secondary or supporting ratio: e.g. Stock velocity, Creditors' velocity, Expenses ratios, etc.

In the above, we have seen different classification of ratios is available on different basis. From the above let us understand in detail some of the very important ratios which we use frequently in different situations of decision-making process, they are on the basis of users or nature or purpose with which a ratio is calculated. On the basis of users or the nature or purpose, accounting ratios may be classified into six broad categories:

1. Liquidity Ratios or Short-term Solving Ratios.
2. Capital Structure or Leverage Ratios.
3. Turnover Ratios or Activity Ratios or Performance Ratios or Asset Management Ratio.
4. Profitability Ratios.
5. Operative Ratios.
6. Market based Ratios.

3.6 LIQUIDITY RATIOS / SHORT TERM SOLVING RATIOS

The liquidity ratios measure the liquidity of the firm and its ability to meet its maturing short-term obligations. Liquidity is defined as the ability to realized value in money, the most liquid of assets.

Liquidity refers to the ability to pay in cash, the obligations that are due. The corporate liquidity has two dimensions viz., quantitative and qualitative concepts. The quantitative aspect

includes the quantum, structure and utilization of liquid assets and in the qualitative aspect, it is the ability to meet all present and potential demands on cash from any source in a manner that minimizes cost and maximizes the value of the firm. Thus, corporate liquidity is a vital factor in business. Excess liquidity, though a guarantor or solvency would reflect lower profitability, deterioration in managerial efficiency, important ratios in measuring short-term solvency are (a) Current ratio, (b) Quick ratio (c) Absolute liquid ratio and (d) Defensive Interval ratio.

1. Current Ratio

This ratio measures the solvency of the company in the short-term; current assets are those assets which can be converted into cash within a year. Current liabilities and provisions are those liabilities that are payable within a year.

Current Assets, Loans & Advances
Current Liabilities & Provisions

A current ratio of 2:1 indicates a highly solvent position A current ratio of 1.33: 1 is considered by banks as the minimum acceptable level for providing working capital finance. The constituents of the current assets are as important as the current assets themselves for evaluation of a company's solvency position. A very high current ratio will have adverse impact on the profitability of the organization. A high current ratio may be due to the piling up of inventory, inefficiency in collection of debtors, high balances in cash and bank accounts without proper investment etc.

Advantages of Current Ratio

1. This ratio indicates the extent of current asset available to meet the current obligations. It is only from the current assets the immediate obligations (current liabilities) are met with. Therefore, the interest of creditors lies in this ratio.

2. The safe ratio is 2:1. This means, for every current liability of Rs. 1, there should be current assets of Rs. 2, so that the firm can conveniently meet its current obligations, even if the assets like stock or debtors are not quickly realized.

3. This margin also leaves sufficient amount as working capital to carry out day-to-day transactions.

4. This is useful in assessing the solvency and liquidity position of the company.

2. Quick/Liquid/Acid Test Ratio

Quick ratio is used as a measure of the company's ability to meet its current obligations. Since bank overdraft is secured by the

inventories, the other current assets must be sufficient to meet other current liabilities.

Current Assets, Loans and Advances – Inventories – Prepaid Expenses – Advance

Current Liabilities Provisions – Bank overdraft – Cash Credit

A quick ratio I: It indicates highly solvent position. This ratio serves as a supplement to the current ratio in analyzing liquidity.

Advantages of the Quick Ratio

a. This ration is very useful for cross-checking the performance in other areas of economic management of an enterprise. Thus, the liquid ratio, cross-checked with inventory throw light on the inventory accumulation. In addition, the liquid ratio can throw light on certain other aspects of inventory management, which will be pointed out later.

b. It is an improved variant of the current ratio in arriving at a liquidity index for an enterprise.

3. Absolute Liquid / Super Quick Ratio

It is the ratio of absolute liquid assets to quick liabilities. However, for calculation purposes, it is taken as ratio of absolute liquid assets to current liabilities. Absolute liquid assets include cash in hand, cash at bank and short-term or temporary investments. The formula is

Absolute Liquid Assets
Current Liabilities

Absolute Liquid Assets – Cash in hand + Cash at Bank + Short term investments. The ideal absolute liquid ratio is taken as 1: 2.

4. Defensive – Interval Ratio

A firm's ability to meet current financial obligation is dependant on the ability to generate daily cash requirements of the firm. The defensive-internal ration is a measure of liquidity by comparing the liquid assets against projected daily cash requirement. The formula is:

Liquid Assets
Projected Daily Cash Requirement

Where, projected daily cash requirement = Projected cash operating expenditure / Number of days in a year (365)

Liquid Assets = Cash + Marketable Securities + Debtors

Projected cash operating expenditure includes all estimated cash expenses excluding depreciation. The higher the ratio, more safety of short-term liquidity.

3.7 LEVERAGE RATIOS / CAPITAL STRUCTURE RATIOS

The long-term financial stability of the firm may be considered as dependent upon its ability to meet all its liabilities, including those not currently payable. The ratios which are important in measuring the financial leverage of the company are as follows:

1. Debt-Equity Ratio

This ratio indicates the relationship between loan funds and net worth of the company, which is known as `gearing'. If the proportion of debt to equity is low, a company is said to be low geared, and vice versa. A debt-equity ratio of 2:1 is the norm accepted by financial institutions for financing of projects. Higher debt-equity ratio of 3:1 may be permitted for higher capital intensive industries like petrochemicals, fertilizers, power etc. The higher the gearing, the higher volatile the return to the shareholders. The formula is:

$$\frac{\text{Long Term Debt}}{\text{Shareholders' Funds}}$$

The use of debt capital has direct implications for the profit accruing to the ordinary shareholders and expansion is often financed in this manner with the objective of increasing the shareholders rate of return. This objective is achieved only if the rate earned on the additional funds raised exceeds that payable to the providers of the loan. The shareholders of a highly geared company reap disproportionate benefits when earnings before interest and tax increase. This is because interest payable on a large proportion of total finance remains unchanged. The converse is also true, and a highly geared company is likely to find itself in severe financial difficulties if it suffers a succession of trading losses. It is not possible to specify an optimal level of gearing for companies but, as a general rule, gearing should be low in those industries where demand is volatile and profits are subject to fluctuation. A debt-equity ratio which shows a declining trend over the years is usually taken as a positive sign reflecting on increasing cash accrual and debt repayment. In fact, one of the indicators of a unit turning sick is rising debt-equity ratio. Usually in calculating the ratio, the preference share capital is excluded from debt, but if the ratio is to show effect of use of fixed interest sources on earnings available to the shareholders then it is to be included. On the other hand, if the ratio is to examine financial solvency, then preference shares shall form part of the capital.

Advantages / Uses of Debt-Equity Ratio

a. This ratio is a measure of contribution of owners to the business as compared to long-term creditors.
b. It tests the long-term liquidity or solvency of an organization.

2. Shareholders Equity Ratio

This ratio is calculated as follows:

$$\frac{\text{Shareholders Equity}}{\text{Total Assets (tangible)}}$$

It is assumed that larger the proportion of the shareholders' equity, the stronger is the financial position of the firm. This ration will supplement the debt-equity ratio. In this ratio the relationship is established between the shareholders' funds and the total assets. Shareholders' funds represent equity and preference capital plus reserves and surplus less accumulated losses. A reduction in shareholders equity signalling the over dependence on outside sources for long-term financial needs and this carries the risk of higher levels of gearing. This ration indicates the degree to which unsecured creditors are protected against loss in the event of liquidation.

3. Long-term Debt to Shareholders Net worth Ratio

This ratio is calculated as follows:

$$\frac{\text{Long-term Debt}}{\text{Shareholders Net worth}}$$

The ratio compares long-term debt to the net worth of the firm i.e. the capital and fresh reserves less intangible assets. This ratio is finer than the debt equity ratio and includes capital which is invested in fictitious assets like deferred expenditure and carried forward losses. This ratio would be of more interest to the contributories of long-term finance to the firm, as the ratio gives a factual idea of the assets available to meet the long term liabilities.

4. Capital Gearing Ratio

It is the proportion of fixed interest bearing funds to equity shareholders funds:

$$\frac{\text{Fixed interest bearing Funds}}{\text{Equity Shareholder's Funds}}$$

The fixed interest bearing funds include debentures, long term loans and preference share capital. The equity shareholders funds include equity share capital, reserves and surplus. Capital gearing ratio indicates the degree of vulnerability of earning available for equity shareholders. This ratio signals the firm which is operating on trading on equity. It also indicates the changes in

benefits accruing to equity shareholders by changing the levels of fixed interest bearing funds in the organization.

Advantages of Capital Gearing Ratio

a. Capital gearing ratio measures the company's capitalization.
b. This ratio is useful to the new investors for making sound investment decision.
c. Capital gearing ratio shows the claim of owners as against the claim of lenders and preference share holders.

5. Fixed Assets to Long-Term Funds Ratio

The fixed assets are shown as a proportion to long-term funds as follows:

$$\frac{\text{Fixed Assets}}{\text{Long-term Funds}}$$

This ratio indicates the proportion of long-term funds deployed in fixed assets. Fixed assets represent the gross fixed assets minus depreciation provided on this till the date of calculation. Long-term funds include share capital, reserves and surplus and long-term loans. The higher the ratio indicates the safer the funds available in case of liquidation. It also indicates the proportion of long-term funds that is invested in working capital.

6. Proprietary Ratio

It expresses the relationship between shareholders' net worth and total assets.

$$\frac{\text{Shareholders Net worth}}{\text{Total Assets}}$$

Net worth = Equity share capital + Preference share capital + Reserves – Fictitious assets.

Total assets = Fixed assets + Current assets – Fictitious assets

Reserves earmarked specifically for a particular purpose should not be included in calculation of net worth. A high proprietary ratio is indicative of strong financial position of the business. The higher the ratio, the better it is.

Advantages or uses of Proprietary Ratio

It also shows the relation between own fund and borrowed fund. It shows the amount of proprietors funds invested in the total assets of the firm.

7. Interest Cover

The interest coverage ratio shows how many times interest charges are covered by funds that are available for payment of interest.

$$\frac{\text{Profit before interest, Depreciation and Tax}}{\text{Interest}}$$

A very high ratio indicates that the firm is conservative in using debt and a very low ratio indicates excessive use of debt. Interest cove indicates how many times a company can cover its current interest payment out of current profits. It gives an indication of problem in servicing the debt. An interest cover of more than 7 times is regarded as safe and more than 3 times is desirable. An interest cover of 2 times is considered reasonable by financial institutions.

8. Debt Service Coverage Ratio (DSCR)

This ratio is the key indicator to the lender to assess the extent of ability of the borrower to service the loan in regard to timely payment of interest and repayment of loan installment. It indicates whether the business is earning sufficient profits to pay not only the interest charges, but also the installments due of the principal amount. The ratio is calculated as follows :

$$\frac{\text{Profit after taxes + Depreciation + Interest on Loan}}{\text{Interest on Loan + Loan repayment in a year}}$$

A ratio of 2 is considered satisfactory by the financial institutions. The greater debt service coverage ratio indicates the better debt servicing capacity of the organization. By means of cash flow projection, the borrower should work DSCR for the entire duration of the loan. This will enable the lender to take correct view of the borrower's repayment capacity.

9. Dividend Cover

This ratio indicates the number of times the dividends are covered by net profit. This highlights the amount retained by a company for financing of future operations.

a) Preference Dividend Cover

$$\frac{\text{Net profit after tax}}{\text{Preference Dividend}}$$

b) Equity Dividend Cover

$$\frac{\text{Net Profit Tax – Preference Dividend}}{\text{Equity Dividend}}$$

Use of Advantages of Debtor Turnover Ratio

1. This ratio helps to monitor credit and collection policies. It can signal the need for corrective action particularly if compared with a norm.

2. This ratio highlights the impact of management policies on the liquidity of the enterprise as well as its profitability. It is a barometer of the general state of health of an enterprise.

3. It is easy to understand, particularly when expressed as debtors' collection period.

3.8 ASSET MANAGEMENT RATIO / TURNOVER RATIO / PERFORMANCE RATIO / ACTIVITY RATIO

Asset management ratios measure how effectively the firm employs its resources. These ratios are also called `activity or turnover ratios' which involve comparison between the level of sales and investment in various accounts – inventories, debtors, fixed assets, etc. Asset management ratios are used to measure the speed with which various accounts are converted into sales or cash. The following asset management ratios are calculated for analysis. These ratios also analyse the use of resources and the utility of each component of total assets. The profitability of the firm can be determined by activity ratios coupled with the degree of leverage.

1. Inventory Turnover Ratio

A considerable amount of a company's capital may be tied up in the financing of raw materials, work-in-progress and finished goods. It is important to ensure that the level of stocks is kept as low as possible, consistent with the need to fulfil customers' orders in time. The ratio is calculated as:

$$\frac{\text{Cost of Goods Sold}}{\text{Average Inventory}} \text{ OR } \frac{\text{Sales}}{\text{Average Inventory}}$$

Average Inventory = (opening stock + closing stock)/2

The higher the stock turnover rate or the lower the stock turnover period the better, although the ratios will vary between companies. For example, the stock turnover rate in a food retailing company must be higher than the rate in a manufacturing concern. The inventory turnover ratio measures how many times a company's inventory has been sold during the year. If the inventory turnover ratio has decreased from past, it means that either inventory is growing or sales are dropping. In addition to that, if a firm has a turnover that is slower than for its industry, then there may be obsolete goods on hand, or inventory stocks may be high. Low inventory turnover has impact on the liquidity of the business.

2. Inventory Ratio

The level of inventory in a company may be assessed by the use of the inventory ratio, which measures how much has been tied up in inventory. The formula is:

$$\frac{\text{Inventory}}{\text{Current Assets}} \times 100$$

3. Debtors Turnover Ratio

Debtor's turnover, which measures whether the amount or resources tied up in debtors, is reasonable and whether the company has been efficient in converting debtors into cash. The formula is:

$$\frac{\textbf{Credit Sales}}{\textbf{Average Debtors}}$$

The higher the ratio, the better the position.

4. Debtors Collection period or Debtors Velocity Ratio

Average debtors collection period measures how long it takes to collect amounts from

$$\frac{\text{Average Debtors}}{\text{Credit Sales}} \times 365\,(\textit{in days})$$

The actual collection period can be compared with the stated credit terms of the company. If it is longer than those terms, then this indicates inefficiency in collecting debts.

5. Bad Debts to Sales Ratio

It measures the proportion of bad debts to sales and calculated as:

$$\frac{\textit{Bad Debts}}{\text{Sales}} \times 100$$

Bad debts to sales ratio indicate the efficiency of the credit control procedures of the company. Its level will depend on the type of business. Mail order companies have to accept a fairly high level of bad debts, while retailing organizations should maintain very low levels of ratio. The actual ratio is compared with the target or norm to decide whether it is acceptable or not.

6. Creditors Turnover Ratio

The measurement of the credit turnover period shows the average time taken to pay for goods and services purchased by the company. The formula is:

$$\frac{\text{Net Credit Purchase}}{\text{Average Creditors}}$$

Here purchases refer to net credit purchases and average creditors are given by opening creditors and bills payable + closing creditors and bills payable divided by two.

In general, the longer the credit period achieved the better, because delays in payment mean that the operations of the company are being financed interest free by suppliers or materials. But there will be a point beyond which delays in payment will damage relationships with suppliers which, if they are operating in a seller's market, may harm the company. If too long a period is taken to pay creditors, the credit rating of the company may suffer, thereby making it more difficult to obtain supplies in the future.

7. Creditors Payment Period or Creditors Velocity Ratio

$$\frac{\text{Average Creditors}}{\text{Credit Purchases}} \times 365\,(in\ days)$$

Generally, payment period of 50 to 60 days is considered ideal.

8. Fixed Assets Turnover Ratio

This ratio will be analysed further with ratios for each main category of asset. This is a difficult set of ratios to interpret as asset values are based on historical cost. An increase in the fixed asset figure may result from the replacement of an asset at an increased price or the purchase of an additional asset intended to increase production capacity. The formula is:

$$\frac{\text{Sales}}{\text{Fixed Assets}}$$

The ratio of the accumulated depreciation provision to the total of fixed assets at cost might be used as an indicator of the average age of the assets, particularly when depreciation rates are noted in the accounts. The ratio of sales value per square foot of floor space occupied is particularly significant for trading concerns, such as a wholesale warehouse or a departmental store.

9. Total Assets Turnover Ratio

This ratio indicates the number of times total assets are being turned over in a year. The Formula is

$$\frac{\text{Sales}}{\text{Total Assets}}$$

The higher the ratio indicates overtrading of total assets, while a low ratio indicates idle capacity.

10. Working Capital Turnover Ratio

This ratio is calculated as follows:

$$\frac{\text{Sales}}{\text{Working Capital}}$$

This ratio indicates the extent of working capital turned over in achieving sale of the firm.

11. Sales to Capital Employed Ratio

This ratio is ascertained by dividing sales with capital employed. The formula is:

$$\frac{\text{Sales}}{\text{Capital Employed}}$$

This ratio indicates efficiency in utilization of capital employed in generating revenue.

3.9 PROFITABILITY RATIOS

The purpose of study and analysis of profitability ratios are to help assessing the adequacy of profits earned by the company and also to discover whether profitability is increasing or declining. The profitability of the firm is the net result of a large number of policies and decisions. The profitability ratios show the combined effects of liquidity, asset management and debt management on operating results. Profitability ratios are measured with reference to sales, capital employed, total assets employed, share holders funds etc. The major profitability rates are as follows:

1. Gross Profit Margin

The gross profit margin is calculated as follows:

$$\frac{\text{Sales - Cost of Goods Sold}}{\text{Sales}} \times 100 \quad \frac{\text{Gross Profit}}{\textit{Sales}} \times 100$$

The ratio measures the gross profit margin on the total net sales made by the company. The gross profit represents the excess of sales proceeds during the period under observation over their cost, before taking into account administration, selling and distribution and financing charges. The ratio measures the efficiency of the company's operations and this can also be compared with the previous year's results to ascertain the efficiency.

2. Net Profit Margin

The ratio is calculated as follows:

$$\frac{\text{Net Profit before interest and Tax}}{\text{Sales}} \times 100$$

The ratio is designed to focus attention on the net profit margin arising from business operations before interest and tax is deducted. The convention is to express profit after tax and interest as a percentage of sales. A drawback is that the percentage which results varies depending on the sources employed to finance business activity; interest is charged above the line while dividends are deducted below the line. It is for this reason that net profit i.e. earnings before interest and tax (EBIT) is used. This ratio reflects net profit margin on the total sales after deducting all expenses but before deducting interest and taxation. This ratio measures the efficiency of operation of the company. The net profit is arrived at from gross profit after deducting administration, selling and distribution expenses.

3. Cash Profit Ratio

Cash profit ratio measures the cash generation in the business as a result of the operations expressed in terms of sales. The formula is:

$$\frac{\text{Cash Profit}}{\text{Sales}} \times 100$$

Cash profit = Net profit + Depreciation

The cash profit ratio is a more reliable indicator of performance where there are sharp fluctuations in the profit before tax and net profit from year to year owing to difference in depreciation charged. Cash profit ratio evaluates the efficiency of operations in terms of cash generation and is not affected by the method of depreciation charged. It also facilitate inter firm comparison of performance since different methods of depreciation may be adopted by different companies.

4. Return on Total Assets

This ration is calculated as follows:

$$\frac{\text{Net Profit after Tax}}{\text{Total Assets}} \times 100$$

The profitability of the firm is measured by establishing relation of net profit with the total assets of the organization. This ratio indicates the efficiency of utilization of assets in generating revenue.

5. Return on Shareholders' Funds or Return on Net worth

This ration expresses the net profit in terms of the equity shareholders funds. This ratio is an important yardstick of performance for equity shareholders since it indicates the return on the funds employed by them. However, this measure is based on the historical net worth and will be high for old plants and low for new plants.

$$\frac{\text{Net Profit after interest and Tax}}{\text{Net worth}} \times 100$$

Net worth = Equity capital + Reserves and Surplus

The factor which motivates shareholders to invest in a company is the expectation of an adequate rate of return on their funds and periodically, they want to assess the rate of return earned in order to decide whether to continue with their investment. This ratio is useful in measuring the rate of return as a percentage of the book value of shareholders equity.

3.10 OPERATING RATIOS

The ratio of all operating expenses (i.e. materials used labour, factory overheads, administration and selling expenses) to sales is the operating ratio. A comparison of the operating ration would indicate whether the cost content is high or low in the figure of sales. If the annual comparison shows that the sales has increased the management would be naturally interested and concerned to know as to which element of the cost has gone up. It is not necessary that the management should be concerned only when the operating ratio goes up. If the operating ratio has fallen, though the unit selling price has remained the same, still the position need analysis as it may be the sum total of efficiency in certain departments and inefficiency in others. A dynamic management should be interested in making a complete analysis. It is, therefore, necessary to break-up the operating ratio into various cost ratios. The major components of cost are: material, labour and overheads. Therefore, it is worthwhile to classify the cost ratio as:

$$\text{Materials Cost Ratio} = \frac{\text{Materials Consumed}}{\text{Sales}} \times 100$$

$$\text{Labour Cost Ratio} = \frac{\text{Labour Cost}}{\text{Sales}} \times 100$$

$$\text{Factory Overhead Ratio} = \frac{\text{Factory Expenses}}{\text{Sales}} \times 100$$

$$\text{Administrative Expenses Ratio} = \frac{\text{Administrative Expenses}}{\text{Sales}} \times 100$$

$$\text{Selling and Distribution Expenses Ratio} = \frac{\text{Selling and Distribution Expenses}}{\text{Sales}} \times 100$$

$$\text{Operating Ratio} = \frac{\text{Cost of Goods Sold} + \text{Operating Expenses}}{\text{Net Sales}} \times 100$$

Generally all these ratios are expressed in terms of percentage. Then total up all the operating ratios. This is deducted from 100 will be equal to the net profit ratio. If possible, the total expenditure for effecting sales should be divided into two categories, viz. fixed and variable and then ratios should be worked out.

3.11 MARKET BASED RATIOS

The market based ratios relates the firm's stock price to its earnings and book value per share. These ratios give management an indication of what investors think of the company's past performance and future prospects. If firm's profitability, solvency and turnover ratios are good, then the market based ratios will be high and its share price is also expected to be high. The market based ratios are as follows:

1. Earnings Per Share (EPS)

The objective of Financial management is wealth or value maximization of a corporate entity. The value is maximized when market price of equity shares is maximized. The use of wealth maximization objective or net present value maximization objective has been advocated as an appropriate and operationally feasible criterion to choose among the alternative financial actions. In practice, the performance of a corporation is better judged in terms of its earnings per share (EPS). The EPS is one of the important measures of economic performance of a corporate entity. The flow of capital to the companies under the present imperfect capital market conditions would be made on the evaluation of EPS. Investors lacking inside and detailed information would look upon the EPS as the best base to take their investment decisions. A higher EPS means better capital productivity. The ratio is calculated as:

$$\frac{\text{Net Profit after Tax - Preference Dividend}}{\text{No. of Equity Shares}}$$

EPS is one of the most important ratios which measures the net profit earned per share. EPS is one of the major factors

affecting the dividend policy of the firm and the market prices of the company. Growth in EPS is more relevant for pricing of shares from absolute EPS. A steady growth in EPS year after year indicates a good track of profitability.

2. Cash Earnings per Share

The cash earnings per share (Cash EPS) are calculated by dividing the net profit before depreciation with number of equity shares. The formula is:

$$\frac{\text{Net Profit after Tax + Depreciation}}{\text{No. of Equity Shares}}$$

This is a major reliable yardstick for measurement of performance of companies, especially for highly capital intensive industries where provision for depreciation is substantial. This measures the cash earnings per share and is also a relevant factor for determining the price for the company's shares. However, this method is not as popular as EPS and is used as a supplementary measure of performance only.

3. Dividend Payout Ratio

Dividend payout ratio is the dividend per share divided by the earnings per share. Dividend payout indicates the extent of the net profits distributed to the shareholders as dividend. A high payout signifies a liberal distribution policy and a low payout reflects conservative distribution policy. The ratio is calculated as:

$$\frac{\text{Dividend per Share}}{\text{Earnings per Share}}$$

4. Dividend Yield

This ratio reflects the percentage yield that an investor receives on this investment at the current market price of the shares. This measure is useful for investors who are interested in yield per share rather than capital appreciation. The ratio is calculated as:

$$\frac{\text{Dividend per share}}{\text{Market Price}} \times 100$$

5. Book Value

This ratio indicates the net worth per equity share. The book value is a reflection of the past earnings and the distribution policy of the company. A high book value indicates that a company has huge reserves and is a potential bonus candidate. A low book value signifies a liberal distribution policy of bonus and dividends, or alternatively, a poor track record of profitability. Book value is considered less relevant for the market price as compared to EPS,

as it reflects the past record whereas the market discounts the future prospects. The formula is:

$$\frac{\text{Equity Capital + Reserves – Profit and Loss A/c Debit balance}}{\text{Total number of Equity Shares}}$$

6. Price Earnings Ratio (P/E Ratio)

The ratio indicates the market price of an equity share to the earnings per share. It measures the number of times the earning per share discounts the market price of any equity share. The ratio is calculated as:

$$\frac{\text{Current Market Price of Equity Share}}{\text{Earnings per Shares}}$$

The ratio indicates how much an investor is prepared to pay per rupee of earnings. The ratio helps to ascertain the value of equity share, if the EPS and probable price-earning ratio of the industry to which the company belongs. The intrinsic value of share may be more or less than the market value which is influenced by company's track record and dividend distribution policy, speculative trading, state of economy, efficiency of management, capital gearing etc. Price-earning approach to share valuation is simple and more popular. This ratio reflects the market's assessment of the future earnings potential of the company. A ratio reflects high earnings potential and a low ratio reflects the low earnings potential. The ratio reflects the market's confidence on company's equity.

7. Market Price to Book Value Ratio (P/BV ratio)

This ratio measures the relationship between the accounting value of the firm's assets and the market price of its stock. The ratio is calculated by dividing the stock price per share by the book value of share. The ratio is calculated as:

$$\frac{\text{Market Price per Share}}{\text{Book Value per Share}}$$

Generally the higher the rate of return a firm is earning on its common equity the higher will be the P/B V ratio. In case of growth firms i.e. firms with high growth of sales and earnings will have this ratio higher than 1, for the reason that the potential future growth in earnings is reflected in the current stock price. Where as the book value of equity is based on historical costs and it does not consider the potential growth.

3.12 QUESTIONS

(I) Theory Questions:

1. What is window dressing of Current Ration and Trading on Equity?
2. "Ration Analysis is only a tool and not a final decision." Discuss.
3. Ratio analysis is only a technique for making judgments and not a substitute for it. Comment
4. What are the accounting ratios?
5. Explain the importance of Ratio Analysis.
6. What is ratio analysis? What are its limitations?
7. What is the ratio analysis?
8. What are the objects of ratio analysis?
9. State the different ratios according to Conventional and Functional Classification.
10. State the significance of the following ratios:
    a) Earnings per share (b) Pricing Earning Ratio (c) Return on Capital Employed (including Long-term Borrowings) (d) Creditors Turnover Ratio.
11. What is a 'ratio'? What are the limitations of ratio analysis?
12. What is vertical analysis?
13. State the different modes of expressing ratios.
14. Distinguish between balance sheet ratios and revenue statement ratios.
15. How would you test the short-term solvency of a company?
16. What is the purpose of a liquid ratio?
17. What is a proprietary ratio? State its significance.
18. Explain the concept of over-capitalisation and undercapitalisation.
19. What is over-trading and under-trading?
20. Explain the following ratios help the management in interpretation of financial data
    a. Acid Test ratio.
    b. Stock-working capital ratio.
    c. Proprietary ratio.

(II) State whether the following statement are TRUE or FALSE

1) The standard for current ratio is 2.
2) Difference in the methods of valuation of inventory between firms is one of the difficulties of Ratio Analysis.

3) The ratio $\frac{\text{Earnings before Interest and Tax}}{\text{Sales}}$ measures stability of the firm.
4) Ratio Analysis enables inter-firm comparison.
5) Inventory turnover ratio is $\frac{\text{Cost of Goods sold}}{\text{Total Inventory}}$
6) Owed funds are internal source of finance.
7) Advance to suppliers is classified as Quick assets in vertical statements.
8) High Stock turnover ratio indicates high cost of Goods sold.
9) Unclaimed dividends are classified as current liabilities in vertical financial statement.
10) A Liquid ratio of 0.5:1 indicates over investment.
11) The firm short term solvency is indicated by its current ratio.
12) When the firm does not have preference share capital it's Capital Gearing Ratio and Debt Equity Ration values are the same.
13) Debt-Equity Ratio can be calculated in two ways :
    a) $\frac{\text{Debt}}{\text{Equity}}$
    b) $\frac{\text{Debt}}{\text{Debt} + \text{Equity}}$
14) Higher stock turnover ratio means loss due to obsolete stock would be maximum.

III. Short Notes

1. Functional Classification of Ratios.
2. Retained Earnings.
3. Explain the significance of capital gearing ratio.
4. What are liquidity ratios and what is their significance?
5. Profitability Ratios.
6. Accounting Ratios measuring Profitability and Solvency.
7. Profitability ratios vis-à-vis investments.
8. Current Ratio.
9. Capital Gearing Ratio.
10. Ratio analysis
11. Trading on equity
12. Debtor's Velocity
13. Classification of Accounting Ratios.

14. Debtors Turnover Ratio.
15. Debtor Turnover Ratio and Creditor Turnover Ratio.
16. Importance of balance sheet Ratios.
17. Return on Capital Employed
18. Short term and Long term Ratios.
19. Limitations of Ratio Analysis.
20. Trading on Equity

IV. Multiple Choice Questions:

1. A very high current ratio will:
   a) increase the profitability
   c) not affect the profitability
   b) adverse impact on profitability
   d) none of the above.

2. One of the following is not an absolute liquid asset:
   a) cash in hand
   b) cash at bank
   c) bills receivable
   d) marketable investments

3. Fixed interest bearing funds do not include one of the following
   a) debentures
   b) long-term investments
   c) preference share capital
   d) public deposits

4. The ratio of sales value per square foot of floor space is not suitable for:
   a) Trading concerns
   b) Departmental stores
   c) wholesale warehouse
   d) manufacturing concern

5. The term cash profit indicates:
   a) Gross profit + Interest + Depreciation
   b) Net profit + Depreciation
   c) Net profit – Interest – Tax
   d) Net profit before depreciation, interest and tax.

6. The return on equity indicates:
   a) Measure of profitability.
   b) The efficiency in use of assets in achieving sales.
   c) Measure of leverage
   d) All of the above,

7. Return on investment can be increased by:
   a) Increasing the profit margin
   c) reduction of invested capital
   b) Increasing the investment turnover
   d) all of the above.

8. Profit margin (net) of B.S. Ltd. is 7% while turnover is 3 times of its capital. The return on investment of the concern is …….
   a) 20%
   b) 18%
   c) 21%
   d) 19%

9. If current ratio is given as 2.5, liquid assets are Rs. 60,000, then the value of the stock will be
   a) Rs. 60,000
   b) Rs. 40,000
   c) Rs. 20,000
   d) Rs. 30,000

10. If the current ratio and liquid ration of a firm are 2.2 and o.8 respectively and its Current liabilities is Rs. 10 lakhs. The value of stock held by the firm is Rs. ___ lakhs.
   a) 12
   b) 14
   c) 16
   d) none of the above

11. The current ratio BM Ltd, is 2:1, while quick ratio is 1.80:1. If the current liabilities are Rs. 40,000, the value of stock will be :
   a) Rs. 6,400
   b) Rs. 8,000
   c) Rs. 10,000
   d) Rs. 12,000

12. Warfied company having net working capital of Rs. 3 lakh has the current ratio of 1:8 and liquid ratio of 1:6. Its value of stock is:
   a) Rs. 55,000
   b) Rs. 65,000
   c) Rs. 75,000
   d) Rs. 85,000

13. Asset management ratios are used to measure the speed with various accounts are converted into :
   a) Fixed assets or current assets
   b) Sales or inventory
   c) sales or cash
   d) cash or bank

14. A firm seeks to increase its current ration from 1:5 before its closing date of the accounts. The action that would make it possible is :
   a) Delaying payment of salaries
   b) Increase charge for depreciation.
   c) Making cash payment to creditors.
   d) Selling marketable securities for cash at book value.

Unit-4

RATIO ANALYSIS
PART II

Unit Structure:

4.1 OBJECTIVES

After studying the unit the students will be able to solve the problems.

4.2 RATIOS SUMMARIZED

Sr. No.	Ratio	Formulae	Meaning
	Profitability Ratio		
1		Gross Profit ---------- X 100 Net Sales	Indicates the Gross efficiency operations.
2	Operating Profit Ratio	Operating Profit ---------- X 100 Net Sales	Indicates operating efficiency. A new bench market to judge firm's competitive earning capacity.
3	Net Profit Ratio	Net Profit ---------- X 100 Net Sales	Indicates net efficiency
4	Operating or Expenses Ratio (Net Sales – Operating Profit)	Operating Costs ---------- X 100 Net Sales	Reflects how management has been able to control operating expenses.

5	Net profit to Total Assets Ratio	Net profit after tax + Interest ---------- x 100 Total Assets	A measure of productivity of total assets.
6	Returns on Share-holders funds or Returns on Net.	(NPAT-Pref. dividend) Profits available for Equity shareholders ---------- X 100 Equity Shareholders Funds	What company has earned on net worth.
7	Earning per equity share	Profits available for Equity shareholders ---------- X 100 No. of Equity shares outstanding	Shows the amount of earnings attributable to each equity share.
8	Dividend Yield	Dividend per share ---------- X 100 Market price per share	It shows relationship between dividend and market price of shares.
9	Price Earning Ratio	Market price of a share ---------- X 100 Earning per share	It reflects the market perception of earnings. Also known as how many time earning has been discounted by market.
10	Fixed interest cover Ratio	Operating Profit ---------- Annual Interest Expense	Operating profit is available for payment of interest.
11	Fixed dividend cover or preference share dividend over ratio	Net Profit ---------- Annual Preference Dividends	Shows the extent to which current earnings are available to pay dividends on preference shares.
12	Market capitalization ratio	Market price per share x No. of shares outstanding.	Suggests the market worth of the company.

13	Inventory Turnover Ratio	Cost of Goods sold ---------- Average Inventory	Indicates how fast payments from accounts receivable (debtors) is realized.
14	Accounts Receivable Turnover Ratio	Net Credit Sales ---------- Average Receivable	How fast an inventory is converted into sales. Higher the Inventory turnover ratio, lower is the inventory holding period.
15	Accounts payable Ratio	Net Credit Purchase ---------- Average Accounts Payable	It reflects speed of payment to creditors. Lower ratio means that credit for more days is available.
16	Current Ratio	Current Assets ---------- Current Liabilities	Measures short term debt paying ability acceptable limit is 1.5 : 1 in a competitive industry.
17	Quick or liquid or acid test	Quick assets ---------- Current Liabilities	A refined measures of the short-terms debt paying ability by measuring short-term liquidity. Accepted limits is 0.75:1.
18	Proprietary Ratio	Total Shareholders Funds ---------- Total Tangible Assets	Measures conservatism of capital structure and shows the extent of shareholders' funds in the total assets employed in the business.
19	Debt Ratio	External Equities ---------- Internal Equities Long-term Debt ---------- Networth	Indicates the percentage of funds being financed through borrowings. Recommended is 1.5:1 (normal industry) and 4: 1 for heavy and capital intensive industry.

4.3 SOLVED ILLUSTRATIONS

Problem 1

The following figures relate to the trading activities of Hind Traders for the year ended 30th June, 19X1:

Sales	15,00,000	*Administrative expenses*	
Purchases	9,66,750	Salaries	81,000
Opening Stock	2,28,750	Rent	8,100
Closing Stock	2,95,500	Stationery, postage etc	7,500
Sales returns	60,000	Depreciation	27,900
Selling and distribution expenses		Other charges	49,500
Salaries	45,900	Provision for taxation	1,20,000
Advertising	14,100	Non-operating income	
Travelling	6,000	Dividend on shares	27,000
Non-operating expenses		Profit on sale of shares	9,000
Loss on sale of assets	12,000		

You are required to (1) rearrange the above figures in a form suitable for analysis, and (2) show separately the following ratios: (i) gross profit ratio; (ii) operating ratio; (iii) stock turnover ratio.

(C.A. adapted)

Solution

HIND TRADERS LTD.
Profit and Loss Statement

		Rs.
Sales (less returns)		15,00,000
Less : Cost of goods sold		
Opening Stock	2,28,750	
Purchases	9,66,750	
	11,95,500	

Less : Closing stock	2,95,500	9,00,000
Operating expenses		6,00,000
Selling and distribution expenses	66,000	
Administrative expenses	1,74,000	2,40,000
Operating net profit		3,60,000
Non-operating income	36,000	
Non-operating expenses	12,000	24,000
Profit before tax		3,84,000
Provision for taxes		1,20,000
		2,64,000

Gross profit ratio: $\frac{\text{Rs. } 6,00,000}{\text{Rs. } 15,00,000} = 0.40 \text{ or } 40\%$

Operating ratio = $\frac{\text{Cost of Goods Sold + Operating Expenses}}{\text{Sales}}$

$= \frac{11,40,000}{15,00,000}$

$= 0.76 \text{ or } 76\%$

Stock turnover ratio $= \frac{\text{Cost of goods sold}}{\text{Average stock}}$ $\frac{\text{Rs. } 9,00,000}{\text{Rs. } 2,62,125} = 3.43 \text{ times}$

Problem 2

Towards the end of 19 X 1 the directors of wholesale Merchants Ltd., decided to expand their business. The annual accounts of the company for 19 X 1 may be summarized as follows

WHOLESALE MERCHANTS LTD
Financial statements

(Rs)

		Year 19X1		Year 19X2
Sales :				
Cash	42,000		44,800	
Credit	3,78,000		4,78,800	
Cost of sales		4,20,000		5,23,600
		3,30,400		4,17,200
Gross margin		89600		1,06,400

Expenses :				
Warehousing		18,200		19,600
Transport		8,400		14,000
Administration		26,600		26,600
Selling		15,400		19,600
Debenture interest		-		2,800
		68,600		82,600
Net profit		21,000		23,800

		On 31st Dec. 19X1		On 31st Dec. 19X2
Fixed assets (Less : depreciation)		42,000		56,000
Current assets:				
Stock	84,000		1,31,600	
Debtors	70,000		1,14,800	
Cash	14,000	1,68,000	9,800	2,56,200
Less : Current liabilities		70,000		1,06,400
Net current assets		98,000		1,49,800
Net assets		1,40,000		2,05,800
Share capital		1,05,000		1,05,000
Reserves and undistributed profit		35,000		58,000
Debenture loan		-		42,000
Capital employed		1,40,000		2,05,800

You are informed that (a) All sales were from stocks in the company's warehouse, (b) The range of merchandise was not changed buying prices remained steady throughout the two years (c) Budgeted total sales for 19X2 were Rs. 3,90,000 (d) The debenture loan was received on 1st January 19X2, and additional fixed assets were purchased on that date.

You are required to state the internal accounting ratios that you would use in this type of business to assist the management of the company in measuring the efficiency of its operation, including its use of capital.

Your answer should name the ratios and give the figures (calculated to one decimal place) for 19X1 and 19X2, together with possible reasons for changes in the ratios for the two years. Ratios relating to capital employed should be based on the capital at the end. Ignore taxation.

(C.A. adapted)

Solution

The following ratios are calculated for Wholesale Merchants Ltd:

RATIOS FOR WHOLE SALE MERCHANT LTD.

Ratios	**(Rs'000)**	**Year 19X1**	**(Rs'000)**	**Year 19X2**
Net margin : EBIT/Sales	21,000/4,20,000	5.0%	26,600/5,23,600	5.1%
Sales to capital employed	4,20,000/1,40,000	3.0 times	5,23,600/2,05,800	2.5 times
Return on capital employed : EBIT/CE	21,000/1,40,000	15.0%	26,600/2,05,800	12.9%
Gross margin:				
Gross profit / sales	89,600/4,20,000	21.3%	1,06,400/5,23,600	20.3%
Expenses (excluding interest) to sales	68,600/4,20,000	16.3%	79,800/5,23,600	15.2%
Stock turnover : CGS/Stock	3,30,400/84,000	3.9 times	4,17,200/1,31,600	3.2 times
Debtors turnover Credit sales / debtors	3,78,000/70,000	5.4 times	4,78,800/1,14,800	4.2 times
Current ratio : CA/CL	1,68,000/70,000	2.4 times	2,56,200/1,06,400	2.4 times
Quick ratio : CA-Stock / CL	84,000/70,000	1.2 times	1,24,600/1,06,400	1.2 times
Long term debt-equity		0	42,000/1,63,800	0.3

Note: EBIT for 19X1 and 19X2 respectively is: Rs. 21,000 and Rs. 23,800 + 2,800 = Rs. 26,600.

Comments: The return on capital employed has fallen from 15% in 19X1 to 12.9in 19X2. The reason lies in the sales to capital ratio which has also fallen in 19X2. The increase in capital employed has not been profitably utilized. The increased capital seems to have been blocked in stock and debtors.

It will be noticed that the gross margin ratio decreased from 21.3% in 19X1 to 20.3% in 19X2. This may be attributed to reduced selling price or granting of trade discounts to bulk orders. The operating ratio (expense to sales ratio) has fallen in 19X1 by 1% and this had a slight impact on net profit ratio which has increased by 0.1%.

The short term solvency of the company, reflected by current ratio and quick ratio, is more or less constant. However, there has been deteriorating in the stock turnover and debtors turnover ratios. This implies the company is holding stocks for longer periods and allowing longer credit periods to customers.

There is no threat to the long-term solvency of the company. It did not use any long-term debt in 19X1. A debenture loan of Rs. 42,000 is taken in 19X2 and is about 0.26 of the equity funds. By a normal criterion, the company could have a debt equity ratio of 2:1.

Problem 3

On the basis of financial statements of ABC Ltd, given below, comment on the asset utilization and profitability of ABC Ltd.

Income Statement ABC Ltd. (Rs. in crore)

	2003-04	2002-03	2001-02	2000-01	1999-2000
Income					
Sales Turnover	9840.09	8682.64	7953.06	7579.17	6834.75
Other Income	146.80	145.27	169.85	169.51	149.05
Stock Adjustments	135.30	31.99	-31.62	-4.27	88.84
Total income	**10122.19**	**8859.90**	**8091.29**	**7744.41**	**7072.64**
Expenditure					
Raw Materials	1988.89	1512.68	1515.95	1549.38	1406.75
Excise Duty	4817.69	4486.20	4109.49	4059.98	3759.31
Power & Fuel Cost	118.96	74.23	62.43	53.30	49.64
Other Manufacturing Expenses	187.65	140.34	110.19	94.72	96.42
Employee cost	279.87	243.96	246.95	201.03	204.08

Selling & Administration Expenses	552.07	448.58	422.09	418.93	368.57
Miscellaneous Expenses	148.23	147.86	134.53	136.77	160.32
Less : Preoperative Expenditure Capitalized	27.59	35.56	30.41	18.98	5.76
Profit before interest, depreciation & Tax	2056.42	1841.61	1520.07	1249.28	1033.31
Interest charges	77.71	101.37	172.59	208.96	155.98
Profit before depreciation & Tax	1978.71	1740.24	1347.48	1040.32	877.33
Depreciation	198.45	139.94	118.53	102.29	85.85
Profit before tax	1780.26	1600.30	1228.95	938.03	791.48
Tax	590.54	594.04	436.51	314.61	265.28
Profit after tax (PAT)	1189.72	1006.26	792.44	623.42	526.2
P&L Balance brought forward	282.5	201.28	187.86	160.95	128.46
Appropriations	1146.35	925.04	779.02	596.51	493.71
P&L Bal. carried down	325.87	282.50	201.28	187.86	160.95
Equity Dividend	334.14	245.42	184.06	134.98	110.44
Retained Earnings	812.21	679.62	594.96	461.53	383.27

Balance Sheet ABC Ltd.

(Rs. in crore)

	2003-04	**2002-03**	**2001-02**	**2000-01**	**1999-2000**
SOURCES OF FUNDS					
Share Capital	247.51	245.41	245.51	245.41	245.51
Reserves & Surplus	4166.47	3289.1	2553.92	1988.79	1516.72
Total Shareholders Funds	**4413.98**	**3534.51**	**2799.33**	**2234.2**	**1762.13**
Secured Loans	199.24	565.77	463.92	548.48	718
Unsecured Loans	85.3	293.17	188.95	703.74	581.04
Total	**4698.52**	**4393.45**	**3452.2**	**3486.42**	**3061.17**
APPLICATION OF FUNDS					
Gross Block	3694.58	2521.93	1871.13	1599.04	1355.67
Less : Accum. Depreciation	1101.9	707.42	592.25	484.85	390.86

Net Block	2592.68	1814.51	1278.88	1114.19	964.81
Capital Work in progress	387.27	146.15	274.36	119.27	82.96
Investments	906.93	1006.94	987.26	1059.76	800.95
Current Assets, loans & Advances					
Inventories	1180.27	1144.63	932.46	916.05	911.74
Sundry Debtors	194.63	105.54	117.66	338.73	268.89
Cash and Bank Balance	44.21	35.41	27.73	170.38	467.44
Loans and Advances	1951.78	1744.66	1324.08	1256.44	1015.52
Less : Current Liab. Prov.					
Current Liabilities	2063.12	1261.13	1140.46	1163.51	1147.88
Provisions	496.13	343.26	349.77	324.89	303.26
Net Current Assets	811.64	1425.85	911.7	1193.2	1212.45
Total	**4698.52**	**4393.45**	**3452.2**	**3486.42**	**3061.17**
Contingent Liabilities	281.42	170.85	383.99	142.28	42.77

Solution

Year	**2004**	**2003**	**2002**	**2001**	**2000**
*Turnover Ratios					
Fixed Assets turnover (Sales ---------- Net Block)	9840 / 2592.68 = 3.795	8682.64 / 1814.51 = 4.785	7953.06 / 12788.88 = 6.22	7579.17 / 1114.19 = 6.80	6834.75 / 964.81 = 7.08
Inventory turnover (Sales) ---------- Inventory	9840.09 / 1180.27 = 8.34	8682.64 / 1144.63 = 7.59	7953.06 / 932.46 = 8.53	7579.17 / 916.05 = 8.27	6834.75 / 911.74 = 7.50
Debtors turnover (Sales ---------- Debtors)	9840.09 / 194.63 = 50.56	8682.64 / 105.54 = 82.27	7953.06 / 117.66 = 67.59	7579.17 / 338.73 = 22.37	6834.75 / 268.89 = 25.42
*Profitability Ratios					
NPM (PAT) -------- (Sales)	1189.72 / 9840.09 = 12.09%	1006.26 / 8682.64 = 11.59%	792.44 / 7953.06 = 9.96%	623.42 / 7579.17 = 8.23%	526.20 / 6834.75 = 7.69%
RONW (PAT) ---------- (Shareholders Funds)	1189.72 / 4413.98 = 26.95%	1006.26 / 3534.51 = 28.47%	792.44 / 2799.33 = 28.31%	623.42 / 2234.20 = 27.90%	526.20 / 1762.13 = 29.86%

Ideally inventory turnover ratio is calculated as Cost of Goods Sold/Average Inventory. However, in the absence of information related to cost of goods sold, we make use of sales figure. Similarly, average inventory is the average of opening and closing inventory. However, in the absence of information we may use closing inventory.

Comments

- Fixed assets turnover ration indicates the efficient utilization of fixed assets. It indicates to what extent fixed assets are contributing in the generation of sales. In case of ABC Ltd, fixed assets turnover ratio is declining. This indicates inefficient management of fixed assets.

- Inventory turnover ratio indicates how quickly inventory is converted into sales. The higher the inventory turnover ratio, the better it is for the organization. In case of ABC Ltd., inventory turnover ratio is more or less constant and is good enough. The corresponding inventory holding period is around 1.5 months, which is reasonably less. This indicates that inventory is not moving very slowly resulting into losses.

- Debtors turnover ratio indicates how quickly outstanding debts are collected to generate cash. A high debtor's turnover ratio is a sign of efficient collection department. In case of ABC Ltd. Debtors' turnover ratio increased in the year 2003 but declined again in 2004 depicting inefficiency of the debt collection department.

- Net profit margin has increased continuously which is a healthy sign. This increase in profit margin is probably due to better cost management. However, this can be confirmed only in the light of further information.

- Return on net worth depicts a fluctuating trend but it is moving within a narrow range. However, RONW is also reasonably high.

Problem 4

From the following details, furnished by Globe Traders for the year ended on 31.3.2009, prepare the Balance sheet as on that date :

Current ratio	1.75	Reserves and surplus : Capital	0.2
Quick ratio	1.25	Cost of sales : Fixed assets	1.2
Stock turnover (cost of sales closing stock)	9	Debt. : Equity	0.6
Gross Profit ratio	25%	Fixed assets : Net worth	1.25

The firm sells its products only on credit. Credit sales for the year ended 31-3-2009 amounted to Rs. 120 lakhs.

Solution

Working Notes

1 Calculation of Cost of Sales

Sales	= Rs. 120 lakhs (given)
Gross profit ratio	= 25% (given)
Cost of sales	= 75%
Cost of sales	= Rs. 120 lakhs x 75/100 Rs. 90 lakhs

2 Calculation of Debtors

Average collection period	$= \frac{\text{Debtors}}{\text{Credit sales}} \times 12 \text{ months}$ 1½ months
1.5 months	$= \frac{\text{Debtors}}{\text{Rs. 120 lakhs}} \times 12 \text{ months}$
Debtors x 12 months	= Rs.120 lakhs x 1.5 months
Debtors	= 180/12 Rs. 15 lakhs

3 Calculation of Fixed Assets

$\frac{\text{Cost of sales}}{\text{Fixed assets}}$	= 1.2 (given)
	= Rs. 90 lakhs
Fixed assets	= 1.2
1.2 x Fixed assets	= Rs. 90 lakhs
Fixed assets	= Rs. 90 lakhs / 1.2 Rs. 75 lakhs

4 Calculation of Closing stock

$\frac{\text{Cost of sales}}{\text{Closing stock}}$	= 9 (given)
$\frac{\text{Rs. 90 lakhs}}{\text{Closing stock}}$	= 9
9 x closing stock	= Rs. 90 lakhs
Closing stock	= Rs. 90 lakhs / 9 Rs. 10 lakhs

5 Calculation of Current Assets and Current Liabilities

Current ratio	= 1.75 (given)
$\frac{\text{Current assets (CA)}}{\text{Current liabilities (C.L.)}}$	= 1.75
CA	= 1.75 CL
$\frac{\text{CA-Stock}}{\text{CL}}$	= 1.25
$\frac{\text{CA-10}}{\text{CL}}$	= 1.25
CA	= 1.25 CL + 10
1.75 CL	= 1.25 CL + 10
0.50 CL	= 10
CL	= 10/0.50 = 20

Current liabilities = Rs. 20 lakhs
Current assets = Rs. 20 lakhs x .125) + Rs. 10 lakhs
Rs. 35 lakhs

6 Calculation of Net worth

$$\frac{\text{Rs. 75 lakhs}}{\text{Net worth}} = 1.25$$

Net worth = Rs. 60 lakhs

7 Calculation of Equity share capital

$$\frac{\text{Reserve}}{\text{Capital}} = 0.2 \text{ (given)}$$

$$\frac{\text{Fixed assets}}{\text{Capital} + \text{Reserve}} = 1.25$$

$$\frac{75}{1.25} =$$

Capital + 0.2 capital
1.25 x 1.2 capital = 75
1.5 capital = 75
Capital = 75/1.5 = 50
Capital = Rs. 50 lakhs

8 Calculation of Debt

$$\frac{\text{Debt}}{\text{Equity}} = 0.6 \text{ (given)}$$

$$\frac{\text{Debt}}{50} = 0.6$$

Debt = 0.6 x 50 Rs. 30 lakhs

9 Calculation of Reserves
Reserves = 0.2 Equity = 0.2 x 50 Rs. 10 lakhs

Globe Traders
Balance Sheet as 31/3/2009

Liabilities	Rs. lakhs	Assets	(Rs. lakhs)
Equity capital	50	Fixed assets	75
Reserves and surplus	10	Current assets :	
Debt	30	Stock	10
Current liabilities	20	Debtors	15
		Cash and Bank (bal. figure)	10
	110		110

Problem 5

With the following ratios and other information, prepare Trading Account, Profit and Loss Account and Balance sheet of Anand :

Gross profit ratio	25%	Fixed assets / Capital	5/4
Net profit / Sales ratio	20%	Fixed assets / Total current assets	5/7
Sales / Inventory ratio	10 times	Fixed assets	Rs. 10 lakh
Net profit / Capital	1/4	Closing stock	Rs. 1 lakh

Solution

Working notes

1	Sales / Inventory Ratio	=	10 times (given)	
	Sales ---------- Inventory	=	10	
	Sales ---------- 1,00,000	=	10	
	Sales	=	1,00,000 x 10	Rs. 10,00,000
2	Gross profit ratio	=	25% (given)	
	Gross profit	=	10,00,000 x 25/100	Rs. 2,50,000
3	Net profit / Sales ratio	=	20% (given)	
	Net profit	=	10,00,000 x 20/100	Rs. 2,00,000
4	Net profit / Capital	=	¼ (given)	
	2,00,000 ---------- Capital	=	1 ------ 4	
	Capital	=	2,00,000 x 4	Rs. 8,00,000
5	Capital / Total liabilities	=	½ (given)	
	8,00,000 ---------- Total liabilities	=	1 ---- 2	
	Total liabilities	=	8,00,000 x 2	Rs. 16,00,000
6	Fixed assets / Capital	=	5/4 (given)	

7	Fixed assets / Total current assets	=	5/ 7 (given)	
	10,00,000 ---------- Total current assets	=	5 ---- 7	
	5 x Total current assets	=	70,00,000	
	Total current assets	=	70,00,000/5	Rs. 14,00,000
8	Total current assets - Stock	=	Other current assets	
	14,00,000 – 1,00,000	=	Rs. 13,00,000	

Trading and Profit and Loss Account of Sri Anand for the ended.

Particulars	Rs.	Particulars	Rs.
To cost of sales (bal. figure	7,50,000	By sales	10,00,000
To gross profit	2,50,000		
	10,00,000		10,00,000
To Expenses (bal. figure)	50,000	By Gross profit	2,50,000
To Net profit	2,00,000		
	2,50,000		2,50,000

Balance Sheet of Shri Anand as at ……

Liabilities		Rs.	Assets		Rs.
Capital			Fixed assets		10,00,000
Opening balance	6,00,000		Current assets		
Add : Profit	2,00,000	8,00,000	Stocks	1,00,000	
Total liabilities		16,00,000	Others	13,00,000	14,00,000
		24,00,000			24,00,000

Illustration 6

The Trading and Profit and Loss Account of SKSS Ltd., for the year ended 31st March, 2007 is given below :

Particulars	Rs.	Particulars	Rs.
To opening stock	2,50,000	By Sales	24,00,000
To Purchases	10,50,000	By Closing stock	1,50,000
To Wages	4,00,000		
To Factory expenses	2,00,000		
To Gross profit c/d	6,50,000		
	25,50,000		25,50,000
To Administration expenses	2,30,000	By Gross Profit b/d	6,50,000
To Selling and distribution expenses	1,00,000	By Miscellaneous Income	50,000
To interest	20,000		
To Net profit	3,50,000		
	7,00,000		7,00,000

You are required to calculate operating ratios.

Solution :

Calculation of Operating Ratios :

1. Materials Cost Ratio

$$\frac{\text{Materials consumed}}{\text{Sales}} \times 100 = 24,00,000$$

$$\frac{11,50,000}{100} = 47.92\%$$

Note : Materials consumed
= Opening stock + Purchases – Closing stock
= 2,50,000 + 10,50,000 – 1,50,000 = Rs. 11,50,000

2. Labour Cost Ratio

$$\frac{\text{Labour cost}}{\text{Sales}} \times 100 = \frac{4,00,000}{24,00,000} \times 100 = 16.6\%$$

3. Factory Expenses Ratio

$$\frac{\text{Factory expenses}}{\text{Sales}} \times 100 = \frac{2,00,000}{24,00,000} \times 100 = 8.33\%$$

4. Administrative Expenses Ratio

$$\frac{\text{Administrative expenses}}{\text{Sales}} \times 100 = \frac{2,30,000}{24,00,000} \times 100 = 9.58\%$$

5. Selling and Distribution Expenses Ratio

$$\frac{\text{Selling and distribution expenses}}{\text{Sales}} \times 100 = \frac{1,00,000}{24,00,000} \times 100 = 4.17\%$$

6. Operating Ratio

$$\frac{\text{Cost of goods sold} + \text{Operating expenses}}{\text{Sales}} \times 100$$

$$= \frac{17,50,000+3,30,000}{24,00,000} \times 100 = 86.67\%$$

Working Note

i) Cost of Goods Sold
= opening stock + Purchase + Wages + Factory expenses – Closing stock
= 2,50,000 + 10,50,000 + 4,00,000 + 2,00,000 – 1,50,000
= Rs. 17,50,000

ii) Operating Expenses
= Administration expenses + Selling and distribution expenses
= 2,30,000 + 1,00,000 = 3,30,000

Net Profit Ratio
= 100% - Operating Ratio = 100% - 86.67% = 13.33%

Illustration 7

From the financial information of Yahoo Ltd., given below, calculate activity or turnover ratios :

Balance sheet as on 31st March, 2007

Balance sheet as on 31st March, 2007	Rs.
Liabilities	30,00,000
Equity share capital	10,00,000
10% Preference share capital	14,00,000
Retained earnings	18,00,000
12% secured debentures	9,50,000
Sundry creditors	5,00,000
Bills payable	3,50,000

Income tax provision	90,00,000
Assets :	
Fixed assets	62,00,000
Inventory	10,60,000
Sundry debtors	8,50,000
Bills receivable	6,50,000
Cash	2,40,000
	90,00,000
Additional information	
Profit before interest and depreciation	25,00,000
Depreciation	8,00,000
Interest	2,16,000

Tax @ 50% loan installment payable during the year Rs. 3, 00,000. Equity dividend declared during the year @ 18% you are required to calculate long-term solvency ratios.

Solution

PBIDT	25,00,000
Less : Depreciation	8,00,000
PBIT	17,00,000
Less : Interest	2,16,000
PBT	14,84,000
Less : Income @ 40%	5,93,600
PAT	8,90,400

1. Debt-Equity Ratio

$$\frac{\text{Long-term debt}}{\text{Shareholders funds}} = \frac{18,00,000}{30,00,000+10,00,000+14,00,000} = 0.33\%$$

The company's long-term solvency is more satisfactory. The debt-equity ratio of the company is 0:33:1 and it is well with in the accepted norm of 2:1. Since the proportion of debt to equity is low, the company is said to be low geared and could not reap the benefit of trading on equity.

2. Shareholders Equity Ratio

$$\frac{\text{Shareholders equity}}{\text{Total assets (tangible)}} = \frac{54,00,000}{90,00,000} = 0.6$$

Since the shareholders equity is larger in proportion of 50% to total assets. Therefore, the financial of position of the company is stronger.

3. Long-term Debt to Shareholders Networth Ratio

$$\frac{\text{Long-term debt}}{\text{Shareholders funds}} = \frac{18,00,000}{30,00,000+10,00,000+14,00,000} = 0.33\%$$

Since the long-term debt represents only 33% of the shareholders net worth leaving balance 67% to other current liabilities, gives an indication of stronger short-term as well as long-term solvency of the company.

4. Capital Gearing Ratio

$$\frac{\text{Fixed interest bearing funds}}{\text{Equity Shareholders funds}} = \frac{10,00,000+18,00,000}{30,00,000+14,00,000} = 0.64\%$$

The fixed interest bearing funds represents 64% of the equity shareholders funds. The financial risk of the company is lower and the earning available to equity shareholders is less vulnerable.

5. Fixed Assets to Long-term Funds Ratio

$$\frac{\text{Fixed Assets}}{\text{Long Term Funds}} = \frac{62,00,000}{30,00,000+10,00,000+14,00,000-18,00,000} = 0.86$$

It indicates the long-term solvent position of the company. The high ratio indicates the high proportion of long-term funds deployed in fixed assets.

6. Proprietary Ratio

$$\frac{\text{Shareholders networth}}{\text{Total Assets}} = \frac{54,00,000}{90,00,000} = 0.60$$

The high proprietary ration indicates the strong financial position of the business.

7. Interest Cover

$$\frac{25,00,000}{2,16,000} = 11.57 \text{ time interest}$$

An interest cover 2:1 is ideal. The high ratio of the company indicates the low proportion of debt and the company is following a very conservative policy in using the debt component in the capital structure.

8. Debt Service Coverage Ratio

$$\frac{\text{Profit after tax+interest+Depreciation}}{\text{Interest + Periodic loan instalment}}$$

$$\frac{8,90,000+2,16,000+8,00,000}{2,16,000+3,00,000}=\frac{19,06,400}{5,16,000}=3.69 \text{ times}$$

The higher debt service coverage ration of the company indicates the better servicing ability of the company.

9. Preference Dividend Cover

$$\frac{\text{Profit available to preference shareholders}}{\text{Preference dividend}}=\frac{8,90,400}{1,00,000}=8.90 \text{ times}$$

The higher preference dividend cover indicates greater assurance to preference shareholders in getting their assure return of 10%.

10. Equity Dividend Cover

$$\frac{\text{Profit after tax-Preference dividend}}{\text{Equity Dividend}} OR \frac{\text{Profit available to Equity shareholders}}{\text{Equity Dividend}}$$

$$\frac{8,90,000\text{-}1,00,000}{5,40,000}=\frac{7,90,400}{5,40,000}=1.46$$

Illustration 8

From the following details, prepare statement of proprietary funds with as many details as possible.

i) Stock velocity : 6
ii) Capital turnover ratio (on cost of sales) : 2
iii) Fixed assets turnover ratio (on cost of sales) :4
iv) Gross profit turnover ratio : 20 percent.
v) Debtors' velocity : 2 months
vi) Creditors velocity : 73 days

The gross profit was Rs. 60,000. Reserves and Surplus amount Rs. 20,000. Closing stock was Rs, 5,000 in excess of opening stock.

Solution

1. Sales :

$$\text{Gross Profit ratio}=\frac{\text{Gross Profit}}{\text{Sales}}\times 100$$

If Gross profit is Rs. 20, Sales = Rs. 100
If Gross profit is Rs. 60,000, Sales = 60,000 x 100/20
= Rs. 3,00,000

2. Stock

$$\text{Stock velocity}=\frac{\text{Cost of goods sold}}{\text{Average stock}}=6$$

Cost of goods sold = Sales – Gross profit
= Rs. 3,00,000 – Rs. 60,000
= Rs. 2,40,000

$$= \frac{2,40,000}{\text{Average stock}} = 6$$

6 x Average stock = 2,40,000

Average stock = 2,40,000 + 6 = Rs. 40,000

$$\text{Average stock} = \frac{\text{Opening stock} + \text{Closing stock}}{2} = \text{Rs. } 40,000$$

Total of stocks (40,000 x 2) = Rs. 80,000

$$\text{Less: Excess} = \frac{\text{Rs. } 5,000}{\text{Rs. } 75,000}$$

$$\text{Opening stock} = \frac{75,000}{2} = \text{Rs.}37,500$$

Closing stock = 37,500 + 5,000 = Rs. 42,500

3. Debtors :

$$\text{Debtors} + \text{Bills receivable} \times \text{No. of working days} = 2 \text{ months}$$

Debtors velocity = Credit sales

There are no bills receivables, Hence,

$$\text{Debtors velocity} \frac{\text{Debtors}}{3,00,000} \times 12 = 2$$

Adopting cross multiplication,

$$Debtors = \frac{3,00,000 \times 2}{12} = \text{Rs.}50,000$$

4. Creditors :

Purchase = Cost of goods sold + Closing stock – Opening stock
= Rs. 2,40,000 + Rs. 42,500 – Rs. 37,500
= Rs. 2,45,000

There is no bills payable, Hence,

$$\text{Creditors velocity} = \frac{Creditors}{2,45,000} \times 265 = 73$$

Creditors' velocity

$$\text{Creditors} = \frac{73 \times 2,45,000}{365} = \text{Rs.}49,000$$

5. Fixed assets :

Fixed assets turnover ratio (based on cost of sales)

$$= \frac{\text{Cost of sales}}{\text{Fixed assets}} = 4$$

$$= \frac{2,40,000}{\text{Fixed assets}} = 4$$

4 x Fixed assets = Rs. 2,40,000

$$\text{Fixed assets} = \frac{2,40,000}{4} = \text{Rs.}60,000$$

6. Share Capital :

$$= \frac{\text{Cost of sales}}{\text{Total capital (or) Proprietary fund}} = 2$$

$$= \frac{2,40,000}{\text{Proprietary fund}} = 2$$

2 x Proprietary fund = Rs. 2,40,000

$$\text{Proprietary fund} = \frac{2,40,000}{2} = \text{Rs.}1,20,000$$

Proprietary fund = Rs. 1,20,000

$$\text{Less: Reserves and Surplus} = \frac{\text{Rs.}20,000}{\text{Rs.}1,00,000}$$

7. Cash

Balance sheet

Liabilities	Rs.	Assets	Rs.
Share capital	1,00,000	Cash **(balancing figure)**	16,500
Reserves & Surplus	20,000	Debtors	50,000
Creditors	49,000	Stock	42,500
		Fixed assets	60,000
	1,69,000		1,69,000

Statement of Proprietary Funds

	Rs.	Rs.
Fixed assets		60,000
Current assets :		
Cash	16,500	
Debtors	50,000	
Stock	42,500	
	1,09,000	
Less : Current liability		
Creditors	49,000	
		60,000
		1,20,000
Represented by :		
Share Capital		1,00,000
Reserves and Surplus		20,000

4.4 EXERCISE

PRACTICLES PROBLEMS

1. A company has Rs. 1, 00,000 in inventory and Rs. 40,000 cost of goods sold. Management has set a 4:1 goal for inventory turnover. How much is the inventory over or under the amount that would give this 4:1 ratio.
2. A company has current liabilities of Rs. 2, 00,000 a mortgage of Rs. 3,00,000 and bonds of Rs. 5,00,000. Its total equity is Rs. 15,00,000. What is its debt-equity ratio?
3. A company has a net income after tax of Rs. 4,00,000 and pays cash dividends of Rs. 2,40,000 on its 2,00,000 shares of outstanding stock at a time when the stock is selling for Rs. 20. What is the dividend yield and dividend pay out of the company?
4. A company has a net income after tax of Rs. 2,00,000 and 80,000 share outstanding, selling at a market price of Rs. 30. What is the company's P/E ratio?
5. If a company has sales of Rs. 2,00,000 and average accounts receivable at Rs. 40,000, what is the accounts receivable turnover and average collection period?
6. Following information are available from recent accounts of M. Ltd.

Sales for the year	10,00,000
Gross Profit Rate	30%
Stock Turnover ratio	5
Collection period for Debts	30 days

It is proposed to enter an entirely new market with a product which has not been handled before. This will lead to an additional sales of Rs. 2,00,000 having a gross profit rate of 20%. Customers will except 60 days a credit and additional stock of raw materials equal to three months' usage will be needed. Raw material costs, on existing products as with the new product, account for 75% of cost of sales.

If the proposal is implemented, how it affect company's ratios (stock turnover ratio and debt collection period)?

7. You are required to make a quick financial projection (i.e. Projected Income Statement and Projected Balance sheet) for the year 2010-11 on the basis of the following limited information :

2009-10

Sales	Rs. 10 crores
Expected Growth Rate	40%
Net Profit Margin	20%
Dividend Payout Ratio	40%
Tax Rate (assumed)	50%

Balance Sheet as on 31/3/2010

Liabilities	Rs. (lakhs)	Assets	Rs. (lakhs)
Share Capital	175	Fixed Assets	400
Retained Earning	150	Current Assets	470
Loans and Liabilities	545		-
	870		870

What will be the dividend rate on the basis of above dividend payout ratio? You may make necessary assumption.

8. Given below are cash position ratios of MRD Ltd., and Industry Average. Industry

Average is arrived at by taking position of 25 companies of the similar trade.

	Absolute Cash Ratio	Cash Position to Total Assets	Cash interval Ratios
MRD Ltd	0.36	12.50	35 Days
Industry Average	0.30	15%	33 Days

How do you feel about the cash position of MRD Ltd? Comparative Balance Sheet for the year ended 31st March 2008 is as follows :

Liabilities	X Ltd Rs.	Y Ltd. Rs.	Assets	X Ltd. Rs.	Y Ltd. Rs.
Equity Share Capital	4,00,000	5,00,000	Goodwill	15,000	5,000
12% Pre. Share Capital	1,00,000	3,00,000	Plant and Machinery	4,45,000	8,00,000
14% Debentures	2,50,000	50,000	Furniture	15,000	25,000
Unsecured Loans	1,50,000	1,00,000	Investments (Trade)	70,000	5,000
Sundry Creditors	2,00,000	2,50,000	Sundry Debtors	3,00,000	4,00,000
Provision for Taxation	50,000	50,000	Stock	3,50,000	2,00,000

Reserves and Surplus	1,00,000	2,50,000	Cash Balance	25,000	32,000
			Prepaid Expenses	5,000	13,000
			Preliminary Expenses	25,000	20,000
	12,50,000	**15,00,000**		**12,50,000**	**15,00,000**

Comparative Profit and Loss A/c for the year ended 31st March, 2006 is as follows :

Liabilities	**X Ltd Rs.**	**Y Ltd. Rs.**	**Assets**	**X Ltd. Rs.**	**Y Ltd. Rs.**
To opening Stock	50,000	18,000	By Net Sales	6,50,000	8,00,000
To Purchase	5,15,000	6,00,000	By Closing Stock	70,000	25,000
To Manufacturing Exp	25,000	80,000	By Dividend Income	-	6,000
To Administrative Exp	15,000	40,000			
To Selling Expenses	42,000	52,000			
To Finance Expenses	45,000	9,000			
To Loss on Sale of Asset	18,000	-			
To Net Profit c/d	10,000	32,000			
	7,20,000	**8,31,000**		**7,20,000**	**8,31,000**

Calculate the following Ratios and Comment:

a) Current ratio
b) Liquid ratio
c) Gross profit ratio
d) Operating ratio
e) Proprietary ratio
f) Debt equity ratio
g) Debtors turnover ratio
h) Selling expense ratio

(M.U. B.Com, October 2000, Adapted)

9. From the following Balance sheet of Bapat Ltd., as on 31/12/2005 and the Trading and Profit and Loss A/c for the year ended 31-12-2005, calculate the following ratios.

a) Current Ratio
b) Liquid Ratio
c) Stock Working Capital Ratio
d) Operating Ratio
e) Stock Turnover Ratio
f) Debtors Collection Period
g) Return of Equity Capital
h) Gross Profit Ratio
i) Proprietary Ratio
j) Expense Ratio.

Liabilities	Rs.	Assets	Rs
Equity Capital	10,00,000	Fixed Assets	26,00,000
10% Preference Capital	2,00,000	Bank Balance	1,00,000
General Reserve	12,00,000	Marketable investment	3,00,000
10% Debenture	10,00,000	Debtors	4,00,000
Creditors	1,20,000	Stock	6,00,000
Outstanding Expenses	2,20,000		
Income to provision	2,60,000		
	40,00,000		**40,00,000**

Trading and Profit and Loss Account

Particulars	Rs.	Particulars	Rs
To Opening Stock	6,00,000	By Sales	60,00,000
To Purchases	51,00,000	By Closing Stock	6,00,000
To Gross Profit	9,00,000		
	66,00,000		66,00,000
To Administrative Expenses	2,80,000	By Gross Profit	9,00,000
To Selling Expenses	1,00,000	By profit on Sale of Fixed Assets	1,10,000
To Interest	1,00,000		
To Provision for tax	2,60,000		
To Net Profit	2,70,000		
	10,10,000		**10,10,000**

(M.U., B.Com April 2002, Adapted)

10. From the following information, prepare a balance sheet in vertical form and calculate :

a) Capital Gearing Ratio
b) Proprietary Ratio
c) Current Ratio
d) Liquid Ratio
e) Debt-Equity Ratio
f) Stock to working capital Ratio

Particulars	Amount (Rs.)
Current Account with Dena Bank	50,000
Land and Building	4,00,000
Advance Payments	31,000
Stock	1,36,5000
Creditors	2,03,000
Debtors	2,61,500
Bills Receivable	10,500
Plant and Machinery	2,72,000
12% Debentures	1,25,000
Loan from Director	26,000
Equity Share Capital	5,00,000
Profit and Loss Account	33,500
Trade Investments	10,000
Proposed Dividends	43,000
Marketable Non Trade Securities	15,000
Provision for taxation	1,32,000
Bills Payable	9,000
General Reserve	50,000
10% Preference Share Capital	75,000
Preliminary Expenses	10,000

(M.U. B.Com., October 2002)

Unit-5

COST OF CAPITAL

Unit Structure:

5.0 OBJECTIVES

After studying this chapter you will be able to:

- Understand the concept of Cost of Capital
- Understand the different sources of capital
- Understand the cost of employing each of these sources of capital
- Know the concept of weighted average cost of capital
- The importance of cost of capital in financial management

5.1 INTRODUCTION

The financing decision relates to the composition of relative proportion of various sources of finance. The sources are;

1. Owned Capital- i.e. Equity Share Capital, Preference Share Capital, Accumulated profits.
2. Borrowed Capital-: Debentures, loans from financial institutions.

The financial management weighs the merits and demerits of different sources of finance while taking the financing decisions. Whether the companies choose shareholders funds or a combination of both, each type of fund carries a cost.

The cost of equity is the minimum return the shareholders would have received if they had invested elsewhere. Borrowed fund cost involves interest payment.

Both types of fund incur cost and this is the cost of capital to the company. This means, cost of capital is the minimum return expected by the company.

Whenever funds are to be raised to finance investments, capital structure decision is involved.

A demand for raising funds generates a new capital structure since a decision has to be made as to the quantity and forms of financing.

5.2 MEANING OF COST OF CAPITAL

In simple terms cost of capital refers to the discount rate that is used in determining the present value of the estimated future cash flows of the business/new project and eventually deciding whether the business/new project is worth undertaking or not.

It is also the minimum rate of return that a firm must earn on its investment which will maintain the market value of shares at its current level.

It can also be stated as the opportunity cost of an investment, i.e. the rate of return that company would otherwise be able to earn at the same risk level as the investment that has been selected. For example, when an investor purchases a stock in a company, he/she expects to see a return on that investment. Since the individual expects to get back more than his/her initial investment, the cost of capital is equal to this minimum return that the investor expects to receive which is termed as investor's opportunity cost.

The cost of each source of capital is called specific cost of capital. When these specific costs are combined for all the sources of capital for a business, it is termed as overall cost of capital for a business.

5.3 MEASUREMENT OF COST OF CAPITAL

The first step in the measurement of cost of capital of the firm is the calculation of the cost of individual sources of raising funds. From the viewpoint of capital budgeting decisions, the long term sources of funds are relevant as they constitute the major

sources of financing the fixed assets. In calculating the cost of capital, therefore, the focus on long-term funds which are:-

i. Long term debt (including debentures)
ii. Preference shares
iii. Equity Capital
iv. Retained Earnings

5.4 COST OF DEBT

The calculation of the cost of debt is relatively easy. A debt may be in the form of Bond or Debenture. A Bond is a long term debt instrument or security. Bonds are issued by the government. Therefore, they do not have any risk of default. The government honours obligations on its Bonds. Bonds of the public sector companies in India are generally secured, but they are not free from the risk of default.

The private sector companies also issue bonds, which are called as Debentures in India. A company in India can issue secured or unsecured debentures.

5.4.1 COST OF DEBENTURES

The cost of debentures and long term loans is the contractual interest rate adjusted further for the tax liability of the company. For a company, the higher the interest charges, the lower the amount of tax payable by the company. The interest on debentures or bonds is debited to the profit and loss account. Therefore, the taxable profit of the company is reduced. It is an indirect saving to the company. Therefore the cost of debt capital is reduced to the extent of the tax liability.

Illustration 1: Two companies X and Y are having their capital structure as follows;

	Company X	Company Y
Earnings before interest and taxes (EBIT) (Rs. In lakhs)	100	100
Interest (I) (12%)	-	40
Profit before tax (PBT)	100	60
Tax (T) @ 35%	35	21
Profit after Tax (PAT)	65	39

The tax rate applicable to the company is 35 percent.

Solution:
Cost of Debt = (I-t) where I = interest rate and t = tax rate
Cost of debt of X = 0, there is no debt.
Cost of debt of Y = (I - T) = (12 - 35%) =12- 4.2 = 7.8%

The important point to remember, while calculating the average cost of capital, is that the post-tax cost of debt should be used and not the pre-tax cost of debt.

5.4.2 COST OF IRREDEEMABLE DEBENTURES

Cost of debentures not redeemable during the life time of the company.

$$Kd = \frac{I(1-t)}{NP} x\ 100$$

where,
K_d = cost of debt after tax
I = Annual interest payment
NP = Net proceeds of debentures
t = Tax rate

Illustration 2

A company issues 1,000 15% debentures of the face value of ₹ 100 each at a discount of ₹ 5. The under-writing and other costs are ₹ 5000 /- for the total issue. . The interest per annum is ₹ 15,000. The income tax rate is 40%. Calculate the cost of Debt.

Solution

$$Kd = \frac{I(1-t)}{NP} x\ 100$$
$$Kd = \frac{15(1-0.40)}{90} x\ 100$$
$$Kd = \frac{15(0.6)}{90} x\ 100$$
$$Kd = \frac{9}{90} x\ 100$$
$$Kd = 10\%$$

The net proceeds of the debenture = 1000 x 95 = ₹ 95,000

₹ 95,000 - ₹ 5,000 = ₹ 90,000

Net proceeds per debenture = 90,000/1,000 = ₹ 90

Though the interest on debenture is 15%, the net cost of debenture is 10%.

5.4.3 Cost of Redeemable debentures

If the debentures are redeemable after the expiry of a fixed period, the cost of debentures would be:

$$Kd = \frac{I(1-t) + \left(\frac{(RV-NP)}{n}\right)}{\frac{(RV+NP)}{2}} \; x\; 100$$

where,

I = Annual interest payment

NP = Net proceeds of debentures

RV = Redemption values of debentures

t = Tax rate

n = Life of debentures

Illustration 3:

A company issued 10,000, 10% debentures of Rs 100 each on 1.4.2007 to be matured on 1.4.2012. If the market price of the debenture is Rs.80. Compute the cost of debt assuming 35% tax rate.

Solution :

$$Kd = \frac{I(1-t) + \left(\frac{(RV-NP)}{n}\right)}{\frac{(RV+NP)}{2}} \; x\; 100$$

$$Kd = \frac{10(1-0.35) + \left(\frac{(100-80)}{5}\right)}{\frac{(100+80)}{2}} \; x\; 100$$

$$Kd = \frac{10(0.65) + \left(\frac{20}{5}\right)}{\frac{(180)}{2}} \; x\; 100$$

$$Kd = \frac{6.5+4}{90} \; x\; 100$$

$$Kd = 11.67\%$$

Illustration 4

Five years ago, Sonata Limited issued 12 per cent irredeemable debentures at Rs. 103, at Rs. 3 premium to their par value of Rs 100. The current market price of these debentures is Rs. 94. If the company pays corporate tax at a rate of 35 per cent what is its current cost of debenture capital?

Solution:

K_d = 12/94 = 12.8 per cent

K_d (after tax) = 12.8 x (1-0.35) = 8.3 per cent

5.5 COST OF BONDS

It is easy to find out the present value of a bond since its cash flows and the discount rate can be determined easily. If there is no risk of default, then there is no difficulty in calculating the cash flows associated with a bond. The expected cash flows consist of annual interest payments plus repayment of principal. The appropriate capitalization or discount rate would depend upon the risk of bond. The risk in holding the government bond is less than the risk associated with a debenture issued by a company. Therefore, a lower discount rate would be applied to the cash flows of the government bond and a higher rate to the cash flows of the company debenture.

5.6 COST OF PREFERENCE SHARES

The cost of preference share capital is the dividend expected by its holders. Though payment of dividend is not mandatory, non-payment may result in exercising of voting rights by them.

The payment of preference dividend is not adjusted for taxes as they are paid after taxes and is not deductible.

The cost of preference share capital is calculated by dividing the fixed dividend per share by the price per preference share.

Illustration 5:
Suzlon Energy has issued preference shares at Rs. 100 per share, with a stated dividend of Rs. 12% and a flotation cost of 3% what is the cost of preference share?

Solution

$$K_p = \frac{\text{Preference Dividend}}{\text{Market Price of Preference Share } (1\text{-flotation cost})}$$

$$= \frac{\text{Rs.}12}{\text{Rs.}100(1\text{-}0.03)} = 12/97 = 12.37\%$$

5.6.1 COST OF IRREDEEMABLE PREFERENCE SHARES

Cost of irredeemable preference shares $= \frac{PD}{PO}$

Where,
PD = Annual preference dividend
PO = Net proceeds in issue of preference shares.

Cost of irredeemable preference shares where Dividend Tax is paid over the actual dividend payment $= \frac{PD(1-Dt)}{PO}$

Where,
PD = Annual preference dividend
PO = Net proceeds in issue of preference shares
Dt = Tax on preference dividend

Illustration 6:

X Ltd. issued 2,000 10% preference shares of Rs 100 each at Rs. 95 each. Calculate the cost of preference shares.

Solution

$$Kp = \frac{PD}{P0}$$
$$Kp = \frac{10}{95}$$
$$Kp = 10.53\%$$

5.6.2 COST OF REDEEMABLE PREFERENCE SHARES:

If the preference shares are redeemable after the expiry of a fixed period the cost of preference shares would be:

$$K_p = \frac{PD + (RV - NP)/N}{\frac{RV + NP}{2}}$$

Where,
PD = Annual Preference Dividend
RV = Redemption value of Preference Shares
NP = Net proceeds on issue of Preference Shares
N = Life of Preference Shares

However, since dividend of preference shares is not allowed as deduction from income for e tax purposes, there is no question of tax advantage in the case of cost of preference shares.

The cost of redeemable preference share could also be calculated as the discount rate that equates the net proceeds of the sale of preference shares with the present value of the future dividends and principal payments.

Thus, in the case of debt as well as preference shares, cost of capital is calculated by reference to the obligations incurred and proceeds received.

Illustration 7:

Y Ltd. issued 2,000 10% preference shares of Rs 100 each at Rs 95 each. The company proposes to redeem the preference shares at the end of 10 years. Calculate the cost of preference shares.

Solution :

$$K_p = \frac{PD + (RV - NP)/N}{\frac{RV + NP}{2}}$$

$$K_p = \frac{\left[\frac{10 + 100 - 95}{10}\right]}{\left[\frac{100 + 95}{2}\right]}$$

$$= 0.107 (approx)$$

$$= 10.7\%$$

5.7 COST OF EQUITY

It may prima facie appear that equity capital does not carry any cost. But this is not true. The market share price is a function of return that equity shareholders expect and get. If the company does not meet their requirements, it will have an adverse effect on the market share price. Also, it is relatively the highest cost of capital. Since expectations of equity holders are high, higher cost is associated with it.

In simple words cost of equity capital is the rate of return which equates the present value of expected dividends with the market share price. In theory the management strives to maximize the position of equity holders and the effort involves many decisions.

Different methods are employed to compute the cost of equity capital.

a) DIVIDEND PRICE APPROACH

Here, cost of equity capital is computed by dividing the current dividend by average market price per share. However, this method cannot be used to calculate cost of equity of units suffering losses.

This dividend price ratio expresses the cost of equity capital in relation to what yield the company should pay to attract investors.

$$K_e = \frac{D_1}{P_0}$$

Where,
K_e= Cost of equity
D_1= Annual dividend
P_0 = Market price of equity

This model assumes that dividends are paid at a constant rate to perpetuity. It ignores taxation.

Earnings and dividends do not remain constant and the price of equity shares is also directly influenced by the growth rate in dividends. Where earnings, dividends and equity share price all grow at the same rate, the cost of equity capital may be computed as follows:

$$K_e = (D_1/P_0) + G$$

Where,
D_1 = $[D_0 (1+G)]$ i.e. next expected dividend
P_0 = Current Market price per share
G = Constant Growth Rate of dividend

Cost of newly issued shares, Kn , is estimated with the constant dividend growth model so as to allow for flotation costs.

$$K_n = (D_1/P_0 - F) + G$$

Where,
F = Amount of flotation cost per share

Illustration 8:

A company has paid a dividend of Rs 1 per share (of face value of Rs 10 each) last year and it is expected to grow @10% next year. Calculate the cost of equity if the market price of share is Rs 50.

Solution

$$K_e = \frac{D+G}{P}$$

$$= \frac{1(1+0.10)}{50} + 0.10$$

$$= 0.12 \; or \; 12\%$$

Ke= D + G

b) EARNING/PRICE APPROACH:

This approach co-relates the earnings of the company with the market price of its share.

The cost of ordinary share capital would be based upon the expected rate of earnings of a company. The argument is that each investor expects a certain amount of earnings, whether distributed or not from the company in whose shares he invests.

If an investor expects that the company in which he is going to subscribe for shares should have at least a 20% rate of earning the cost of ordinary share capital can be construed on this basis Suppose the company is expected to earn 30%, the investor will be prepared to pay Rs 150 Rs30 x 100 for each share of Rs 100.

So, cost of equity will be given by:

$$\left[K_e = \frac{E / P}{20} \right]$$

Ke= (E/P)

where,
E= Current earnings per share
P= Market share price

Since earnings do not remain constant and the price of equity shares is also directly influenced by the growth rate in earning, we need to modify the above calculations with an element of growth.

So, cost of equity will be given by:

$K_e = (E/P) + G$

where,
E = Current earnings per share
P = Market share price
G = Annual growth rate of earnings

The calculation of 'G' (the growth rate) is an important factor in calculating cost of equity capital. The past trend in earnings and dividends may be used as an approximation to predict the future growth rate if the growth rate of dividend is fairly stable in the past.

$G = 1.0 (1+G)^n$ where n is the number of years

The Earning Price Approach is similar to the dividend piece approach; only it seeks to nullify the effect of changes in the dividend policy.

c) REALIZED YIELD APPROACH:

According to this approach, the average rate of return realized in the past few years is historically regarded as 'expected return' in the future. The yield of equity for the year is:

$$Y_t = \frac{D_t + P_{t-1}}{P_{t-1}}$$

where,
Y_t = Yield for the year t
D_t = Dividend for share for end of the year t
P_t = Price per share at the end of the year t
P_{t-1} = Price per share at the beginning and at the end of the year t

This approach provides a single mechanism of calculating cost of equity. It has unrealistic assumptions. If the earnings do not remain stable, this method is not practical.

d) CAPITAL ASSET PRICING MODEL APPROACH (CAPM):

CAPM model describes the risk-return trade-off for securities. It describes the linear relationship between risk and return for securities. The risks to which a security is exposed are divided into two groups, diversifiable and non-diversifiable.

The diversifiable risk can be eliminated through a portfolio consisting of large number of well diversified securities.

The non-diversifiable risk is attributable to factors that affect all businesses. Such risks are:-

Interest rate changes
Inflation
Political changes etc.

Thus, the cost of equity capital can be calculated under this approach as:

$$K_e = R_f + b\ (R_m - R_f)$$

where,
K_e = Cost of equity capital
R_f = Rate of return on security
b = Beta coefficient
R_m = Rate of return on market portfolio

Therefore, required rate of return = risk free rate + risk premium

The idea behind CAPM is that investors need to be compensated in two ways-time value of money and risk.

The time value of money is represented by the risk-free rate in the formula and compensates the investors for placing money in any investment over a period of time.

The other half of the formula represents risk and calculates the amount of compensation the investor needs for taking on additional risk. This is calculated by taking a risk measure (beta) which compares the returns of the asset to the market over a period of time and compares it to the market premium.

Illustration 9:

Calculate the cost of equity capital of Shanthi ltd, whose risk free rate of return equals 10%. The firm's beta equals 1.75 and the return on the market portfolio equals to 15%.

Solution

$K_e = R_f + b (R_m - R_f)$

$K_e = 0.10 + 1.75 (0.15 – 0.10)$

$= 0.10 + 1.75(0.05)$

$= 0.1875$

$=18.75\%$

5.8 COST OF RETAINED EARNINGS

Like other sources of fund, retained earnings involve cost. It is the opportunity cost of dividends forgone by shareholders.

The given future depicts how a company can either keep or reinvest cash or return it to the shareholders as dividends. If the cash is reinvested, the opportunity cost is the expected rate of return that shareholders could have obtained by investing in financial assets.

There are two approaches to measure this opportunity cost. One approach is by using discounted cash flow (DCF) method and the second approach is by using capital asset pricing model.

a) by DCF : $K_S = \frac{D_1 + G}{P_0}$

where,

D_1 = Dividend

P_o = Current market price

G = Growth rate

b) By CAPM : $K_S = R_f + b (R_m – R_f)$

where,
K_s = Cost of equity capital
R_f = Rate of return on security
b = Beta coefficient
R_m = Rate of return on market portfolio

Illustration 10: A Ltd provides the following details:

D_0 = Rs 4.19 P_0 = Rs 50 G= 5%

Calculate the cost of retained earnings based on DCF method.

Solution :

$$K_S = \frac{D_1 + G}{P_0}$$
$$= \frac{D_0(1+G)}{P_0} + G$$
$$= \frac{Rs.4.19(1.05)}{Rs.50} + 0.05$$
$$= 0.088 + 0.05$$
$$= 138$$
$$= 13.8\%$$

Illustration 11: C Ltd provides the following details:

R_f = 7% b = 1.20 R_m=13%

Calculate the cost of retained earnings based on CAPM method.

Solution

$K_s = R_f + b (R_m – R_f)$
= 7% + 1.20(6%)
= 7% + 7.20
K_s= 14.2%

5.9 WEIGHTED AVERAGE COST OF CAPITAL (WACC)

WACC (Weighted Average Cost of Capital) represents the investors' opportunity cost of taking on the risk of putting money into a company.

Since every company has a capital structure i.e. what percentage of funds comes from retained earnings, equity shares,

preference shares, debt and bonds, so by taking a weighted average, it can be seen how much cost/interest the company has to pay for every rupee it borrows/invest. This is the weighted average cost of capital.

The weighted average cost of capital for a firm is of use in two major areas:-

1. In consideration of the firms position;
2. Evaluation of proposed changes necessitating a change in the firm's capital. Thus, a weighted average technique may be used in a quasi-marginal way to evaluate a proposed investment project, such as the construction of a new building.

Thus, weighted average cost of capital is the weighted average after tax costs of the individual components of firm's capital structure. That is, the after tax cost of each debt and equity is calculated separately and added together to a single overall cost of capital.

$$K_0 = \%\ D(mkt)\ (K_i)\ (1 - t) + (\%\ Psmkt)\ K_p + (Csmkt)\ K_e$$

where,

K_0 = Overall cost of capital

K_i = Before tax cost of debt

1 – t = 1 – Corporate tax rate

K_p = Cost of preference capital

K_e = Cost of equity

% Dmkt = % of debt in capital structure

% Psmkt = % of preference share in capital structure

% Cs = % of equity share in capital structure

The cost of weighted average method is preferred because the proportions of various sources of funds in the capital structure are different. Therefore, cost of capital should take into account the relative proportions of different sources of finance.

Illustration 12:

Calculate the WACC using the following data

(a) Book value weights Basis

(b) Market value weights Basis

The capital structure of the company is as under:

Rs.	
5,00,000	Debentures (Rs 100 per debenture)
5,00,000	Preference shares (Rs 100 per share)
10,00,000	Equity shares (Rs 10 per share)

The market prices of these securities are:

Debenture	Rs 105 per debenture
Preference	Rs 110 per preference share
Equity	Rs 24 each

Additional information:

1) Rs 100 per debenture redeemable at par, 10% coupon rate, 4% flotation costs, 10 year maturity.
2) Rs 100 per preference share redeemable at par, 5% coupon rate, 2% flotation cost and 10 year maturity.
3) Equity shares have Rs 4 flotation cost.

The expected dividend is Rs 10 with annual growth of 5%. The firm has a practice of paying all earnings in the form of dividend.

Corporate tax rate is 30%.

Solution

Cost of equity = $K_e = \frac{10}{20} + 0.05$

= 0.05 + 0.05

= 0.10

= 10%

Cost of Debt = $K_d = \frac{10(1-0.3) + \frac{(100-96)}{10}}{\frac{(100+96)}{2}}$

$= \left[\frac{7+0.4}{196}\right] \times 2$

$= 0.0755$

$= 7.55\%$

Cost of preference shares = $K_p = \left[\frac{5 + \frac{2}{10}}{\frac{198}{2}}\right]$

$$= \frac{5.2}{99}$$
$$= 0.0535$$
$$= 5.35\%$$

a) Calculation of WACC using book value weights

Source of capital	Book value	Specific cost (K%)	Total cost
10% Debentures	5,00,000	5.55	27,500
5% preference shares	5,00,000	5.3	26,500
Equity shares	10,00,000	10.0	1,00,000
Total	20,00,000		1,54,000

$$K_0 = \frac{Rs.1,54,000}{Rs.20,00,000}$$
$$= 0.077$$
$$= 7.7\%$$

b) Calculation of WACC using market value weights;

Source of Capital	Book value	Specific cost (K %)	Total cost
10% Debentures	5,25,000	5.5	28,875
5 % Preference shares	5,50,000	5.3	29,150
Equity shares	24,00,000	10.00	2,40,000
	34,75,000		2,98,025

$$K_0 = \frac{\text{Rs } 2,98,025}{\text{Rs } 34,75,000}$$
= 0.08576 (approx) =8.58%

5.10 EXERCISES

1. Indicate whether the following statements are true or false :
   a) Cost of capital is the cost of borrowing funds.
   b) Retained earnings do not have explicit cost.
   c) Cost of Preference Share capital is higher than the cost of equity capital.
   d) The higher is the corporate tax rate, the higher is the cost of debt.
   e) Overall cost of capital decreases on payment of entire long term debt.

   (Answers: a-False, b-True, c-False, d-False, e-False)

2. What is cost of capital? Explain the problems faced in determining cost of capital.

3. Explain the different approaches to the calculation of cost of equity capital.

4. What is weighted average cost of capital? Explain the rationale behind the use of weighted average cost of capital.

5. Explain the approach to determine the cost of retained earnings.

6. A company has the following specific cost of capital along with the indicated book and Market Value weights' :

Type of Capital	Cost %	Book Value Weights	Market Value Weights
Debentures	5	30	25
Preference Shares	10	20	17
Equity Shares	12	40	46
Retained Earnings	12	10	12

Calculate the weighted average cost of capital using book value and market value weights. (Answers : Ko = 9.5%, 9.9%)

7. Two companies, A and B are in the same business and hence similar operating risks. However, the capital structure of each of them is different. The following are the details :

Particulars	A (Rs.)	B(Rs.)
Equity Share Capital (face value Rs.10)	5,00,000	2,50,000
Market value per share	12	20
Dividend per share	2.88	4.00
Debentures	2,50,000	1,00,000
Market value per debenture	80	125
Interest Rate	8	10

Assume that current levels of dividends are generally expected to continue indefinitely and the income tax rate is 35 percent. Compute the weighted Average Cost of capital of each company. (Answers : 19%, 17%)

Unit-6

CAPITAL STRUCTURE DECIONS

Unit Structure:

6.0 OBJECTIVES

After studying the unit the students will know;

- The concept of capital structure.
- The importance of capital structure.
- The concept of optimum capital structure
- The choice of capital structure.
- The capital structure theories.

6.1 INTRODUCTION:

Capital structure is the mix of different securities to a firm's capitalisation. It is the permanent financing of the company represented primarily by long-term debt and shareholder's equity. It is also a part of a company's financial structure. The choice of capital structure depends upon a number of factors such as nature of business, regularity of earnings, conditions of the financial markets and attitudes of the investors. A capital structure will be considered appropriate if it possesses profitability, solvency, flexibility, conservatism and control. The capital structure of a company is to be determined initially at the time of incorporation of a company. The initial capital structure will have long term implications. It may not be possible to have optimum capital structure but the management should set a target capital structure and the initial capital structure should be framed keeping in view

the target capital structure. Therefore, the capital structure decision is a continuous one.

6.2 MEANING OF CAPITAL STRUCTURE:

Capital structure is the mix of a firm's capitalisation. It includes long term sources of funds such as debentures, shares, etc. According to Gavstenberg, capital structure is the "make-up of a firm's capitalisation." Thus, it represents the mix of different sources of long term funds, in the capitalisation of the company. The term capitalisation is used with reference to the total long term funds raised by a company.

The decisions regarding the form of financing, their requirements and their relative proportions in the total capital of a company are known as capital structure decisions. The company management has to take extreme care and prudence in arriving at the proper capital structure. The term capital structure is used for the mix of capitalisation. The capitalisation is used for the sources of long-term capital of a company. The long term sources of raising capital are issue of shares, debentures or bonds and long-term borrowings. The share is a owned capital and debentures and bonds are borrowed capital. Hence, there should be a mix of sources of capital.

The capital structure of a company is to be determined initially, at the time of formation of the company. The initial capital has long-term implication and hence proper care should be taken while deciding the sources of capital at the beginning. The capital structure should be flexible, profitable and simple. The initial capital structure of a company depends upon many factors.

6.3 CHOICE OF A CAPITAL STRUCTURE:

The choice of an appropriate capital structure depends upon a number of factors. These factors include nature of company's business, regularity of earnings, conditions of financial markets, attitude of the management as well as the investors. However, a firm has the choice to raise funds for financing its projects with the following choices:

a) Only with equity shares.
b) With equity and preference shares.
c) With equity shares and debentures.
d) With equity shares, preference shares and debentures.

A capital structure will be considered to be appropriate if it possesses the following features:

i) **Flexibility:** The capital structure should be determined in such a way that there should be some scope for changes according to the changing circumstances. It should be possible for the company to provide funds whenever needed for financing its activities.

ii) **Profitability:** The capital structure of a company should be most profitable. The objective of a company is to maximise the return to the shareholders. Therefore, the capital structure should tend to minimise cost of financing and at the same time maximise the returns to the shareholders.

iii) **Solvency:** The capital structure should be determined in such a way that it should not be a risk of becoming insolvent. Excessive use of debt or borrowed capital in the capital structure results into insolvency. It affects profitability as well as liquidity of the company adversely.

iv) **Conservative:** The capital structure of a company should be conservative in the sense, that the debt portion in the capital structure should not exceed the limit which the company can bear. Normally, the debt-equity ratio should not be more than 2:1.

v) **Control:** While deciding the capital structure of a company, the management has to see that its control should not be reduced. The promoter's control should not be reduced. The promoters control the company with more proportion of equity than debt. In order to avoid this, a proper balance between owned capital and debt capital should be maintained.

6.4 OPTIMUM CAPITAL STRUCTURE:

Optimum capital structure is that capital structure at which the value of equity share is the maximum while the average cost of capital is the minimum. The value of equity share mainly depends upon the earnings per share. The theory of capital structure deals with the issue of the right mix of debt and equity in the long-term capital of the company. If a company raises debt, the value of equity shares goes up to a certain point. If the debt increases beyond that point, the value of equity shares goes down. Therefore, the company should determine its appropriate level of debt-equity mix which is known as optimum capital structure.

6.5 IMPORTANCE OF CAPITAL STRUCTURE:

The capital structure decisions are very important in financial management. These decisions influence debt-equity mix which ultimately affects shareholders.' return and risk. Since the cost of debt is cheaper, companies prefer to borrow. The value of equity depends upon earnings per share. As long as return on investment is more than the cost of borrowings, extra borrowings will increase the earnings per share. However, beyond the limit, it increases the risk and the share price may fall. The effect of fall in share price due to heavy load of debt is difficult to measure. Market factors are so highly psychological and complex as they hardly follow these theoretical considerations. However, a company can determine an appropriate debt-equity mix empirically, considering various factors.

The debt-equity mix in the capital structure is one of the important factors. Affecting the value of a share of a company. There is a significant relationship between the share price and the variables like return, risk, growth size and leverage. Companies in India are now showing almost an equal preference for debt and equity in designing their capital structure. This is due to the freedom in paying dividend and easy to raise money. However, the returns have become uncertain due to increasing competition.

An important function of financial management is to decide an appropriate capital structure of their company. The financial performance of a company depends upon the capital structure decisions. A good capital structure will help the company to increase profits, efficiency and reputation of the company. Therefore, capital structure decisions are very important.

6.6 FACTORS. AFFECTING CAPITAL STRUCTURE:

An appropriate capital structure can be determined on the basis of the following factors:

1) TRADING ON EQUITY:

Trading on equity means use of owned capital as well as borrowed capital in the capital structure of a company. A company can raise funds by issue of shares and debentures. Debentures carry a fixed rate of interest and the interest is paid irrespective of profits. A company can also raise capital only by issue of shares. In this case, the shareholders will get less amount of dividend because of large number of shareholders. However, if a company issues shares as well as debentures, the shareholders will be benefited more in the form of dividend. Debenture holders have a limited share in the company's profits and hence want to be

protected in terms of earnings and values represented by equity capital. Fixed interest on debt does not vary with the firms' earnings before interest and tax, a magnified effect is produced on earnings per share.

Illustration 1:

A Ltd wants to raise Rs. 1, 00,000 as capital. The company expects earnings before interest and taxes (EBIT) Rs. 40,000 per annum. The management is considering the following alternatives for raising the capital:

a) Issue 10,000 equity shares of Rs. 10 each.
b) Issue 5000 equity shares of Rs. 10 each and 500, 12% preference shares of Rs. 100 each.
c) Issue 5000 equity shares of Rs. 10 each and 10% Debentures of Rs. 50,000.

You are required to calculate earnings per share and advise the alternative to be used for raising capital, assuming tax rate of 30%.

Solution:

Calculation of earnings per share:

Alternatives	(a) Rs.	(b) Rs.	(c) Rs.
EBIT	40,000	40,000	40,000
Less: Interest	–	–	5,000
EBT	40,000	40,000	35,000
Less: Tax @ 30%	12,000	12,000	10,500
PAT	28,000	28,000	24,500
Pref. Dividend	–	6,000	–
Profit available to equity shareholders	28,000	22,000	24,500
Number of equity shares	10,000	5,000	5,000
Earning per share Rs.	2.80	4.40	4.90

In case of alternative (c) i.e. capital structure consisting of debt-equity (trading on equity) the earnings per share is highest, hence the alternative (c) should be followed in order to maximize the return to shareholders.

2) LEVERAGES:

Leverage is the ability of a firm to use fixed cost assets or funds to magnify the return to its owners. There are two leverages associated with the capital structure i.e. operating leverage and financial leverage. Operating leverage exists when a firm has a

fixed cost that must be incurred regardless of volume of business. On the other hand, financial leverage is a mix of debt and equity in the capitalisation of the firm. In order to decide proper financial policy, operating leverage may be taken into consideration as the financial leverage is a superstructure built on the operating leverage. The operating profits i.e. earnings before interest and taxes (EBIT) serves as a function in defining these two leverages. Financial leverage represents the relationship between the firms' earnings before interest and taxes and earnings available for equity holders. When there is an increase in EBIT there is a corresponding increase in market price of equity shares. However, increased use of debt in the capital structure has certain limitations. If debt capital is employed in greater proportion, marginal cost of debt will also increase and share price may fall as investors may find it risky. On the other hand, in spite of increased risk, market price of shares may increase due to speculation. Therefore, before using financial leverage, its impact on Earning Per Share (EPS) must be considered. A company having higher operating leverage should use low financial leverage and vice versa otherwise, it may face problems of insolvency and inadequate liquidity.

Illustration 2:

GTL Ltd, a widely held company is considering a major expansion of its production facilities and the following alternatives are available:

	Alternatives (Rs. lakhs)		
	A	B	C
Share Capital (Rs. 10)	50	20	10
14% Debentures	–	20	15
Loan from financial Institution @15%	–	10	25

Expected rate of return before tax is 25%. The rate of dividend of the company is not less than 20%. The company at present has low debt. Corporate tax is 30%. Which of the alternatives you would choose?

Solution:

Evaluation of financial alternative **(Rs. lakhs)**

Particulars	A	B	C
Earnings before Int. & Taxes (25% of Rs. 50 lakhs)	12.50	12.50	12.50
Less: (i) Interest on Debentures	–	2.80	2.10
(ii) Interest on Loan	–	1.50	3.75
EBT	12.50	8.20	6.65
Less: Taxes	3.75	2.46	2.00
PAT	8.75	5.74	4.65
Number of Shares (lakhs)	5.00	2.00	1.00
Earning per Share	1.75	2.87	4.65

Alternative (C) is more profitable because shareholders will be benefited more. Therefore alternative (C) should be chosen.

3) INTEREST COVERAGE RATIO:

The ability of a firm to use debt in the capital structure may be judged in terms of interest coverage ratio. It is the ratio or relation between operating profit and interest. Higher the ratio, greater is the certainty of meeting interest payment. If the ratio is lower, the firm may not be able to pay interest in future.

4) CASH FLOW ANALYSIS:

EBIT-EPS analysis is a good supporting tool in determining a suitable capital structure. Cash flow under adverse situation should be examined in order to determine the debt capacity. A high debt-equity ratio may not be risky if the company has the ability to generate adequate cash flows. It may be possible to increase the debt until cash flows equal to the risk set out by debt capital. With the help of information available, a range can be determined for an optimum level of debt in the capital structure.

Illustration 3:

BEST Ltd, a profit making company has paid up capital of Rs. 100 lakhs consisting of 10 lakhs equity shares of Rs. 10 each. Currently it is earning an annual pre-tax profit of Rs. 60 lakhs. The company's shares are listed and quoted in the range of Rs. 50 to Rs. 80. The management wants to diversity production and has approved a project which will cost Rs. 50 lakhs and it is expected to yield a pre-tax income of Rs. 40 lakhs per annum. To raise this additional capital, the following options are under consideration of the management.

a) To issue equity capital for the entire additional amount. It is expected that the new shares (face value Rs. 10) can be sold at a premium of Rs. 15.

b) To issue 16% non-convertible debenture of Rs. 100 each for the entire amount.

c) To issue equity capital for Rs. 25 lakhs (face value Rs. 10) and 16% non-convertible debenture for the balance amount. In this case, the company can issue shares at a premium of Rs. 40 each.

You are required to advise the management as to how the additional capital can be raised keeping in mind that the management wants to maximise the earning per share to maintain its goodwill. The tax rate applicable to the company is 30%.

Solution:

Calculation of EPS under three options (Rs. in lakhs)

Particular	I	II	III
	Equity	Debt	Debt + Equity
Earning before Interest & Tax:			
Current operations	60	60	60
New operations	40	40	40
Total	**100**	**100**	**100**
Less: Interest on Debt	–	8	4
Profit before tax	100	92	96
Less: Tax	30	27.6	28.8
Profit after tax	70	64.4	67.2
Number of Equity Share:			
Existing (lakhs)	10	10	10
New Issued (lakhs)	2	–	0.50
	12	10	10.50
∴ Earning per Share	70	64.4	67.2
	12	10	10.50
EPS (Rs.)	5.83	6.44	6.4

Option II, i.e. issue of 16% Debentures is most suitable to maximise the EPS.

Illustration 4:
'Z' Ltd is currently EBIT of Rs. 12 lakhs. Its present borrowings are:

(Rs. in Lakhs)

12% Term Loans	40
Working Capital	–
Bank Loan @ 15%	35
Public Deposit @ 12%	15

The sales of the company are growing and to support this, the company proposes to obtain an additional bank borrowing as Rs. 25 lakhs at 15% p.a. The increase in EBIT is expected to be 20%. Calculate the change in interest coverage ratio after additional borrowings and after your comments.

Solution:

i) The present EBIT is Rs. 12 lakhs

ii) Interest on present borrowing

		Rs.
Term Loans-12% of Rs. 40 lakhs	=	4.80 lakhs
Public Deposit- 12% of Rs. 15	=	1.80 lakhs
Bank Loan- 15% of Rs. 35	=	5.25 lakhs
Total		11.85 lakhs

iii) Present Interest Coverage Ratio $= \frac{EBIT}{Interest}$

$= \frac{12.00}{11.85}$

$= 1.01\,Times$

iv) Revised EBIT $= 12 \times \frac{120}{100}$ = Rs. 14.40 lakhs

v) Revised amount of interest = Rs.11.85 lakhs × 15% of 25 lakhs

= Rs. 11.85 + Rs. 3.75 lakhs

= Rs. 15.6 lakhs

vi) Revised Interest Coverage Ratio $= \frac{EBIT}{Interest}$

$= \frac{14.40}{15.60}$

$= 0.92$

Illustration 5:

Mangalore Chemicals Ltd. requires Rs. 25 lakhs for a new plant. This plant is expected to yield earnings before interest and

taxes of Rs. 5 lakhs. While deciding about the financial plan, the company considers the objective of maximising earnings per share. It has three alternatives to finance the project by raising debt of Rs. 2,50,000 or Rs. 10,00,000 or Rs. 1,50,000 and the balance in each case, by issuing equity shares. The company's share is currently selling at Rs. 150 but it is expected to decline to Rs. 125 in case the funds are borrowed in excess of Rs. 10,00,000. The funds can be borrowed at the rate of 10% up to Rs. 2,50,000 at 15% over Rs. 2,50,000 and up to Rs. 1,00,000 and at 18% over Rs. 10,00,000. The tax rate applicable to the company is 30%. Which form of financing should the company chose?

Solution:

Evaluation of alternative proposals (Rs.)

Plan / particular	I (2.50+22.50)	II (10+15)	III (15+10)
EBIT	5,00,000	5,00,000	5,00,000
Less: Interest	25,000	1,50,000	2,70,000
EBT	4,75,000	3,50,000	2,30,000
Less: Tax	1,42,500	1,05,000	69,000
PAT	3,32,500	2,45,000	1,61,000
Number of Shares	15,000	10,000	8000
Earnings per Share Rs.	22.17	24.50	20.125

Earning per share in case of alternative II is highest. Hence, the company should finance the new plant by raising Rs. 10 lakhs of Debt @ 15% and issue of equity shares. The company can issue 10,000 Equity shares at Rs. 150 each and raise Rs. 15 lakhs through equity.

6.7 CAPITAL STRUCTURE THEORIES:

A firm has to maintain an optimum capital structure with a view to maintain financial stability. The optimum capital structure can be obtained when the marked value per share is the maximum. Therefore, the objective of the firm should be to select a financing or debt equity mix which will maximise the value of the firm, optimum leverage can be the mix of debt-equity which maximises the value of a company. In order to achieve this goal, the finance manager has to follow the theories of capital structure of corporate enterprises. There are four major theories which explain the relationship between capital structure, cost of capital and value of the firm. These are as follows:

1) Net Income Approach.
2) Net Operating Income Approach.
3) Modigliani- Miller Approach (MM).
4) Traditional Approach.

However, in order to understand this relationship, the following assumptions are made:

i) The firm employs only two types of capital i.e. debt and equity capital.

ii) Taxes are not considered.

iii) The firm pays its earnings in full as dividend. There is no returned earning.

iv) The firm's total assets are given and there is no change in the assets.

v) The firm's total financing remains constant. The firm can change its capital structure by interchanging the source of finance.

vi) The operating profit is not expected to change.

vii) The business risk remains constant and it is independent of capital structure and financial risk.

viii) The firm has a perpetual life. It means the business is a going concern and it has long life.

ix) All the investors has the same subjective probability distribution of the future expected operating profits for a given firm.

6.7.1. NET INCOME APPROACH (NI):

David Durand, of USA, had suggested this approach. According to him, capital structure decision is relevant to the valuation of the firm. It means, a change in the capital structure causes a corresponding change in the overall cost of capital as well as the total of the firm.

This approach also suggests that a higher debt content in the capital structure will result in decline in the overall cost of capital. This will cause increase in the value of the firm and consequently increase in the value of equity shares of the company. The Net Income Approach is based on the following assumptions:

i) The cost of debt is less than cost of equity.
ii) The debt content does not change the risk perception of the investors.

Thus, the Net Income Approach suggests that an increase in financial leverage will lead to decline in the weighted average cost

of capital and the value of the firm as well as market price of equity shares will increase. On the other hand, a decrease in the financial leverage will cause on increase in the weighted average cost of capital and a consequent decline in the value as well as market price of equity shares.

The value of the firm on the basis of Net Income Approach can be ascertained as follows:

V = S + D
where, V = Value of the firm
S = Market value of equity
D = Market value of Debt

The market value of Equity can be ascertained as follows:

$$S = \frac{NI}{K_e}$$

where, S = Market value of Equity
NI = Earnings available to Equity shareholders.
K_e = Equity capitalisation rate

Under Net Income approach, the value of the firm will be maximum at a point where weighted average cost of capital is minimum. Therefore, the theory suggests maximum possible debt financing for minimizing the cost of capital. The overall cost capital is determined as follows:

$$\text{Overall cost of capital} = \frac{EBIT}{Value\ of\ the\ firm}$$

Illustration 6:

The EBIT of Kripa Ltd is Rs. 5,00,000. The company has 10% Debentures of Rs. 20,00,000. The equity capitalisation rate is 15%.

You are required to calculate:
i) Market value of Equity
ii) Value of the Company
iii) Overall cost of capital.

Solution:

Statement showing value of firm

Net Income Approach	Rs.
Earnings before interest & Taxes (EBIT)	5,00,000
Less: Interest on Debenture	
(10% of 20,00,000)	2,00,000
Net Income	3,00,000

Equity capitalisation rate = (K_e) = 15%

i) Market value of Equity $= \frac{NI}{K_e}$

$= \frac{3,00,000}{15} \times 100$

= Rs. 20,00,000

ii) Value of the company = Value of Equity + Value of Debt
= Rs. 20,00,000 + 20,00,000
= Rs. 40,00,000

iii) Overall cost of capital $= \frac{EBIT}{Value\ of\ the\ firm} \times 100$

$= \frac{5,00,000}{40,00,000} \times 100$

= 12.5%

Illustration 7:

Zed Ltd is expecting on annual EBIT of Rs. 10,00,000. The company has Rs. 40 lakhs in 10% Debentures. The cost of equity capital or capitalisation rate is 12.5%. You are required to calculate the total value of the company and overall cost of capital.

Solution:

Statement showing value of the firm

Net Income Approach	Rs.
Earnings Before interest & Taxes	10,00,000
Less: Interest	
(10% of 40,00,000)	4,00,000
Net Income	6,00,000

Equity capitalisation rate = 12.5%

a) Market Value of Equity (s) $= \frac{NI}{K_e}$

$= \frac{6,00,000}{12.5\%}$

= Rs. 48,00,000

b) Market Value of Debt is Rs. 40,00,000

c) Value of the firms = S+D

= Rs. 48,00,000 + Rs. 40,00,000

= Rs. 88,00,000

d) Overall Cost of capital $= \frac{EBIT}{Value\ of\ the\ firm} \times 100$

$= \frac{10,00,000}{88,00,000} \times 100$

= 11.36%

Illustration 8:

'H' Ltd is expecting annual EBIT of Rs. 10,00,000. The company has issued 10% Debentures of Rs. 40,00,000. The equity capitalisation rate is 12.5%. The company desires to redeem debentures of Rs. 10,00,000 by issuing additional equity shares of Rs. 10,00,000. You are required to calculate the value of the firm and also the overall cost of capital.

Solution:

Statement showing the value of the firm

Net Income Approach	Rs.
EBIT	10,00,000
Less: Interest	
(10% of 30,00,000)	3,00,000
Net Income	7,00,000

Equity capitalisation Rate = K_e = 12.5%

a) Market value of Equity (S) $= \frac{NI}{K_e}$

$= \frac{7,00,000}{12.5\%}$

= Rs. 56,00,000

b) Market value of the firm = S + D
= Rs. 56,00,000 + 30,00,000
= Rs. 86,00,000.

c) Overall cost of capital $= \frac{EBIT}{Value\ of\ the\ firm} \times 100$

$= \frac{10,00,000}{86,00,000} \times 100$

= 11.63%

Illustration 9:

The operating income of 'A' Ltd is Rs. 6,00,000. The firms cost of debt is 10%. The amount of Debt is Rs. 15,00,000. The overall cost of capital of the firm is 15%. You are required to determine:

a) Total value of the firm
b) Cost of equity

Solution:

(a)

Statement sharing the value of the firm:

Earnings before Interest Taxes	Rs. 6,00,000
Less: Interest on Debentures	
10% of Rs. 15,00,000	1,50,000
Net Income	4,50,000

Total cost of capital 15%

$\therefore$ Value of the firm = $\frac{EBIT}{K_e}$

$= \frac{6,00,000}{0.15}$

= Rs. 40,00,000

$\therefore$ Market value of Equity = V – D
= Rs. 40,00,000 – 15,00,000
= Rs. 25,00,000

b) Calculation of cost of Equity

$Cost\ of\ Equity\left(K_e\right) = \frac{Net\ Income}{Market\ Value\ of\ Equity} \times 100$

$= \frac{4,50,000}{25,00,000} \times 100$

$= 18\%$

6.7.2 NET OPERATING INCOME APPROACH (NOI):

This approach was also suggested by Mr. David Durand. Net operating Income means earning before interest and tax. This approach suggests that the market value of the firm is not at all affected by the capital structure changes. The capital structure decisions of the firm are irrelevant. And change in the leverage will not lead to any change in the total value of the firm and the market price of the shares. The market value of the firm is ascertained by capitalising the net operating income at the overall cost of capital (K) which is considered to be constant. The market value of equity is ascertained by deducting the market value of the debt from the market value of the firm.

The net operating income approach is based on the following assumptions:

1) The overall cost of capital (K) remains constant for all degree of debt-equity mix.

2) The market capitalises the value of the firm as a whole and therefore, the spit between debt and equity is not relevant.

3) The low cost debt increases the risk of equity shareholders. This results in increase in equity capitalisation rate. An increase in the use of debt is offset by an increase in the equity capitalisation rate.

The value of the firm is determined as follows:

$$V = \frac{EBIT}{K}$$

Where, V = Value of the firm
K = Overall cost of Capital
EBIT = Earning before interest and tax.

The value of equity can be determined by using the following formula:

$$S = V - D$$

Where, S = Value of Equity
V = Value of firm
D = Value of Debt

Illustration 10:

'X' Ltd has an EBIT of Rs. 10 lakhs. The cost of Debt is 10% and the outstanding debt amounts to Rs. 3,00,000. If the overall capitalisation rate is 12.5%, calculate the total value of the firm and equity capitalisation rate.

Solution:

(a)

Statement showing the value of the firm
(Net Operating Income Approach)

	Rs.
EBIT	10,00,000
Overall capitalisation rate = 12.5%	
$\therefore$ Market Value of the firm $= \frac{EBIT}{K}$	
$= \frac{10,00,000}{12.5\%}$	
Value of Debt	80,00,000
$\therefore$ Value of Equity	30,00,000
	50,00,000

Equity Capitalisation Rate $= K_e = \frac{EBIT - I}{V - D} \times 100$

$$= \frac{10,00,000 - 3,00,000}{80,00,000 - 30,00,000} \times 100$$

$$= \frac{7,00,000}{50,00,000} \times 100$$

$$= 14\%$$

Illustration 11:

'Y' Ltd has an EBIT of Rs. 30,00,000. Its cost of debt is 12.5% and the outstanding debt is Rs. 40,00,000. The overall capitalisation rate is 15%. The company decides to raise a sum of Rs. 10,00,000 through issue of equity shares and use the proceeds to redeem the debt. You are required to calculate the total value of the firm and equity capitalisation rate.

Solution:

(a)

Statement showing the value of the firm

	(Rs.)
EBIT	30,00,000
Overall capitalisation Rate = 15%	
$\therefore$ Market Value of the firm = $\frac{30,00,000}{15\%}$	2,00,00,000
Value of Debt	30,00,000
$\therefore$ Market Value of Equity	1,70,00,000

(b) Equity Capitalisation Rate $= \frac{EBIT - I}{V - D} \times 100$

$$= \frac{30,00,000 - 3,75,000}{2,00,00,000 - 30,00,000} \times 100$$

$$= \frac{26,25,000}{1,70,00,000} \times 100$$

$$= 15.44\%$$

6.7.3 MODIGILIANI-MILLER APPROACH (MM):

Modigiliani – Miller approach provides behavioural justification for constant overall cost of capital and total value of the firm. It does not provide operational justification for irrelevance of the capital structure in the valuation of the firm. According to this approach the value of a firm is independent of its capital structure. MM approach maintains that the average cost of capital does not change with change in the debt-weighted equity mix or capital structure of the firm.

The three basic propositions of the MM approach are as follows:

1) The overall cost of capital (K) and the value of the firm (V) are independent of the capital structure. In other words 'K' and 'V' are constant for all levels of debt–equity mix. The total market value of the firm is given by capitalising the expected net operating income (NOI) by the rate appropriate for that risk class.

2) The cost of equity (K_e) is equal to capitalisation rate of a pure equity stream plus a premium for the financial risk. The financial risk increases with more debt content in the capital structure. Thus, (K_e) increases in a manner to offset exactly the use of a less expensive source of funds represented by debt.

3) The cut-off rate of investment purposes is completely independent of the way in which an investment is financed.

MM approach is based on the following assumptions:

1) Capital markets are perfect. This means investors are rational and are well informed.
2) All the firms within the same risk class will have the same degree of business risk.
3) All investors have the same expectation of a firm's net operating income with which to evaluate the value of any firm.

According to MM approach the total investment value of a firm depends upon its underlying profitability and risk. The operational justification of MM approach can be explained through

the functioning of the arbitrage process. Arbitrage refers to buying asset or security at lower price in one market and selling it at a higher price in another market. As a result equilibrium is attained in different markets. For example, there are two identical firms. One has debt in its capital structure and other is not having the debt. Investor of the firm whose value is higher will sell their shares and buy the shares of the firm whose value is lower. They will be able to earn the same return at lower outlay with the same perceived risk or lower risk. They would, therefore, be better off. The value of the leveraged firm can neither be greater nor lower than that of an unleaveraged firm. Thus, there is neither advantage nor disadvantage in using debt in the firm's capital structure.

Illustration 12:

Two firms A and B are identical in all respect except the firm A has 10% Debentures of Rs. 5, 00,000. Both the firms have the same earnings before interest and tax accounting to Rs. 1, 00,000. The equity capitalisation rate of firm A is 16% and that of B is 12.5%. You are required to calculate the total market value of each of the firms.

Solution:

Statement showing the total value of the firms

Particulars	A (Rs.)	B (Rs.)
Earnings before Interest + Taxes	1,00,000	1,00,000
Less: Interest	50,000	–
Earning available to Equity Shareholders	50,000	1,00,000
Equity Capitalisation Rate	16%	12.5%
∴ Total Market value of Equity	3,12,500	8,00,000
$\left(\frac{50,000}{16\%}\right), \left(\frac{1,00,000}{12.5\%}\right)$		
Total value of firms:		
Equity + Debt	8,12,500	8,00,000
Overall cost of capital	$\frac{1,00,000}{8,12,500} \times 100$	$\frac{1,00,000}{8,00,000} \times 100$
	= 12.30%	12.5%

Illustration 13:

The two companies X Ltd and Y Ltd are having same earnings before interest and taxes of Rs. 2,00,000. Y Ltd is levered company having a debt of Rs. 10,00,000 @ 9% rate of interest. The

cost of equity of X Ltd is 10% and that of Y Ltd is 11.50%. You are required to calculate the total value of each company.

Solution:

Statement sharing the total value of firms

Particulars	X (Rs.)	Y (Rs.)
Earnings before Interest & Taxes	2,00,000	2,00,000
Less: Interest	–	90,000
Earning available to Equity shareholders	2,00,000	1,10,000
Equity capitalisation Rate	10%	11.50%
∴ Market value of Equity	20,00,000	9,56,522
Market value of Debt	–	10,00,000
Total market value	20,00,000	19,56,522
Overall cost of capital	$\frac{2,00,000}{20,00,000} \times 100$	$\frac{2,00,000}{19,56,522} \times 100$
	= 10%	= 10.22%

6.7.4 TRADITIONAL APPROACH:

Traditional approach favors that as a result of financial leverage up to a certain level cost of capital comes down and value of the firm increases. However, beyond that level reserve trend emerges. Thus, the essence of the traditional approach lies in the fact that a firm through judicious use of debt-equity mix can increase its total value and thereby reduce its overall cost of capital. It is because debt is a cheaper source of funds as compared to raising money through shares because of tax advantage. However, raising debt beyond a certain point may become a financial risk and would result in higher equity capitalisation rate.

The principal implication of traditional approach is that the cost of capital is independent on the capital structure and there is an optimal capital structure which minimises cost of capital. At the optimal capital structure the real marginal cost of debt and equity is the same. Before the optimal point the real marginal cost of debt is less than real marginal cost of debt is more than the real marginal cost of equity and beyond this point the real marginal cost of debt is more than the real marginal cost equity. Therefore, the firm should strive to reach the optimal capital structure and its total valuation through a judicious use of the debt and equity capital in the capital structure. At the optimal capital structure the overall cost of capital will be minimum and the value of the firm is maximum.

Illustration 14:

In considering the most desirable capital structure for a company the following estimates of the cost of debt and equity capital (after tax) has been made at various levels of debt–equity mix.

Debt as a percentage of total capital Employed	Cost of Debt (%)	Cost of Equity (%)
00	5.0	12.0
10	5.0	12.0
20	5.0	12.5
30	5.5	13.0
40	6.0	14.0
50	6.5	16.0
60	7.0	20.0

You are required to determine the optimal debt equity mix for the company by calculating composite cost of capital.

Solution:

Composite Cost of Capital

Debt as a percentage of total capital employed	Cost of Debt (%)	Cost of Equity (%)	Composite Cost of Capital
00	5.0	12.0	$5 \times 0 + 12 \times 1 = 12.00$
10	5.0	12.0	$5 \times .10 + 12 \times 0.9 = 11.30$
20	5.0	12.5	$5 \times .20 + 12 \times 0.8 = 11.00$
30	5.5	13.0	$5 \times .30 + 12 \times 0.07 = 10.75$
40	6.0	14.0	$5 \times 0.40 + 12 \times .6 = 10.80$
50	6.5	16.0	$5 \times 0.50 + 12 \times 0.5 = 11.25$
60	7.0	20.0	$5 \times 0.6 + 12 \times 0.4 = 12.20$

Optimal debt-equity mix is 30% and 70% i.e. 30%. Debt and 70% Equity, where the composite cost of capital is 10.75% which is the minimum.

6.8 EXERCISES:

1) State whether the following statements are True or False:
   a) The optimum capital structure is obtained when the market value per equity share is the maximum.
   b) The traditional approach is a mid way approach between net income approach and net operating income approach.
   c) The value of a levered firm is higher than that of an unlevered firm on account of corporate taxes.
   d) According to MM approach, the value of a firm is affected by the debt-equity mix.
   (Ans.: (a) True, (b) True, (c) True, (d) False)

2) Choose the right answer from the following:
   a) When establishing their optimal capital structure firms should strive to:
      i) minimise the weighted average cost of capital.
      ii) minimise the amount of debt financing.
      iii) maximise the marginal cost of capital.

   b) A highly leveraged firm is _____ risky than its peers.
      i) less ii) more iii) not

   c) An advantage of debt financing is _____
      i) interest payments are tax deductible.
      ii) lowers the cost of capital.
      iii) does not dilute owner's earnings.
      iv) all the above.

   d) An EBIT – EPS indifference analysis chart is used for:
      i) Evaluating the effects of business risk on EPS.
      ii) Examining EPS results for alternative financing plans of varying EBIT analysis.
      iii) Determining the impact of a change in sales on EBIT.
      (Ans.: (a)- i, (b)- ii, (c)-iv, (d)- ii)

3) What is capital structure? What is optimum capital structure?

4) Write short Notes on:
   a) Weighted Average Cost of Capital.
   b) Marginal Cost of Capital
   c) M.M.Approach.
   d) Traditional Approach.

5) A Ltd provides you the following figures

	Rs.
Profit	13,00,000
Less: Int on Debentures @ 12%	3,00,000
Profit before tax	10,00,000
Less: Income tax @ 35%	3,50,000
Profit after tax	6,50,000
Number of Equity Shares (Rs. 10 each)	2,00,000
Earning Per Share (EPS)	3.25
Ruling Price in the Market	25
Price/Earning Ratio	10

The company has undistributed reserve of Rs. 3,00,000. The company needs Rs. 10,00,000 for expansion. This amount will earn the same rate as funds already employed. You are further informed that a debt-equity ratio higher than 35% pulls the PE ratio down to 8 and raises the interest rate on additional amount borrowed at 14%. You are required to ascertain the probable price of the share if:

i) The additional funds are raised as loans.
ii) The additional funds are raised by issuing equity shares.

6) E Ltd is considering three financing options. The key information is as follows:

a) Total Investment is to be raised Rs. 2,00,000.

b) Plans of financing.

Plan	Equity	Debt	Preference Shares
A	100%	–	–
B	50%	50%	–
C	50%	–	50%

c) Cost of Debenture is 8% and cost of preference shares is 10%

d) Tax rate is 35%

e) Equity Shares of face value of Rs. 10 each will be issued at a premium of Rs. 10 per share.

f) Expected EBIT will be Rs. 80,000. You are required to determine for each plan:

i) Earning per share

ii) The financial break-even point.

iii) Compute the EBIT range among the plans of indifference.

7) From the following data find out the value of each firm as per the Modigiliani–Miller Approach:

Firms	A	B	C
EBIT	12,00,000	12,00,000	12,00,000
Number of Shares	3,00,000	2,50,000	2,00,000
12% Debentures	–	7,50,000	8,00,000

Each firm expects 12% return on investment.

8) From the following data, determine the value of the firm 'X' and 'Y' belonging to the homogeneous risk class under (a) the NI approach and (b) the NOI approach.

	Levered firm X	Unlevered firm Y
EBIT	2,00,000	2,00,000
Interest @ 10%	50,000	–
Equity Capitalisation rate	15%	–
Corporate tax rate	35%	–

Which of the two firms has an optimal capital structure under the a) NI approach and b) NOI approach.

9) Determine the optimal capital structure of Z Ltd from the following information supplied to you assuming 35% tax rate:

(Kd) Cost of Debt	(Ke) Cost of Equity	Proportion of Debt in the Capital Structure
8.0	10.0	0.00
8.0	10.0	0.10
8.6	11.0	0.20
9.0	12.0	0.30
10.0	13.0	0.40
12.0	15.0	0.50
15.0	18.0	0.60

10) The values of two firms X and Y in accordance with the traditional theory are given below:

	X (Rs.)	Y (Rs.)
Expected operating income(X)	5,00,000	5,00,000
Cost of Debt(Kd)	–	1,00,000
Net Income	5,00,000	4,00,000
Cost of Equity (Ke)	0.10	0.12
Market Value of Shares (s)	50,00,000	36,00,000
Market Value of Debenture (D)	–	20,00,000
Total Value of the firm	50,00,000	56,00,000
Average cost of capital (Ke)	0.10	0.09
Debt-Equity Ratio	0	0.56

Compute the values of the firms X and Y as per the MM Approach. Assume that corporate income-tax does not exist and the equilibrium value of Ko is 12.5%.

Unit-7

LEVERAGES

Unit Structure :

7.0 OBJECTIVES

After studying the unit the students will:

- The meaning of leverage
- Business risk & financial risk
- Sources of financing
- Types of leverages
- Importance of leverages

7.1 INTRODUCTION:

A company can raise funds required for investment either by increasing the owners' claims or creditors' claims. The claims of the owners increase when a company raises funds by issuing equity shares. The claims of the creditors increase when the funds are raised by borrowings. Thus, the various means used to raise the funds represent the capital structure of the company. The capital structure decision is of great importance for the management because it influences the debt-equity mix of the company which affects the shareholders' return and risk. If the borrowed funds are more in the capital structure of a company, it results in an increase in shareholders' earnings together with increase in their risk. It is because the cost of borrowed funds is less than that of the shareholders'. The costs on account of borrowed funds are allowable as a deduction for income-tax purpose. However, the borrowed funds carry a fixed rate of interest which has to be paid whether the company is earning profit or not. Thus, the risk of the shareholders increases in case there are a high proportion of borrowed funds in the total capital of a company. If the proportion of

the shareholders' funds is more than the proportion of the borrowed capital, the return as well as the risk of the shareholders will be less. The effect of financing or debt-equity mix on the shareholder's earnings and risk can be examined by using the concept of leverage.

7.2 MEANING OF LEVERAGE:

The term leverage refers to a relationship between two interrelated variables. It represents the influence of one financial variable over some other related financial variable. Leverage is used to describe the firm's ability to use fixed cost assets or funds to magnify the return to its owners.

James Horne defined Leverage as "the employment of an asset or funds for which the firm pays a fixed cost or fixed return." Leverage results when a firm employs an asset or source of funds which has a fixed cost. There will be no leverage, if a firm is not required to pay a fixed cost. The fixed cost or return has to be paid or incurred irrespective of the volume of output or sales, the size of such cost or return has considerable influence on the amount of profits available for the shareholders. When the volume of sales changes leverage helps in quantifying such influence. Thus, leverage can be defined as "relative change in profits due to a change in sales." A high degree of leverage means large change in profits due to a relatively small change in sales. Thus, higher the leverage, higher is the risk and higher is the expected return.

7.3 TYPES OF LEVERAGE:

There are three commonly used measures of leverage in financial analysis. These are as follows:

7.3.1 OPERATING LEVERAGE:

The operating leverage is defined as the employment of an asset with a fixed cost in the hope that sufficient revenue may be generated to cover all the fixed and variable costs. It can also be defined as "the tendency of the operating profit to vary disproportionately with sales." It exists when the firm has to pay fixed cost regardless of volume of output or sales. Thus, operating leverage is a function of three factors:

i) Fixed amount of cost.
ii) Variable contribution margin.
iii) Volume of sales.

The operating leverage can be calculated by using the following formula:

$$\text{Operating leverage} = \frac{\text{Contribution}}{\text{Operating profit}}$$

$$= \frac{C}{EBIT}$$

Contribution = Sales - Variable Cost.

Operating profit means Earnings before Interest and Taxes (EBIT).

Operating leverage is the ratio of net operating income before fixed charges to net operating income after fixed charges.

Degree of Operating Leverage:

The degree of operating leverage may be defined as a percentage change in the profits resulting from a percentage change in the sales. It can be put in the form of a formula as follows:

$$DOL = \frac{\text{Percentage change in net operating income}}{\text{Percentage change in sales}}$$

Operating leverage is directly proportional to business risk. It indicates the impact of change in sales on operating income. If a firm has a high degree of operating leverage a small change in sales will have a large effect on operating income. The operating profits of such a firm will increase at a faster rate than the increase in sales. Similarly, the operating profits of such a firm will suffer a greater loss as compared to reduction in its sales. Generally, the firms should not operate under conditions of a high degree of operating leverage because it is a very risky situation where a small decline in sales will affect its profits.

Illustration 1:

A company produces and sells 10,000 calculators. The selling price per calculator is Rs. 500. Variable cost per calculator is Rs. 200 and fixed operating cost is Rs. 20, 00,000. You are required to calculate:

a) Operating leverage.
b) If sales are up by 10%, what is its impact on EBIT?

Solution:

a) Statement of Profitability:

	Rs.
Sales Revenue (10,000 × 500)	50,00,000
Variable cost (10,000 × 200)	20,00,000
Contribution	30,00,000
Fixed cost	20,00,000
EBIT (Profit)	10,00,000

$$\therefore \text{Operating leverage}(\text{OL}) = \frac{\text{Contribution}}{\text{EBIT}}$$

$$= \frac{30,00,000}{10,00,000} = 3 \text{ Times}$$

b) If sales are up by 10%:

$$\text{OL} = \frac{\%\Delta \text{ in EBIT}}{\%\Delta \text{ in sales}}$$

$$\therefore \ 3 = \frac{X}{10}$$

$$\therefore \ X = 30\%$$

Thus, if sales are up by 10% the EBIT will increase by 30% (10 x 3) which is checked as follows:

	(Rs.)
Revised Sales	55,00,000
Less: Variable cost 40%	22,00,000
Contribution	33,00,000
Less: Fixed cost	20,00,000
EBIT	13,00,000

$$\therefore \text{Increase in EBIT} = \frac{3,00,000}{10,00,000} \times 100$$

7.3.2 FINANCIAL LEVERAGE:

The financial leverage can be defined as "the tendency of the residual net income to vary disproportionately with operating profit. It may also be defined as the use of funds with a fixed cost in order to increase earnings per share of the company." The financial leverage indicates the change that takes place in the taxable income as a result of change in the operating income. It signifies the existence of fixed interest bearing securities in the capital structure of the company. Financial leverage induces the use of funds obtained at a fixed cost in the hope of increasing the return to he equity shareholders. The financial leverage can be computed using the following formula:

$$\text{Financial leverage} = \frac{\text{EBIT}}{\text{EBT}}$$

Where, EBIT is the Earnings before Interest and Taxes.

EBT is the Earnings before Tax.

Degree of Financial Leverage (DFL) is the ratio of the percentage change in earning before tax to the percentage increase in operating profit i.e. EBIT. This can be put in the following formula:

$$DFL = \frac{\text{Percentage change in taxable income}}{\text{Percentage change in the operating income}}$$

According to Gitman, "financial leverage is the ability of a firm to use fixed financial charges to magnify the effects of changes in EBIT on the company's earning per share." Thus, the financial leverage indicates the percentage change in earning per share in relation to a percentage change in EBIT. Accordingly, the degree of financial leverage can be calculated as per the following formula:

$$DFL = \frac{\text{Percentage change in EPS}}{\text{Percentage change EBIT}}$$

There will be no financial leverage if the result of the above equation is less than 1.

Financial leverage is also termed as 'Trading on Equity'. The concept of trading on equity states that the company uses equity capital as well as borrowed capital while deciding its capital structure. The objective of the term trading on equity is to provide a higher return to the shareholders of the company. However, trading on equity should be used for the term financial leverage only when the financial leverage is favourable. The financial leverage has potentiality of increasing the return to equity shareholders but at the same time it cerates additional risk for the shareholders also.

Illustration 2:

Z Ltd. has given the following details:

	Rs.
Sales	48,00,000
Variable cost	24,00,000
Fixed cost	12,00,000

It has borrowed Rs. 10,00,000 @ 15% p.a. and its equity share capital is Rs.10,00,000

You are required to calculate:

a) Operating leverage.
b) Financial leverage.

Solution:

a) Income Statement:

	Rs.
Sales	48,00,000
Less: Variable cost	24,00,000
Contribution	24,00,000
Less: Fixed cost	12,00,000
EBIT	12,00,000
Less: Interest	1,50,000
EBT	10,50,000

$$\therefore \text{Operating leverage}(\text{OL}) = \frac{\text{Contribution}}{\text{EBIT}}$$
$$= \frac{24,00,000}{12,00,000}$$
$$= 2 \text{ Times}$$

b) $$\text{Financial leverage} = \frac{\text{EBIT}}{\text{EBT}}$$
$$= \frac{12,00,000}{10,50,000}$$
$$= 1.14 \; Times$$

7.3.3 COMBINED LEVERAGE:

Combined leverage expresses the relationship between revenue on account of sales and the taxable income. It may be defined as "the potential use of fixed costs, both operating and financial which magnifies the effect of sales volume on the earnings per share of a company." Thus, degree of combined leverage is the ratio of percentage change in earning per share to the percentage change in sales. It indicates the effect of the change in sales on earning per share.

Operating leverage and financial leverage are closely concerned with the firm's capacity to meet its fixed costs, both operating and financial. If both the leverages are combined, the result obtained will disclose the effect of change in sales over change in taxable profit. Combined leverage can also be called as composite leverage. It helps to find out the resulting change in taxable income due to change in sales. The following formula can be used to find out combined leverage:

Combined leverage = Operating Leverage x Financial Leverage =

$$= \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$
$$= \frac{\text{Contribution}}{\text{EBT}}$$

The degree of combined leverage can also be calculated as follows:

$$\text{DCL} = \frac{\text{Percentage change in EPS}}{\text{Percentage change in sales}}$$

Degree of combined leverage indicates the effect of change in sales on the earning per share.

Illustration 3:

The Income Statement of CRL Ltd. is given below: You are required to calculate

a) Operating leverage,
b) Financial leverage, and
c) Combined leverage.

Income Statement for the year ended 31-12-2008

	Rs.
Sales	21,00,000
Variable cost	15,00,000
Fixed cost	1,00,000
Interest	1,40,000
Tax rate	33%

Solution:

Income Statement for the year ended 31-12-2008

	Rs.
Sales	21,00,000
Less: Variable cost	15,00,000
Contribution	6,00,000
Less: Fixed cost	1,00,000
EBIT	5,00,000

Less: Interest	1,40,000
EBT	3,60,000
Less: Tax	1,20,000
EAT (PAT)	2,40,000

a) Operating Leverage $= \frac{\text{Contribution}}{\text{EBT}}$

$= \frac{6,00,000}{5,00,000}$

$= 1.2 \text{ Times}$

b) Financial Leverage = $\frac{\text{EBIT}}{\text{EBT}}$

$= \frac{5,00,000}{3,60,000}$

$= 1.39 \text{ Times}$

c) Combined Leverage $= \text{OL} \times \text{FL} = \frac{\text{Contribution}}{\text{EBT}}$

$= 1.2 \times 1.39 = \frac{6,00,000}{3,60,000}$

$= 1.67$

7.4 SIGNIFICANCE OF LEVERAGE:

Leverages are the tools used by the financial experts to measure the return to the owners. The financial leverage is considered to be superior of these tools. Financial leverage focuses the attention on the market price of the share. The management of a company always tries to increase the market price of the shares by increasing the net worth of the company. Therefore, the management resorts to trading on equity in order to increase EBIT and then the corresponding increase in the price of the equity shares.

A company has to keep the balance between the two leverages because they have got tremendous effect on EBIT and EPS. A right combination between the two leverages is a very big challenge for the company managements. A proper combination of both operating and financial leverages is a blessing for the company's growth. However, an improper combination may prove to be a curse. Financial or operating leverages exist only when the result of the calculation is more than one.

A high degree of operating leverage together with a high degree of financial leverage makes the position of the company very risky. In this case, a company employs excessively assets for which it has to pay fixed costs and at the same time it uses a large amount of debt capital. The fixed costs for using assets and fixed interest charges bring a greater risk to the company. If the earnings fail, the company may not be in a position to meet its fixed costs. Greater fluctuations in earnings are likely to occur on account of the existence of a high degree of operating leverage. The existence of high degree of operating leverage will result in a more than proportionate change in operating profits even on account of small change in sales. The presence of a high degree of financial leverage causes more than proportionate changes in EPS even on account of a small change in EBIT. Thus, a company having a high degree of financial leverage and a high degree of operating leverage has to face the problems of inadequate liquidity or even insolvency in one or the other way. However, lower leverages indicate the cautious policy of the management but the firm may be losing many profit-earning opportunities. Therefore, a company should make all possible efforts to combine the operating and financial leverage in a way that suits the risk-bearing capacity of the company. Thus, a company with high operating leverage should have low financial leverage so that the combined leverage may be ideal. Similarly, a company having a low operating leverage will stand to gain by having a high financial leverage provided it has enough profitable opportunities for the employment of borrowed funds. Low operating leverage and a low financial leverage is considered to be an ideal situation for the maximization of the profits with minimum of risk.

7.5 SOLVED PROBLEMS

Illustration 4:

'B' Ltd. has the following balance sheet and income statement:

Balance Sheet as on 31-3-2009

Liabilities	Rs.	Assets	Rs.
Equity Share Capital (Rs. 10 each)	10,00,000	Fixed Assets (net)	20,00,000
Retained Earnings	8,00,000	Current Assets	18,00,000
10% Debentures	10,00,000		
Current liabilities	10,00,000		
	38,00,000		38,00,000

Income statement for the year ended 31-3-2009

	Rs.
Sales	6,80,000
Less: Operating Expenses (including Rs. 60,000 as Depreciation)	2,40,000
EBIT	4,40,000
Less: Interest	1,00,000
EBT	3,40,000
Less: Taxes @ 30%	1,02,000
EAT	2,38,000

Required:

a) Determine the degree of operating, financial and combined leverages at the current sales level, if all operating expenses other than depreciation are variable costs.

b) If total assets remain at the same level, but sales:
   i) increase by 20 per cent and
   ii) decrease by 20 per cent.
   iii) What will be the earnings per share at the new sales levels?

Solution:

a)

Income Statement

	Rs.
Sales	6,80,000
Less: Variable cost	1,80,000
Contribution	5,00,000
Less: Fixed cost	60,000
EBIT	4,40,000
Less: Interest	1,00,000
EBT	3,40,000
Less: Tax @ 30%	1,02,000
PAT	2,38,000

i) Operating leverage $= \frac{\text{Contribution}}{\text{EBIT}}$

$= \frac{5,00,000}{4,40,000}$

$= 1.14 \text{ Times}$

ii) Financial leverage $= \frac{\text{EBIT}}{\text{EBT}}$

$= \frac{4,40,000}{3,40,000}$

$= 1.29 \text{ Times}$

iii) Combined leverage = OL x FL

= 1.14 x 1.29

= 1.47

Alternatively (CL) $= \frac{\text{C}}{\text{EBT}}$

$= \frac{5,00,000}{3,40,000}$

$= 1.47 \text{ Times}$

b) Earning per share at the new sales level:

	Sales increase by 20% (Rs.)	Sales decrease by 20% (Rs.)
Sales level	8,16,000	5,44,000
Less: Variable Cost (26.47%)	2,15,995	1,43,997
Contribution	6,00,005	4,00,003
Less: Fixed Cost	60,000	60,000
EBIT	5,40,005	3,40,003
Less: Interest	1,00,000	1,00,000
WBT	4,40,005	2,40,003
Less: Tax	1,32,000	72,000
PAT/EAT	3,08,005	1,68,003
Number of Equity Shares	1,00,000	1,00,000
Earning per share (EPS) Rs.	3.08	1.68

Illustration 5:

Calculate the Operating Leverage, Financial Leverage and Combined Leverage from the following data under situation I and II and Financial Plan A and B:

Installed Capacity	4800 units	
Actual production and sales	75% of the capacity	
Selling price	Rs. 30 per unit	
Variable cost	Rs. 15 per unit	
Fixed cost		
Under situation I	Rs. 25,000	
Under situation II	Rs. 30,000	
Capital Structure	**Financial Plan**	
	A (Rs.)	**B (Rs.)**
Equity	1,00,000	1,50,000
Debt @ 15%	1,00,000	50,000
	2,00,000	2,00,000

Solution:

a) Income statement:

	Situation I		**Situation II**	
Sales (3600 × 30)	1,08,000		1,08,000	
Less: Variable Cost (3600 × 15)	54,000		54,000	
Contribution	54,000		54,000	
Less: Fixed Cost	25,000		30,000	
Operating Profit (EBIT)	29,000		24,000	
	A	**B**	**A**	**B**
Less: Interest	15,000	7,500	15,000	7,500
EBT	14,000	21,500	9,000	16,500

	Situation I		**Situation II**	
(a) Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}}$	$\frac{54,000}{29,000}$		$\frac{54,000}{24,000}$	
	= 1.86 Times		2.25 Times	
	A	**B**	**A**	**B**
(b) Financial Leverage = $\frac{\text{EBIT}}{\text{EBT}}$	= $\frac{29,000}{14,000}$	$\frac{29,000}{21,500}$	= $\frac{24,000}{9,000}$	$\frac{24,000}{16,500}$
	= 2.07	1.35	2.67	1.45
(c) Combined Leverage:				
Situation I = (OL × FL)	1.86 × 2.07		1.86 × 1.35	
	= 3.85		= 2.51	
Situation II = OL × FL	2.25 × 2.67		2.25 × 1.45	
	= 6.00		= 3.26	

Comments: Operating leverage under situation II is higher than situation I. Financial leverage of plan A is higher than Situation II. Combined leverage of Plan A is also higher in situation I. Hence, the financial leverage is higher than operating leverage. Financial plan A is riskier in both the situations.

Illustration 6:

The capital structure of Prakash Industries Ltd. consists of an ordinary share capital of Rs. 10 lakhs (Rs. 10 each) and Rs. 10 lakh of 10% Debentures. Sales increased by 20% from 1,00,000 units to 1,20,000 units. The selling price is Rs. 10 per unit, variable cost amounts to Rs. 6 per unit and fixed expenses amount to Rs. 2,00,000. The income tax rate is 30%. You are required to calculate the following:

i) The degree of operating leverage.
ii) The degree of financial leverage.
iii) The percentage increase in earning per share at 1,00,000 units and 1,20,000 units.

You are also required to comment on the behaviour of operating and financial leverages in relation to increase in production from 1,00,000 units to 1,20,000 units.

Solution:

Income Statement

	1,00,000 units Rs.	1,20,000 units Rs.
Sales	10,00,000	12,00,000
Less: Variable Cost	6,00,000	7,20,000
Contribution	4,00,000	4,80,000
Less: Fixed Expenses	2,00,000	2,00,000
EBIT	2,00,000	2,80,000
Less: Interest	1,00,000	1,00,000
EBT	1,00,000	1,80,000
Less: Tax @ 30%	30,000	54,000
PAT	70,000	1,26,000
Number of Equity Shares	1,00,000	1,00,000
EPS	0.70	1.26

% increase in EPS = 1.26 – 0.70 = 0.56

$$\therefore \frac{0.53}{0.70} \times 100 = 80\%$$

$$\text{Operating leverage} = \frac{4,00,000}{2,00,000} = \frac{4,80,000}{2,80,000}$$
$$= 2\ Times \quad = 1.71\ Times$$
$$\text{Financial leverage} = \frac{2,00,000}{1,00,000} = \frac{2,80,000}{1,80,000}$$
$$= 2\ Times \quad = 1.56\ Times$$

Comments: On account of increase in sales from 1 lakh units to 1,20,000 units, the EPS has increased by 80%. While the operating leverage has come down from 2 times to 1.71 times and financial leverage has also declined from 2 times to 1.56 times. There is a significant decrease in both the business risk and the financial risk of the company on account of reduction in both the leverages.

Illustration 7:
A firm has sales of Rs. 75 lakhs, variable cost of Rs. 42 lakhs and Fixed cost of Rs. 6 lakhs. It has a debt of Rs. 45 lakhs @ 9% and equity of Rs. 55 lakhs.

i) What is the firms's ROI?
ii) Does it have favourable financial leverage?
iii) If the firm belongs to an industry whose asset turnover is 3, does it have a high or low asset leverage?
iv) What are the operating, financial and combined leverages of the firm?
v) If the sales drop of Rs. 50 lakhs, what will be the EBIT?
vi) At what level of EBT of the firm will be equal to zero?

Solution:

Income Statement

	Rs. Lakhs
Sales	75.00
Less: Variable cost	42.00
Contribution	33.00
Less: Fixed cost	6.00
EBIT	27.00
Less: Interest @ 9%	4.05
EBT	22.95

1) Return of Investment (ROI) $= \frac{\text{EBIT}}{\text{Capital Employed}} \times 100$
$= \frac{27,00,000}{1,00,00,000} \times 100$
$= 27\%$

2) The return on investment at 27 % is higher than the interest payable on debt at 9%. Thus, the firm has a favourable financial leverage.

3) Assets Turnover $= \dfrac{\text{Net Sales}}{\text{Total Sales}}$

$= \dfrac{75,00,000}{1,00,00,000}$

$= 0.75$

The industry average is 3. Hence, the firm has a low asset average.

4) (i) Operating Leverage $= \dfrac{\text{Contribution}}{\text{EBIT}}$

$= \dfrac{33,00,000}{27,00,000}$

$= 1.22 \text{ Times}$

ii) Financial Leverage $= \dfrac{\text{EBIT}}{\text{EBT}}$

$= \dfrac{27,00,000}{22,95,000}$

$= 1.1764 \text{ Times}$

iii) Combined Leverage $= \dfrac{\text{Contribution}}{\text{EBT}}$

$= \dfrac{33,00,000}{22,95,000}$

$= 1.438 \text{ Times}$

5) If the sales drop to Rs. 50 lakhs, from Rs. 75 lakhs, the fall is by 33.33%. Hence, the EBIT will drop by 40.66 % (33.33 □ 1.22). Hence, the new EBIT will be Rs. 27,00,000 $\left(\dfrac{100 - 40.66}{100}\%\right) =$ Rs. 16,02,180.

6) EBT to become zero means 100% reduction in EBT. The combined leverage is 1.438. Hence, sales have to drop by 100/1.438 i.e. 69.54%. The new sales will be Rs. 75,00,000 $\left(\dfrac{100 - 69.54}{100}\%\right) =$ Rs. 22,84,500.

Illustration 8:

Prepare income statements from the data given below for P, Q and R companies:

Particulars	Rs.		
	P	Q	R
Variable Cost as a percent of sales	50	60	70
Fixed cost as percent of sales	40	30	30
Interest	45,000	20,000	10,000
Degree of operating leverage	5:1	4:1	7:1
Degree of financial leverage	4:1	5:1	6:1
Income tax rate	50%	50%	50%

Compute net profit (after tax) rate for all the three companies. Offer your comments on the leverages and profitability position of all the three companies.

Solution:

Income Statement

	P Rs.	Q Rs.	R Rs.
Sales	6,00,000	2,50,000	2,80,000
Less: Variable Cost	3,00,000	1,50,000	1,96,000
Contribution	3,00,000	1,00,000	84,000
Less: Fixed Cost	2,40,000	75,000	72,000
EBIT	60,000	25,000	12,000
Less: Interest	45,000	20,000	10,000
EBT	15,000	5,000	2,000
Less: Tax @ 50%	7,500	2,500	1,000
PAT	7,500	2,500	1,000
PAT % of sales	1.25%	1 %	0.36%

Comments:

1) Leverage

Combined leverage:	5 x 4 = 20	4 x 5 = 20	7 x 6 = 42
	Very high	Very high	Very very high

2) Profitability: Good Satisfactory Poor

3) Working: Calculation of sales for 'P'

i) DFL $= \frac{\text{EBIT}}{\text{EBT}} = \frac{4}{1}$

Interest is Rs. 45,000

$\therefore$ EBIT – EBT = Rs. 45,000

$\therefore$ 4 EBT = EBIT

$\therefore$ 4 EBT – EBT = 45,000

$\therefore$ 3 EBT = 45,000

$\therefore \text{EBT} = \frac{45{,}000}{3} = Rs.15{,}000$

$\therefore$ EBIT = 15,000 x 4 = Rs. 60,000

ii) DOL $= \frac{\text{Contribution}}{\text{EBIT}}$

$= \frac{5}{1} = \frac{\text{Contribution}}{60{,}000}$

$\therefore \text{Contribution} = 5 \times 60{,}000$

$= 3{,}00{,}000$

iii) Variable cost as a percentage of sales = 50%

Contribution is Rs. 3,00,000

$\therefore$ Variable cost is also Rs. 3,00,000

$\therefore$ Sales = Rs. 6,00,000

Illustration 9:

From the following information available for four companies, calculate:

i) EBIT
ii) EPS
iii) Operating leverage
iv) Financial leverage

Particulars		P	Q	R	S
Sales price per unit	Rs.	15	20	25	30
Variable cost per unit	Rs.	10	15	20	25
Quantity	Nos.	20,000	25,000	30,000	40,000
Fixed costs	Rs.	30,000	40,000	50,000	60,000
Interest	Rs.	15,000	25,000	35,000	40,000
Tax rate	percent	40	40	40	40
No. of Equity Shares	Nos.	5000	9000	10,000	12,000

(ICU A/Inter Dec.1996)

Solution:

Income Statement

Particulars	P Rs.	Q Rs.	R Rs.	S Rs.
Sales	3,00,000	5,00,000	7,50,000	12,00,000
Less: Variable Cost	2,00,000	3,75,000	6,00,000	10,00,000
Contribution	1,00,000	1,25,000	1,50,000	2,00,000
Less: Fixed Cost	30,000	40,000	50,000	60,000
(i) EBIT	70,000	85,000	1,00,000	1,40,000
Less: Interest	15,000	25,000	35,000	40,000
EBT	55,000	60,000	65,000	1,00,000
Less: Tax @ 40%	22,000	24,000	26,000	40,000
PAT	33,000	36,000	39,000	60,000
Number of equity shares	5,000	9,000	10,000	12,000
(ii) EPS (Rs.)	6.60	4.00	3.90	5.00
(iii) Operating leverage = $\frac{\text{Contribution}}{\text{EBIT}}$	$\frac{1,00,000}{70,000}$	$\frac{1,25,000}{85,000}$	$\frac{1,50,000}{1,00,000}$	$\frac{2,00,000}{1,40,000}$
	= 1.42	1.47	1.5	1.43
(iv) Financial leverage = $\frac{\text{EBIT}}{\text{EBT}}$	$\frac{70,000}{55,000}$	$\frac{85,000}{60,000}$	$\frac{1,00,000}{65,000}$	$\frac{1,40,000}{1,00,000}$
	= 1.27	1.42	1.54	1.40

Illustration 10:

The Balance sheet of International Trade Ltd. as on 31st March, 2008 is as under:

Liabilities	Rs. (Lakhs)	Assets	Rs. (Lakhs)
Equity Share Capital (Rs. 10 per share)	90	Building	150
10% Long term debt	120	Machinery	75
Retained Earnings	30	Stock	50
Current Liabilities	60	Debtors	20
		Cash	5
Total	300	Total	300

The income assets turnover ratio of the company is 3, its fixed operating cost is 1/6 of sales and variable operating cost is 50% of sales. The corporate tax rate is 35%.

You are required to calculate:
a) The operating, financial and combined leverages.
b) The market price of the share if the P/E multiple is 2.5.
c) The level of EBIT if the EPS is (a) Rs. 15 and (b) Rs. 25.

Solution:

Workings:

1) Total assets turnover is 3.

$\therefore$ Total Assets Turnover $= \frac{\text{Net Sales}}{\text{Total assets}}$

$3 = \frac{\text{Net Sales}}{300\ lakhs}$

$\therefore$ Net Sales = 3 x 300
= Rs. 900 lakhs.

$\therefore$ Fixed operating cost = $\frac{1}{6} \times 900$ lakhs
= Rs. 150 lakhs

$\therefore$ Variable operating cost = 50 % of Net sales
= 50 % of 900 lakhs
= Rs. 450 lakhs

2)

Income Statement

	Rs. Lakhs
Sales	900
Less: Variable cost	450
$\therefore$ Contribution	450
Less: Fixed cost	150
EBIT	300
Less: Interest	12
EBT	288
Less: Taxes @ 35 %	101
PAT	187
No. of equity shares	9
$\therefore$ EPS	Rs. 20.78

a) i) Operating leverage $= \frac{\text{Contribution}}{\text{EBIT}}$

$= \frac{450}{300}$

$= 1.5\ Times$

ii) Financial leverage $= \frac{\text{EBIT}}{\text{EBT}}$

$= \frac{300}{288}$

$= 1.04\ Times$

iii) Combined leverage $= \frac{\text{Contribution}}{\text{EBT}}$

$= \frac{450}{288}$

$= 1.56\ Times\ (1.5 \times 1.04)$

b) Calculation of Market Price of the share

P/E Ratio $= \frac{\text{Market Price}}{EPS}$

$\therefore$ Market price= P/E Ratio x EPS

= 2.5 x 20.78

= Rs. 51.95

c) Calculation of the level of EBIT if the EPS is Rs. 15 and Rs. 25:

Income Statement for EPS:

EPS	Rs. 15	Rs. 25
$\therefore$ No. of shares	9 lakhs	9 lakhs
$\therefore$ PAT	135 lakhs	225 lakhs
Tax @ 35%	72.69	121.15
$\therefore$ PBT	207.69 lakhs	346.15 lakhs
Interest	12.00	12.00
$\therefore$ EBIT	216.69	358.15

7.7 EXERCISES:

1) Choose the right answer with your reasoning:

a) The _____ is the percentage change in operating income that results from a percentage change in sales:
   i) Degree of operating leverage
   ii) Degree of financial leverage
   iii) Degree of combined leverage

b) A highly leveraged firm is _____ risky than its peers.
   i) Less
   ii) More
   iii) Same

c) An advantage of Debt financing is _____.
   i) Lowers the cost of capital
   ii) Increases the cost of capital
   iii) Dilutes owners earnings

d) Combined leverage is the percentage change in relationship between sales and _____.
   i) Operating income
   ii) Operating leverage
   iii) Earning per share

e) If interest expenses for a firm rise, we know that the firm has taken on more _____.
   i) Financial leverage
   ii) Operating leverage
   iii) Combined leverage

2) Define operating leverage and financial leverage. How these leverages are measured?

3) What is combined leverage? Explain its significance in financial planning of a firm.

4) A firm has sales of Rs. 75 lakhs variable cost of Rs. 42 lakhs and fixed cost of Rs. 6 lakhs. It has a debt of Rs. 45 lakhs at 9% and equity of Rs. 55 lakhs.
   a) What is its ROI?
   b) Does it have favourable financial leverage?
   c) What are the operating, financial and combined leverages of the firm?
   d) If the sales drop to Rs. 50,00,000, what will be the new EBIT?

5) The Balance Sheet of a company is as under:

Balance sheet as on 31.12.2008

Liabilities	Rs.	Assets	Rs.
Equity Share Capital (Rs. 10 each)	6,00,000	Fixed Assets	15,00,000
10% Long term debt	8,00,000	Current Assets	5,00,000
Retained Earnings	2,00,000		
Current Liabilities	4,00,000		
	20,00,000		20,00,000

The company's total assets turnover is 3.00, its fixed operating costs are Rs. 10,00,000 and variable operating costs ratio is 40%. The income tax rate is 30%.

Calculate:

a) Operating, financial and combined leverages.

b) Determine the likely level of EBIT if EPS is (a) Rs. 10 (b) Rs. 30 and (c) Rs. zero.

6) Calculate the degree of operating leverage degree of financial leverage and degree of combined leverage for the following companies and interpret the results.

Particulars	X	Y	Z
Output (units)	3000	7500	5000
Fixed costs Rs.	3,50,000	7,00,000	75,000
Unit variable cost Rs.	100	75	10
Interest Expenses Rs.	25,000	50,000	Nil
Unit selling price Rs.	300	250	50

(7) Find out the financial leverage from the following:

Equity capital Rs.	20,00,000
Debt/Equity ratio	3:1
Interest Rate	12%
Operating profit Rs.	25,00,000

8) A and B are two companies competing with each other. Their revenue statements are given below:

	Rs. lakhs	
Particulars	**A**	**B**
Sales	500	500
– Variable cost	400	150
Contribution	100	350
– Fixed cost	25	250
EBIT	75	100
– Interest	50	50
EBT	25	50
– Tax	7.5	15
PAT	17.5	35
Pref. Dividend	–	5
Equity Dividend	5.0	20
Retained Earnings	12.5	15.00

With the help of leverages, comment on the business risks of the two companies.

9) The following particulars relate to X and Co. Ltd.

Particulars	**Rs.**
Sales	10,00,000
– Variable cost	4,00,000
Contribution	6,00,000
– Fixed cost	3,00,000
EBIT	3,00,000
– Interest	1,00,000
EBT	2,00,000
– Tax @ 35%	70,000
PAT	1,30,000
No. of Equity Shares	1,00,000
EPS	1.30

Using the concept of combined leverage, by what percentage will earnings per share increase, if sales increase by 10%? Verify your answer by calculating earnings per share.

10) From the following data prepare income statement of A, B and C companies.

Particulars	A	B	C
Financial leverage	3:1	4:1	2:1
Interest (Rs.)	2000	3000	10,000
Operating leverage	4:1	5:1	3:1
Variable cost as a % of sales	66	75	50
Income tax rate	30%	30%	30%

❖❖❖❖