158

M. Com. Part - II
Accountancy
Paper -III

Advanced Financial Mangement

(Revised Syllabus w.e.f Academic Year 2012-13)

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Revised Syllabus of M. Com. Part – II
Paper - III
Advanced Financial Management

Sr. No. Topics

1 Scope & objectives of financial management

Introduction
Meaning
Importance
Scope
Objectives
Profit v/s value maximization

2 Time value of money

The concept
Present value
Annuity
Techniques of discounting
Techniques of compounding

3 Financial analysis – Application of ratio analysis in financial decision making

Management analysis
Profitability Ratios : Gross Profit Ratio, Operating Profit Ratio, Return on Capital Employed.
Efficiency Ratios : Sales to Capital Employed, Sales to Fixed Assets , Profit to Fixed Assets, Stock Turnover Ratio, Debtors Turnover Ratio, Creditors Turnover Ratio
Liquidity Ratios: Current Ratio, Quick Ratio
Stability Ratio : Capital Gearing Ratio, Interest Coverage Ratio
Investors Analysis
Earning Per Share, P/E Ratio, Dividend Yield

Note: Problems should be on analysis and decision making with/without calculation of ratios.

4 Financial Decision

Cost of Capital

- Introduction
- Definition of Cost of Capital
- Measurement of Cost of Capital
- WACC
- Marginal Cost of Capital

Capital Structure Decisions

- Meaning
- Choice of Capital Structure
- Importance
- Optimal capital Structure
- EBIT-EPS Analysis
- Cost of Capital, Capital structure & Market Price of Share
- Capital Structure Theories
- Dividend Policy – Payout Ratio

Business Risk & Financial Risk

- Introduction
- Debt v/s Equity Financing
- Types of Leverage

Investment objective/ criteria for individuals /Non-business purpose

5 Types of Financing

Introduction

Needs of Finance & Sources : Long Term, Medium Term, Short Term

Long Term sources of Finance

- Owners Capital / Equity Capital
- Preference share capital
- Retained Earning
- Debentures or Bonds
- Loans from Financial Institutions / Banks

Short Term Sources of Finance

- Trade Credit
- Accrued Expenses & Defferred Income
- Advances From Customers
- Commercial Papers

Bank Advances :- Loans, O/D , Clean O/Ds, Cash Credit, Advances against goods, Bills Purchased, Discounted, Advances against documents of title of goods, Advances against supply of bills, Term Loans

Inter Corporate Deposits

Certificate of Deposits

Public Deposits

6 Investment Decisions

Introduction

Purpose of Capital Budgeting

Capital Budgeting Process

Types of Capital Investment Decisions

Project Cash Flows and Net profit Approval

Basic Principle of Measuring Project Cash Flows

Increment principle, Long Term Funds Principle, Exclusion of Financial Cost Principle, Post Tax Principle.

Probability technique for measurement of cash flow.

Capital Budgeting Techniques (Only Time adjusted / discounted cash flows)

Net present value, PI, IRR, Discounted pay back

Capital Rationing

(Note: Problems on computation of cash flow, ranking of projects on various techniques, selection & analysis with/without capital rationing. Comparison of IRR with Required rate of return i.e. cut off rate, IRR & mutually exclusive projects with unequal lives, multiple IRR.)

7 Management of Working Capital

Meanings, Concepts & policies of working capital

Meaning & Concept

Management of working capital

Issues in working capital

Estimating working capital needs (only Theory)

Operating or working capital cycle (only Theory)

Cash Management

Management of Inventory

Management of Receivables

Financing of Working Capital

PATTERN OF QUESTION PAPER

Maximum Marks 100 **Duration 3 Hours**

No of questions to be asked	9
No of questions to be answered	6
Question No.01 Compulsory Practical question	20 Marks
Question No.02 Compulsory Objective	16 Marks
Question No. 03 to Question No. 09 (Any 4)	16 Marks each

Notes:-

(1) From Question No. 03 to Question No.09 not more than one question may be theory including short problems/questions

(2) Student to answer any four out of Question No. 03 to Question No.09

(3) Objective questions to be based on all topics and include Inter alia questions like :-

(a) Multiple choice (b) Fill in the blanks (c) Match the columns (d) True or False

1

NATURE AND SCOPE OF FIANCIAL MANAGEMENT

Unit Structure :

1.0 Objectives
1.1 Introduction
1.2 Meaning and Definition of Financial Management
1.3 Scope of Financial Management
1.4 Importance of Financial Management in Business
1.5 Qualities of a Successful Finance Manager
1.6 Functions of Financial Controller
1.7 Goals / Objectives of Finance Management
1.8 Exercises

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 a 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 most 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 marvelous 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 raising 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 benefit 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 being 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 affects 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 caliber 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 uncertainly 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 with an investment with high profits potential but having a high degree of risk. 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 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.

3. 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.

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. It it a staff of line function ?

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 (c) growth rate
   (b) Hurdle 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 (c) long-term funds

(b) Debt 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 (c) growth

(b) Cash (d) wealth

(7) Liquidity and profitability are _____ goals for the Finance manager.

(a) Different (c) competing

(b) Separate (d) finance

(8) Wealth maximization means maximizing the ____ of a course of action.

(a) NPV (c) profit

(b) IRR (d) growth

(9) _____ maximization objective considers the risk and time value of money.

(a) Profit (c) value

(b) Wealth (d) growth

2

TIME VALUE OF MONEY

Unit Structure :

2.0 Objectives
2.1 Introduction
2.2 Time Value of Money
2.3 Basic Concepts
2.4 Time Value of Money Relationship
2.5 Future Value of Single Amount
2.6 Future Value of Annuity
2.7 Doubling Period
2.8 Present Value of an Uneven Series of Payments
2.9 Present Value of Annuity
2.10 Net Present Value
2.11 Mathematical Tables
2.12 Exercise

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 requires 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 represent greater real purchasing power as compared to Rs. 100 one year later. The longer the term of a loan, the greater 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 = $\frac{1}{(1 + R)t}$

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:

Shashikant deposit Rs. 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
= Rs. 1,33,100

Mr. Shashikant will get Rs. 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 payment 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

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

$$= \text{Rs. 5,000 x FVIFA @ 8\%}$$

$$= \text{Rs. 5,000 x 4.5061}$$

$$= \text{Rs. 22530.50.}$$

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 :

(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 are the doubling periods of an investment at this rate ?

Solution

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

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

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

$$0.35 + \frac{69}{10.} = 0.35 + 6.9 = 7.25 \text{ years}$$

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 but 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 Rs. 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%

= Rs. 50,000 x 0.623

= Rs. 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 flows, 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 Rs. 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 Rs. 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 Rs. 75,635 which is higher than present net cash flow of Rs. 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 Rs. 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

= Rs. 8,000 x PVIF at 12%
= Rs. 8,000 x 3.0373
= Rs. 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 Rs. 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 Rs. 40,789 in case of Alternative I and Rs. 39,962 in case of 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 Rs. 40,000. The returns would be Rs. 8000, 10000, 11000 and 12000 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 = Rs. 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 Rs. 37,188 which is lower than investment of Rs. 40,000. The net present value (i.e. 37,188-40,000 = Rs. 2,812) is negative. Hence the investment is not profitable at 10% interest.

Illustration 9 :

The share of Ridhi Ltd (Rs.10) was quoting at Rs. 102 on 01.04.2002 and the price rose to Rs. 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 Rs. 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 = Rs. 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 Rs. 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
PVd = 1 (PVAF) + F (DF)
= 1(PVAF 12% for 5 years) + F (DF 12% for 5 years)
= 150 (3,6048) + 1,000 (0.5674)
= Rs. 540.72 + 567.40
= Rs. 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 Rs. 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 Rs. 2000 are deposited into an account that yields 7% compound interest.

Solution

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

= Rs. 2,000 (FVAFA @ 7% for 3 years)

= Rs. 2,000 x 3.215

= Rs. 6,430

Illustration 15 :

Calculate the compound value when Rs. 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 $(1 + R)^t$

$= 10{,}000 \times (1 + \frac{10}{2})^{2 \times 3}$

$= 10{,}000\ (1.05)^6$

= Rs. 10,000 x 1.340

= Rs. 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 :

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

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

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.

FVIF = (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 :

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

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

2.12 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?

(1) 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 Rs. 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 Rs. 4,00,000. How much should he save annually to have a sum of Rs. 4,00,000 at the end of 5 years. If the interest rate is 9%?

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

(5) Mukesh deposits Rs. 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, a such amount as will amount to Rs. 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 Rs. 1,000 now, you would received Rs. 1,464 at the end of 4 years or Rs. 1,611 at the end of 5 years. What rates of interest is the company paying ?(Ans. 10%)

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

(9) You can save Rs. 20,000 a year for 5 years and Rs. 9,000 and Rs. 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. Rs. 31,479)

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

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

3

RATIO ANALYSIS I

Unit Structure :

3.0 Objectives
3.1 Introduction
3.2 Ratio Meaning and Definition
3.3 Importance of Ratio Analysis
3.4 Advantages of Ratio Analysis and Limitations of Ratio Analysis
3.5 Classification of Ratios
3.6 Liquidity Ratios / Short Term Solving Ratios
3.7 Leverage Ratios / Capital Structure Ratios
3.8 Asset Management Ratio / Turnover Ratio / Performance Ratio / Activity Ratio
3.9 Profitability Ratios
3.10 Operating Ratios
3.11 Market based Ratios
3.12 Questions

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 analysist 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 an 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, 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.

$$\frac{\text{Current Assets, Loans \& Advances}}{\text{Current Liabilities \& Provisions}}$$

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
Current Liabilities Provisions – Bank overdraft

A quick ratio **I: I** 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 more volatile the return to the shareholders. The formula is:

Long – term Debt
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:

Shareholders Equity
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 signaling 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 :

Profit after taxes + Depreciation + Interest on Loan
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

Net profit after tax
Preference Dividend

(b) Equity Dividend Cover

Net Profit Tax – Preference Dividend
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 fulfill customers' orders in time. The ratio is calculated as:

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

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:

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

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

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

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:

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

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

Average Creditors
---------- x 365 (in days)
Credit Purchases

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:

Sales
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

Sales
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:

Sales
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:

Sales
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:

Sales – Cost of Goods Sold x 100 OR Gross Profit x 100
Sales Sales

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 :

Net profit before interest and Tax
---------- X 100
Sales

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 breakup 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:

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

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

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

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

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

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

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:

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

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) is calculated by dividing the net profit before depreciation with number of equity shares. The formula is:

Net Profit after Tax + Depreciation
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:

Dividend per Share
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:

Dividend per share X 100
Market Price

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:

Equity Capital + Reserves – Profit and Loss A/c Debit balance
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 intrinstic 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 rations :
    (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 under-capitalisation.
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 are 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 its 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) $\frac{\text{Debt}}{\text{Debt + Equity}}$

(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 Question:-

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 assets :
   - (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 (c) wholesale warehouse
   (b) Departmental stores (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% (c) 21%
   (b) 18% (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 (c) Rs. 20,000
   (b) Rs. 40,000 (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 (c) 16
   (b) 14 (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 (c) Rs. 10,000
   (b) Rs. 8,000 (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 (c) Rs. 75,000
(b) Rs. 65,000 (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 (c) sales or cash
(b) Sales or inventory (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.

4

RATION ANALYSES
PART II

Unit Structure :

4.1 Objectives
4.2 Ratios Summarized
4.3 Solved Illustrations
4.4 Exercise

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: Rs. 6,00,000 = 0.40 or 40%
Rs. 15,00,000

Operating ratio: Cost of goods + Operating expenses = Rs. 11,40,000 = 0.76 or 76%
Sales Rs. 15,00,000

Stock turnover ratio = Cost of goods sold Rs. 9,00,000 = 3.43 times
Average stock Rs. 2,62,125

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 ware house, (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 debtors 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	=	Debtors ---------- X 12 months Credit sales	1 ½ months
	1.5 months	=	Debtors ---------- X 12 months Rs. 120 lakhs	
	Debtors x 12 months	=	Rs.120 lakhs x 1.5 months	
	Debtors	=	180/12	Rs. 15 lakhs
3	Calculation of Fixed Assets			
	Cost of sales ---------- 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			
	Cost of sales ---------- Closing stock	=	9 (given)	
	Rs. 90 lakhs ---------- 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)	
Current assets (CA)			
----------	=	1.75	
Current liabilities (C.L.)			
CA	=	1.75 CL	
CA-Stock			
----------	=	1.25	
CL			
CA- 10			
----------	=	1.25	
CL			
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

Rs. 75 lakhs			
----------	=	1.25	
Net worth			
Net worth	=	Rs. 60 lakhs	

7 Calculation of Equity share capital

Reserves
---------- = 0.2 (given)
Capital

Fixed assets
---------- = 1.25
Capital + Reserves

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)	
	1,00,000 ---------- 8,00,000	=	5 ----- 4	
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 year 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 are 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*

$$\frac{\text{Materials consumed}}{\text{Sales}} \times 100 = \frac{11,50,000}{24,00,000} \times 100 = 47.92\%$$

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

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

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

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

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

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**

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

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**

$$\frac{\text{Profit before interest, depreciation and tax}}{\text{Interest}} = \frac{25,00,000}{2,16,000} = 11.57 \text{ time Interest}$$

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**

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

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

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**

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

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

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

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

Total of stocks (40,000 x 2) = Rs. 80,000
Less : Excess = Rs. 5,000
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 :

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

Debtors velocity = Credit sales

There are no bills receivable, Hence,

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

Adopting cross multiplication,

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

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, Creditors velocity

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

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

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

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

6. Share Capital :

Capital turnover ratio (based on cost of sales)

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

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

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

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

Proprietary fund = Rs. 1,20,000

Less : Reserves and Surplus = Rs. 20,000

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 (d) Liquid Ratio
(b) Proprietary Ratio (e) Debt-Equity Ratio
(c) Current 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)

5

COST OF CAPITAL

Unit Structure

5.0 Objectives
5.1 Introduction
5.2 Definition of Cost of Capital
5.3 Measurement of Cost of Capital
5.4 Cost of Debt
5.5 Cost of Bonds
5.6 Cost of Preference Shares
5.7 Cost of Equity
5.8 Cost of Retained Earnings
5.9 Weighted Average Cost of Capital (WACC)
5.10 Exercises

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%	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.

$$K_d = \frac{I}{NP}(1-t)$$

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 Rs. 100 each at a discount of Rs. 5. The under-writing and other costs are Rs. 5000 /- for the total issue. . The interest per annum is Rs 15000. The income tax rate is 40%. Calculate the cost of Debt.

Solution
Cost of debt=15(1-.4)/90
15x.6/90=.1 or10%
The net proceeds of the debenture=1000x95=Rs 95000
Rs 95000-5000=90000
Net proceeds per debenture=90000/1000=Rs90
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:

$$K_d = \frac{I(1-t) + (RV-NP)/N}{\frac{RV + NP}{2}}$$

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 :

$$Kd = \frac{RV - NP}{\frac{1(1-t) + N}{\frac{RV + NP}{2}}}$$

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

$$= \frac{605+4}{90}$$

$$= 0.1166$$

$$= 0.12 \text{ or } 12\%$$

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

$$K_p = \frac{\text{Preference dividend}}{\text{Market price of preferenceshare(1-flotation cost)}}$$

$$= \frac{\text{Rs 12}}{\text{Rs 100(1-.03)}} = 12/97=12.37\%$$

5.6.1 COST OF IRREDEEMABLE PREFERENCE SHARES:

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

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

$$K_p = \frac{PD}{PO}$$

$$K_p = \frac{(10 \times 2000)}{(95 \times 2000)}$$

$$= \frac{10}{95}$$

$$= 0.1053$$

$$= 10.53\%$$

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, K_n , is estimated with the constant dividend growth model so as to allow for flotation costs.

$$K_n = (D_1/P_0\text{-}F) + G$$

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

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

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

$$= 0.12 \text{ or } 12\%$$

(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:

$$K_e = \frac{(E/P)}{20}$$

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:

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

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 : $\frac{K_s}{P_o} = D_1 + G$

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

$$K_s = \frac{D_1 + G}{P_o}$$

$$= \frac{D_0 (1 + G)}{P_0} + G$$

$$= \frac{Rs\ 4.19\ (1.05)}{Rs\ 50} + 0.05$$

$$= 0.088 + 0.05$$

$$= .138$$

$$= 13.8\ \%$$

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.

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

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

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 $= \dfrac{10(1-0.3) + \dfrac{(100-96)}{10}}{\dfrac{(100+96)}{2}}$

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

$= 0.0755$

$= 7.55\%$

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

$= \dfrac{5.2}{99}$

$= 0.0535$

$= 5.35\%$

(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

$K_0 = \dfrac{\text{Rs.1,54,000}}{\text{Rs.20,00,000}}$

= 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 alongwith 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%)

6

CAPITAL STRUCTURE DECIONS

Unit Structure

6.0 Objectives
6.1 Introduction
6.1 Meaning of Capital Structure
6.2 Choice of Capital Structure
6.3 Optimum Capital Structure
6.5 Importance of Capital Structure
6.6 Factors Affecting Capital Structure
6.7 Capital Structure Theories
6.8 Exercises

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 equityholders. 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 $= \frac{\text{EBIT}}{\text{Interest}}$

$= \frac{12.00}{11.85}$

= 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 $= \frac{\text{EBIT}}{\text{Interest}}$

$= \frac{14.40}{15.60}$

= 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:

$$\text{Overall cost of capital} = \frac{EBIT}{\text{Value of the firm}}$$

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 $= \frac{EBIT}{\text{Value of firm}} \times 100$

$= \frac{5,00,000}{40,00,000} \times 100$

= 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 $= \frac{EBIT}{\text{Value of firm}} \times 100$

$= \frac{10,00,000}{88,00,000} \times 100$

= 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 $= \frac{\text{EBIT}}{\text{Valuation of firm}} \times 100$

$= \frac{10,00,000}{86,00,000} \times 100$

$= 11.63\%$

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 $= \frac{\text{EBIT}}{K_e}$

$= \frac{6,00,000}{0.15}$

= 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 (K_e) $= \frac{\text{Net Income}}{\text{Market Value of Equity}} \times 100$

$= \frac{4,50,000}{25,00,000} \times 100$

$= 18\%$

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%	
∴ Market Value of the firm = $\frac{EBIT}{K}$	
= $\frac{10,00,000}{12.5\%}$	
Value of Debt	80,00,000
∴ 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%	
∴ Market Value of the firm = $\frac{30,00,000}{15\%}$	2,00,00,000
Value of Debt	30,00,000
∴ 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%
$\therefore$ 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 K_o is 12.5%.

7

LEVERAGES

Unit Structure

7.0 Objectives
7.1 Introduction
7.2 Meaning of Leverage
7.3 Types of Leverages
7.4 Significance of Leverages
7.5 Exercises

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:

$$\textbf{Operating leverage} = \frac{\textbf{Contribution}}{\textbf{Operating profit}}$$

$$= \frac{\textbf{C}}{\textbf{EBIT}}$$

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:

$$\text{DOL} = \frac{\text{Percentage change in net operating income}}{\text{Percentage change in sales}}$$

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

$$\therefore \text{Operating leverage (OL)} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$= \frac{30,00,000}{10,00,000} = 3 \text{ Times}$$

(b) If sales are up by 10%:

$$\text{OL} = \frac{\%\Delta \text{ in EBIT}}{\%\ \Delta \text{ in sales}}$$

$$\therefore \quad 3 = \frac{X}{10}$$

$$\therefore \quad X = 30\%$$

Thus, if sales are up by 10% the EBIT will increase by 30% (10 × 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

$$\therefore \text{Increase in EBIT} = \frac{3,00,000}{10,00,000} \times 100$$

$$= 30\ \%.$$

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

the equity shareholders. The financial leverage can be computed using the following formula:

$$\textbf{Financial leverage} = \frac{\textbf{EBIT}}{\textbf{EBT}}$$

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:

$$\text{DFL} = \frac{\text{Percentage change in taxable income}}{\text{Percentage change in the operating income}}$$

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:

$$\text{DFL} = \frac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}}$$

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

$$\therefore \text{Operating leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$= \frac{24,00,000}{12,00,000}$$

$$= 2 \text{ Times}$$

(b) Financial leverage $= \frac{\text{EBIT}}{\text{EBT}}$

$$= \frac{12,00,000}{10,50,000}$$

$$= 1.14 \text{ Times.}$$

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 × Financial Leverage

$$= \frac{\textbf{Contribution}}{\textbf{EBIT}} \times \frac{\textbf{EBIT}}{\textbf{EBT}}$$

$$= \frac{\textbf{Contribution}}{\textbf{EBT}}$$

The degree of combined leverage can also be calculated as follows:

$$DCL = \frac{\text{Percentage change in EPS}}{\text{Percentage change in sales}}$$

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 $= \frac{\text{Contribution}}{\text{EBIT}}$

$= \frac{6,00,000}{5,00,000}$

= 1.2 Times

(b) Financial Leverage $= \frac{\text{EBIT}}{\text{EBT}}$

$= \frac{5,00,000}{3,60,000}$

= 1.39 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 Times

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 Times.

(ii) Financial leverage $= \frac{\text{EBIT}}{\text{EBT}}$

$= \frac{4,40,000}{3,40,000}$

= 1.29 Times.

(iii) Combined leverage = OL $\times$ FL

= 1.14 $\times$ 1.29

= 1.47

Alternatively (CL) $= \frac{\text{C}}{\text{EBT}}$

$= \frac{5,00,000}{3,40,000}$

= 1.47 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 = Contribution / EBIT	54,000 / 29,000		54,000 / 24,000	
	= 1.86 Times		2.25 Times	
	A	**B**	**A**	**B**
(b) Financial Leverage = EBIT / EBT	= 29,000 / 14,000	29,000 / 21,500	= 24,000 / 9,000	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

$\therefore \frac{0.56}{0.70} \times 100 = 80\ \%$

Operating leverage = $\frac{\text{Contribution}}{\text{EBIT}}$	$\frac{4,00,000}{2,00,000}$	$= \frac{4,80,000}{2,80,000}$
	= 2 Times	= 1.71 Times
Financial leverage = $\frac{\text{EBIT}}{\text{EBT}}$	$= \frac{2,00,000}{1,00,000}$	$= \frac{2,80,000}{1,80,000}$
	= 2 Times	= 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 $= \frac{\text{Net Sales}}{\text{Total Assets}}$

$= \frac{75,00,000}{1,00,00,000}$

$= 0.75$

The industry average is 3. Hence, the firm has a low asset average.

(4) **(i)** Operating Leverage $= \frac{\text{Contribution}}{\text{EBIT}}$

$= \frac{33,00,000}{27,00,000}$

= 1.22 Times

(ii) Financial Leverage $= \frac{\text{EBIT}}{\text{EBT}}$

$= \frac{27,00,000}{22,95,000}$

= 1.1764 Times

(iii) Combined Leverage $= \frac{\text{Contribution}}{\text{EBT}}$

$= \frac{33,00,000}{22,95,000}$

= 1.438 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 $\times$ 1.22). Hence, the new EBIT will be Rs. 27,00,000 $\left(\frac{100 - 40.66}{100}\ \%\right)$ = 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 $\left(\frac{100 - 69.54}{100}\ \%\right)$ = 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 leverage:**	**Combined**	$5 \times 4 = 20$ Very high	$4 \times 5 = 20$ Very high	$7 \times 6 = 42$ Very very high
(2)	**Profitability:**		Good	Satisfactory	Poor

(3) Working: Calculation of sales for 'P'

(i) $DFL = \frac{EBIT}{EBT} = \frac{4}{1}$

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

$\therefore$ $EBT = \frac{45,000}{3}$ = Rs. 15,000

$\therefore$ EBIT = 15,000 $\times$ 4 = Rs. 60,000

(ii) $DOL = \frac{Contribution}{EBIT}$

$= \frac{5}{1} = \frac{Contribution}{60,000}$

$\therefore$ Contribution $= 5 \times 60,000$

$= Rs.\ 3,00,000$

(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 = Contribution / EBIT	1,00,000 / 70,000	1,25,000 / 85,000	1,50,000 / 1,00,000	2,00,000 / 1,40,000
	= 1.42	1.47	1.5	1.43
(iv) Financial leverage = EBIT / EBT	70,000 / 55,000	85,000 / 60,000	1,00,000 / 65,000	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.

$$\therefore \text{ Total Assets Turnover } = \frac{\text{Net Sales}}{\text{Total Assets}}$$

$$3 = \frac{\text{Net Sales}}{300 \text{ lakhs}}$$

$$\therefore \text{Net sales } = 3 \times 300$$

$$= \text{Rs. } 900 \text{ lakhs.}$$

$$\therefore \text{ Fixed operating cost } = \frac{1}{6} \times 900 \text{ lakhs}$$

$$= \text{Rs. } 150 \text{ lakhs}$$

$$\therefore \text{Variable operating cost } = 50 \text{ \% of Net sales}$$

$$= 50 \text{ \% of } 900 \text{ lakhs}$$

$$= \text{Rs. } 450 \text{ lakhs}$$

(2) **Income Statement**

	Rs. Lakhs
Sales	900
Less: Variable cost	450
∴ Contribution	450
Less: Fixed cost	150
EBIT	300
Less: Interest	12
EBT	288
Less: Taxes @ 35 %	101
PAT	187
No. of equity shares	9
∴ 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 (1.5×1.04)

b) Calculation of Market Price of the share

$$\text{P/E Ratio} = \frac{\text{Market price}}{\text{EPS}}$$

$\therefore$ Market price= P/E Ratio $\times$ EPS

= 2.5×20.78

= 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	219.69	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%

8

TYPES OF FINANCING

Unit Structure

8.0 Objectives
8.1 Meaning of Finance
8.2 Sources of Long term Finance
8.3 Institutional Consideration
8.4 Exercises

8.0 OBJECTIVES

After studying this unit you will understand:

- Meaning of finance
- Need and Importance of Finance
- Sources of long term finance
- Institutional Considerations
- Sources of short term finance

8.1 MEANING OF FINANCE

It is necessary to raise finance from various sources for implementation of the project The scheme of finance will be determined after consideration of various aspects attached to different sources of finance as following:

a) Share capital –preference shares and equity shares
b) Debentures
c) Term loan from financial institutions
d) Unsecured loan-banks, promoters, others.

8.1.1 Promoters Contribution

The persons who are involved in implementation of a project are known as promoters .An entrepreneur who promotes the project is also required to participate in the scheme of finance of the project. The extent of promoter's contribution in the project is a sign of interest of the promoters in the project. Promoter's contribution indicates the extent of their involvement the in the

project. The promoters contribution can be provided in the form of subscribing to equity and preference shares issued by the company unsecured loans ,seed capital assistance and internal accrual of funds .The bank and financial institution normally participate in the scheme of project finance and they ask the promoters to bring in a certain portion of funds required which is normally between 25% to 50% of the cost of the project into the equity share capital of the company .The promoters contribution can be arranged from outside sources like friends and relatives. For eligibility of the project financing the financial institution may stipulate minimum promoter's contribution which is to be arranged by the promoters.

8.1.2 Margin money

The banks and financial institutions maintain a margin while financing the project cost. They asked the borrowers to bring a certain amount of the cost of the project cost as margin money to safeguard from the changes in the value of assets that are being financed and provided as a security. The quantum of margin money to depend upon the creditworthiness of the borrower and nature of security provided to the institution. Margin money is one of the important factors which are evaluated by the financial institutions while considering the project for financial assistance. The margin money required for working capital will be provided in the project cost .The RBI guidelines provide the amount of capital brought by the promoters in project financing.

8.1.3 Capital Structure

Capital structure refers to the mix of a firm's capitalization and includes long-term source of fund such as debentures, preference shares, equity share, and retained earnings. The decision regarding the forms of financing their requirements and their relative proportions in total capitalization are known as capital structure decision. A firm has the choice to raise capital for financing its project from different sources in different proportions as follows:

(a) exclusive use of equity capital
(b) Use of equity and preference capital
(c) Use of equity and debt capital
(d) Use of equity, preference and debt capital
(e) Use of a combination of debt, equity and preference capital in different proportions.

The choice of combination of these sources is called capital structure mix.

8.1.4 Optimum Capital Structure:

The theory of optimal capital structure deals with the issue of right mix of debt and equity in the long term capital structure of a firm. This theory states that if a company takes on debt the value of

the firm increases up to a point, beyond that point if debt continues to increases then the value of the firm will start to decrease. if the company is unable to repay the debt within the specified period, then it will affect the goodwill of the company in the market . Therefore, the company should select its appropriate capital structure with due consideration to the factors of debt and equity.

8.1.5 Trading on Equity

The term 'trading on equity' is derived from the fact that debts are contracted and loans are raised mainly on the basis of equity capital. The concept of trading on equity provides that the capital structure of a company should include equity as well as debt. Again the proportion of debt in the capital structure should also be optimal. Those who provide debt have a limited share in the firm's earnings and hence want to be protected in term of earning and values represented by equity capital. Since fixed charges do not vary with the firm's earning before interest and tax, a magnified effect is produced on earning per share. The determination of optimal level of debt is a formidable task and is a major policy decision .EBIT-EPS analysis is a widely used tool to determine the level of debt in a firm.

8.1.6 Service of Interest and Debts:

In order to analyse the borrower's capacity in payment of interest and debt installment regularly, interest coverage ratio are considered.

a) Interest Coverage ratio:

The interest coverage shows many times interest charges are covered by funds are available for payment of interest. It is determined as follows:

$$\text{Interest coverage ratio} = \frac{\text{PBIT}}{\text{Interest on Debt}}$$

Where, PBIT means profit before interest, and taxes

A very high interest coverage ratio indicates that the firm is conservative in using debt and a very low ratio indicates excessive use of debt. Interest cover indicates how many times a company can its current interest payments out of current profit.

b) Debt service coverage ratio:

Debt service coverage ratio (DSCR) is the key indicator to the lender to 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 profit amount. The DSCR is calculated as follows:

DSCR = profit after tax +depreciation +interest on loan
Interest on loan + loan in a year

A ratio of two or more is considered satisfactory by the financial institution. The higher debt service the better debt servicing capacity of the company.

Illustration 1:

Preeti Ltd has the following data for projection for the next five years. It has an existing term-long of Rs 360 lakhs repayable over the next 5 years and got sanctions for new term loan for Rs 450 lakhs which is also repayable in 5 years. As a finance manager you are required to calculate;

(a) Interest coverage ratio
(b) Debt service coverage ratio for each of the 5 years and offer your comments.

Rs lakhs

Particulars	1	2	3	4	5
Profit after tax	480	575	635	650	685
Depreciation	155	150	140	135	120
Taxation	125	203	254	275	299
Interest on term loans	162	125	87	50	16
Repayment of term loans	178	178	178	178	178

Solution:

(a) Calculation of interest coverage ratio:

(Rs.lakhs)

Particular/years	1	2	3	4	5	total
PBIT	767	903	976	975	1000	4621
Interest	162	125	87	50	16	440
Interest coverage	4.73	7.22	11.22	19.5	62.5	10.50

(b) Calculation of Debt service coverage ratio:

(Rs.lakhs)

Particular/years	**1**	**2**	**3**	**4**	**5**	**Total**
PAT	480	575	635	650	685	3025
Depreciation	155	150	140	135	120	700
Interest on loan	162	125	87	50	16	440
Total	**797**	**850**	**862**	**835**	**821**	**4165**
Interest on term loan	162	125	87	50	16	440
Repayment of term loan	178	178	178	178	148	860
Total	**340**	**303**	**265**	**228**	**164**	**1300**
DSCR	2.34	2.81	3.25	3.66	5.00	3.20

(c) **Comments:** average interest coverage ratio is 10.50 times and average debt service coverage ratio is 3.20 times. As DSCR is higher than 2 it indicates the better debt serving capacity of the company. Interest coverage ratio is also higher and it indicates that the company is conservative in using its debt.

Illustration 2

BEST ltd is a profit making company heaving paid up capital of Rs 100 lakhs consisting of 10 lakh ordinary share Rs 10 each. Currently it is earning an annual pre tax profit of Rs 60 lakhs. The company's shares are listed on BSE and are quated in the range of Rs 50 to Rs 80. The management wants to diversify production and has approved a project which will cost Rs. 50 lakhs and which is expected to yield a pre-tax profit of Rs. 40 lakhs per annum.To raise this 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 of Rs. 10) can be sold at a premium of Rs.15 each.

(b) To issue 16% non-convertible debentures of Rs.100 each for the entire amount.

(c) To issue equity capital of Rs.25 lakhs (face value of Rs 10) and 16% non-convertible debentures foe 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 the management wants to maximize the earnings per share to maintain its goodwill. The company is paying income tax at 30%.

Solution:

(a) Calculation of earnings per share under the three options:

	Option I (Rs lakhs)	**Option II (Rs lakhs)**	**Option III (Rs lakhs)**
Estimated total income			
(i) current operations	60	60	60
(ii) new operations	40	40	40
PBIT	100	100	100
Less: interest on 16%debenture	-	8	4
Profit before tax	100	92	96
Less :tax @ 30%	30	27.60	28.80
Profit after tax	70	64.40	67.20
Number of equity shares(lakhs)	12	10	10.50
EPS	5.83	6.44	6.4

Earning per share can be maximized with option. II. Hence, it is advised to issue 16% debentures, is the most suitable.

8.2 SOURCES OF LONG TERM FINANCE

There are different sources of funds available to meet long-term financial needs of the business. These sources may be broadly classified as under:

(a) Share capital.
(b) Debentures or bonds.
(c) Retained earnings.
(d) Loans from financing institutions.
(e) Loans from commercial banks.

(a) Share capital:

A public limited company can raise capital from issue of shares to the public. It is called public issue of shares. A private

company can raise capital by issue of shares to the friends and relatives but not from the public through public issue. Share capital is the owner's capital. Every company can raise capital by issue of shares. Partnership and sole traders cannot issue shares. Public limited companies can raise any amount of capital by issue of shares because there is no limit on the maximum number of shareholder's or members. There are two types of shares.

(i) Preference shares:

Preference shares are those shares which have first preference for payment of dividend and refund of capital at the time of winding up of the company, long – term funds can be revised by public limited companies through a public issue of share. The preferences carry a fixed rate of dividend. If the stock market, it can raise capital by issue of preference shares for raising long – term funds. Preference shares are normally cumulative i.e. the dividend payable in a year of loss gets carried over to the next year till there are adequate profits to pay the cumulative dividends . The companies act, 1956 provides that "no profit, no dividend".

Preference share capital is a hybrid form of financing because it possesses some characteristics of equity capital and some attributes of debt capital. Preference shares may be convertible which can be converted into equity share after a certain period. These shares can also be redeemable at a certain period. This enables the gained importance after the finance bill, 1997 as dividends became tax free in the hands of the individual investors and are taxable in the hands of the company as a tax on dividend distribution.

(ii) Equity or ordinary shares:

Ordinary shares are those shares which are not preference shares. Ordinary shares are a source of permanent capital. Ordinary shares are owners of company and they undertaken the risks of the business. They are entitled to dividends after the income claims of others stakeholders are satisfied. Similarly in the event of winding up, ordinary shareholders' can exercise their claim on assets after the claim of the other suppliers of capital have been met. They elect the directors to run and manage the business of the company. The cost of equity shares is usually highest. This is due to the fact that the shareholders' expect a higher rate of return on their investment as compared to other suppliers of long – term funds. Thus, ordinary shareholders'' carry a higher amount of risk and so expect a higher return .a company , having substantial ordinary share capital may find it easier to raise funds, in view of the fact that share capital provides a security to other suppliers of funds.

(b) Debenture or Bonds:

Issues of debentures or bonds are sources of borrowed capital. It is a source of long – term capital. A debenture is an acknowledgement of debt issued by a company. Normally the debentures are issued by the public limited companies in private sector. However, bonds are issued by the government companies a public sector undertaking. Debentures a bond are issued in different denomination ranging from Rs 100 to Rs 1000 and carry different rate of interest. a company has to make public issue for issuing Debenture or bonds . it is just like issue of share . The Debenture are also traded in stock market. Thus, Debentures provides a more convenient mode of long – term funds. The cost of capital through Debenture is quite low because the interest payable on Debenture can be charged as an expense before tax. From the investor's point of view, Debenture offer a more attractive prospect than the preferences shares since, interest on debenture is payable, whether or not the company makes profit.

Debentures in India are considered as secured loan. They are protected by a charge on the assets of the company. The Debenture can also be convertible Debenture. They are partly convertible or fully convertible into share of a company. Debentures are converted into equity share as per the term of the issue in relation to price and the time conversion. Interest on debenture is fixed at a time of issue and interest convertible debenture is generally lower then the non convertible debenture. Indian companies have been issuing convertible debenture or bonds with a number of schemes, options, and incetivities like warrants etc.The issue of convertible debentures has distinct advantage from the point of view of the issuing company. such an issue enables the management to raise the equity capital indirectly diluting the equity holding until the capital raise has started earning an added return to support the additional shares such securities can also be issued even when the equity market is not very good convertible bonds are normally unsecured and, therefore, there issuance may ordinary not impair the borrowing capacity. The debentures or bonds are issued subject to the SEBI guidelines. Public issues of debentures now require that the issue be rated by a credit rating agency. The credit rating is given after evaluating factor like track record if the company, profitability debt servicing capacity, credit worthiness and perceived risk of landing.

(c) Long term financial institution:

Long term loans are provided by specify financial institutions in India. The following are the specialised financial institution:

(i) The industrial financial corporation in India.
(ii) Industrial development bank of India.
(iii) Industrial Reconstruction Corporation in India.

(iv) Small industries development bank of India.
(v) Life insurance Corporation of India.
(vi) State financial corporation.
(vii) Exime book.

Term loans are provided by these institutions at deferent rate of interest under scheme of financial institution. it is also to be repaid according to a stipulated repayment schedule these institution stipulate a number of condition management and certain and other financial policy of a company .

Term loan represent secured borrowing. It is the most important source of finance for new project. They generally carry a rate of interest inclusive interest tax depending on the credit rating of the borrower, the perceived risk of lending. The loan are generally repable over a period of 60 to 10 years in annul, half yearly or quarterly installment. for last scale project all India financial institution provide the bulk of term finance either singly or in consortium with other financial institution .

(d) Loan from commercial banks:

The banks' in India also provide term loans to the companies .banks normally provides term loans to projects in the small and medium scale sectors . The primary role of commercial banks is to cater to the short term requirement of the industry. However banks have started taking an interest on term financing of industries in several ways. The proceeds of the term loan from banks are generally used for fixed assets or for expansion of plant capacity. Their repayment is scheduled over a period of time. Term loans proposals involve an element of risk because of changes in the conditions affecting the borrowers. The bank making such a proposal has to access the situation to make a proper appraisal. The decision in such a situation would depend upon various factors affecting the conditions of the industry concerned and the earning potential of the borrower.

(e)Retained earnings:

Retained earnings are the profits retained in the business. Every company retains certain portion every year in the form of reserve. Even the balance of profit after declaration of dividend is also carried forward in the balance of sheet. It is known as ploughing backs of profits. Such funds belong to the ordinary shareholder's and increase the net worth of company. a public limited company has to plough back a reasonable amount of profit every year keeping in view the legal requirements and its own expansions plans. However, retained earnings can be used by existing and financially sound companies. A new company or a loss making company cannot follow this method. Retained earnings are used as a long-term capital without any cost.

8.3 INSTITUTIONAL CONSIDERATION

The sources from which a business meets its financial requirements can be classified according to the period, ownership and source of generation. The sources of funds according to the period, under long-term sources of funds such as shares, debentures and term loans and short-term, sources such as public deposits, advances from customers and trade creditors. According to ownership the share capital and retained earnings are owned sources. While debentures and term loans are borrowed funds.

According to source of generation, internal are retained earnings and funds and external sources such as shares and debentures or term loans.

For the sake of convenience, the different sources of funds can be classified into the three categories. These categories are security financing, internal financing and loan financing. A large number of specialized financial institutions have been set up in the country after independence to meet the specific term financial needs of the companies. They are popularly known as development banks. Development banks seek to mobilize scarce resources, such as capital, technology, managerial and entrepreneurial talents and canalise them into industrial activities in accordance with plan priorities .it has, therefore, to share its policies, procedures and function in way do as to cater to development needs of specified sectors as well as economy in general.

Institutional considerations are provided on the based of type of loan, period and their priorities. There considerations are given below:

1) Certain institutions provide any short term loan such as SIDBI and state financial corporation.

2) The IFCI financials assistance for setting up new industrial projects m renovation, modernization, expansion and diversification etc.

3) IDBI was established to provide direct assistance scheme which included project m renovation, modernization, technical development fund scheme and equipment finance schemes.

4) The objective of the unit trust of India was to stimulate and pool the saving of the middle class and low income group and to enable them to share the benefits and the prosperity of the rapidly growing industrial; of the country.

5) The Exim bank was setup on 1st January 1982 , for financing and promoting export and for coordinating working of other financial institution engaged in the export` -import financing.

6) Infrastructure development finance company Ltd was conceived as an institution that take the lead in providing capital to commercially viable infrastructure project in India.

7) Loans indication involves commitment them term loan from the financial institution and banks for financing a particular project. Two or more financial institution or banks agree to finance a particular project. One of the institutions may become institution and bring about coordinator in the financing arrangement.

8) When the individual bank finds it difficult to meet the suge financial requirement of a borrower, it give rights to multiple banking which may be form “consortium lending “.
9) Bridge loans are available from the bank and financial institution when the sources and timing of the funds to raised is known with certainnity .where there is a time gape for excess of fund , then for speeding up of implementation of the project bridge loan provided such loans are repaid immediately after the the raising of funds.

10) Non–recourse financing; traditionally, the debt component of the standard project finance project has been of the full – resource warily the development finance institution have had full recourse to even non- project-related assets as finance is extended either on the basis of the over all strength of the balance sheet of the company or on the basis or guarantee of other sombrous of company.

8.4 EXERCISES:

1. What are the sources of long-term finance?
2. Explain the concept of financial feasibility of a Project?
3. Explain the advantages of equity financing?
4. What is debenture (debt) financing? Why debentures are considered cheaper than equity as a source of long-term finance?
5. Write short notes on the following :
   (a) Debt Service coverage ratio.
   (b) Trading on equity
   (c) Promoter’s contribution.
   (d) Project report.
   (e) Internal rate of return.
   (f) Loan syndication.

6. From the following projected figures, calculate the average debt service coverage ratio.

(Rs.Lakhs)

Year	Net Profit after Deprecation	Depreciation	Interest on Term Loan	Repayment of Term loans.
1	10.50	15.50	10.00	10
2	15.50	15.00	9.00	10
3	17.00	14.25	8.00	10
4	20.00	13.50	7.00	10
5	22.00	12.50	6.00	20
6	25.00	11.25	4.00	20
7	25.00	10.00	2.00	20

A machine is available for purchase at a cost of Rs.8,00,000. It is expected to have a life of 5 years and have a scrap value of Rs.1,00,000 at the end of five years period. The machine will generate the following profits over its life as under :

Year	Amount (Rs.)
1	2,00,000
2	3,00,000
3	4,00,000
4	1,50,000
5	50,000

The above estimates are profits before depreciation. You are required to calculate the accounting rate of return.

9

INVESTMENT DECISION I

Unit Structure :

9.0 Objectives
9.1 Introduction
9.2 Time Value of Money
9.3 Methods of Times Value of Money
9.4 Future Value of a Single Flow
9.5 Investment Appraisal Techniques
9.6 Payback Period Method
9.7 Average Rate of Return
9.8 Earnings per Share (EPS)
9.9 Net Present Value (NPV) Method
9.10 Internal Rate of Return (IRR)
9.11 NPV-IRR Conflict
9.12 Questions

9.0 OBJECTIVES

After studying the unit the students will be able to:

- Discuss the concept Time value of money.
- Understand the methods of Time value of money.
- Calculate the future value of single flow.
- Discuss the merits and demerits of various Investment Appraisal Techniques
- Solve the problems on Investment Appraisal Techniques.

9.1 INTRODUCTION:

Capital Budgeting is the art of finding assets that are worth more than they cost to achieve a predetermined goal i.e., ‘optimizing the wealth of a business enterprise’.

Capital investment involves a cash outflow in the immediate future in anticipation of returns at a future date.

A capital investment decision involves a largely irreversible commitment of resources that is generally subject to significant degree of risk. Such decisions have for reading efforts on an enterprise's profitability and flexibility over the long-term. Acceptance of non-viable proposals acts as a drag on the resources of an enterprise and may eventually lead to bankruptcy.

For making a rational decision regarding the capital investment proposals, the decision maker needs some techniques to convert the cash outflows and cash inflows of a project into meaningful yardsticks that can measure the economic worthiness of projects.

CAPITAL BUDGETING PROCESS:

A Capital Budgeting decision involves the following process:

(1) Investment screening and selection
(2) The Capital Budget proposal
(3) Budgeting Approval and Authorization
(4) Project Tracking
(5) Post-completion Auditor

9.2 TIME VALUE OF MONEY :

9.2.1 Concept

We know that Rs. 100 in hand today is more valuable than Rs. 100 receivable after a year. We will not part with Rs. 100 now if the same sum is repaid after a year. But we might part with Rs. 100 now if we are assured that Rs. 110 will be paid at the end of the first year. This "additional Compensation" required for parting Rs. 100 today, is called "interest" or "the time value of money". It is expressed in terms of percentage per annum.

9.2.2 Why should money have time value?

Money should have time value for the following reasons:

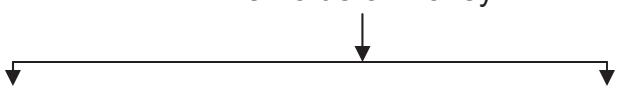
(a) Money can be employed productively to generate real returns;
(b) In an inflationary period, a rupee today has higher purchasing power than a rupee in the future;
(c) Due to uncertainties in the future, current consumption is preferred to future consumption.
(d) The three determinants combined together can be expressed to determine the rate of interest as follows:

Nominal or market interest rate
= Real rate of interest or return (+) Expected rate of inflation (+) Risk premiums to compensate for uncertainty.

9.3 METHODS OF TIME VALUE OF MONEY

(1) Compounding: We find the Future Values (FV) of all the cash flows at the end of the time period at a given rate of interest.

(2) Discounting : We determine the Time Value of Money at Time "O" by comparing the initial outflow with the sum of the Present Values (PV) of the future inflows at a given rate of interest.



Compounding (Future Value)	Discounting (Present Value)
(a) Single Flow	(a) Single Flow
(b) Multiple Flows	(b) Uneven Multiple Flows
(c) Annuity	(c) Annuity
	(d) Perpetuity

9.4 FUTURE VALUE OF A SINGLE FLOW

It is the process to determine the future value of a lump sum amount invested at one point of time.

$$\mathbf{FV_n = PV\ (1+i)^n}$$

Where,

FV_n	= Future value of initial cash outflow after n years
PV	= Initial cash outflow
i	= Rate of Interest p.a.
n	= Life of the Investment
and $(1+i)^n$	= Future Value of Interest Factor (FVIF)

Illustration: 1

The fixed deposit scheme of Punjab National Bank offers the following interest rates:

Period of Deposit	Rate Per Annum
46 days to 179 days	5.0
180 days < 1 year	5.5
1 year and above	6.0

An amount of Rs. 15,000 invested today for 3 years will be compounded to:

$$FV_n = PV\ (1+i)^n$$

$$= PV \times FVIF\ (6,3)$$

$$= PV \times (1.06)^3$$

$$= 15,000\ (1.191)$$

$$= \text{Rs. } 17,865$$

Doubling Period "How long will it take for the amount invested to be doubled for a given rate of interest"?

(i) By Applying "Rule of 72"

$$\text{Doubling Period} = \frac{72}{\text{Rate of Interest}}$$

For instance, if the rate is 5%, then the doubling period is $\frac{72}{5} = 14.4$ years.

(ii) Rule of 69: For a better and accurate way of calculating the doubling period :

$$= 0.35 + \frac{69}{\text{Interest Rate}}$$

$$= 0.35 + \frac{69}{5} = 0.35 + 13.8 = 14.15 \text{ Years.}$$

If compounding is done for shorter periods (i.e. other than annual compounding)

$$FV = PV_n \left(1 + \frac{i}{m}\right)^{m \times n}$$

PV = Initial Cash Outflow
i = Rate of interest p.a.
m = no. of times compounding is done per year
n = no. of years for which compounding is done.

Illustration 2:
Calculate the Future value of Rs. 1000 invested in State Bank Cash Certificate Scheme for 2 years @ 5.5% p.a., compounded semi-annually.

Solution:

$$FV_n = PV\left(1+\frac{i}{m}\right)^{m\times n} = 1{,}000\ (1.0275)^4$$

$$= 1{,}000\left(1+\frac{0.55}{2}\right)^{2\times 2}$$

$$= 1{,}000 \text{ X } 1.11462 = 1{,}114.62$$

Future Value of Multiple Flows

Rate of Interest = 6% p.a. Total Accumulation after 3 years

Being of Year	Investment (Rs.)	EVIF	Compounded Value (Rs.)
0	4,000	1.2625	5,050
1	6,000	1.191	7,146
2	5,000	1,1236	5,618
3	5,000	1.06	5,300
Total	**20,000**		**23,114**

The total compounded value is Rs. 23,114

Future Value of Annuity

Annuity is a term used to describe a series of periodic flows of equal amounts. These flows can be inflows or outflows.

The future value of annuity is expressed as :

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

Where, A = Amount of Annuity
i = rate of interest
n = time period
FVA_n = compounded at the end of n years.

And $\left(\frac{(1+i)^n - 1}{i}\right)$ is the Future Value of Interest Factor for Annuity (FVIFA)

Illustration 3 :

Calculation the maturity value of a recurring deposit of Rs. 500 p.a. for 12 months @ 9% p.a. compounded quarterly.

Solution :

Effective rate of interest per annum $= \left(\frac{1+0.09}{4}\right)^4 - 1$

= 1.0931 – 1 = 0.0931

Rate of interest per month
= $(1 + i)^{1/m} - 1$
= $(1+ 0.0931)^{1/12} - 1$
= 1.0074 – 1
= 0.0074
= 0.74%

Maturity Value can be calculated as follows:

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

$$= 500\left\{\frac{(1+0.0074)^{12} - 1}{0.0074}\right\}$$

= 500 ×12.50 = Rs. 6,250/-

Present Value of a Single Flow:

$$PV = \frac{FV_n}{FVIF(i,n)} = \frac{FV_n}{(1+i)^n}$$

Where, PV = Present Value
FV_n = Future Value receivable after n years
i = rate of interest
n = time period

And $\frac{1}{FVIF(i,n)} = PVIF(i,n)$ [Present Value of Interest Factor]

Illustration 4:

Calculate the Present Value of Rs. 1,000 receivable after 3 years. Cost of Capital @ 10% p.a.

Solution :

P.V. of Re. 1 @ 10% p.a. receivable after 3 years. = 0.7513
P.V. of Rs. 1000 = Rs. 1000 × 0.7513 = Rs. 751.30

Present Value of Uneven Multiple Flows

Year	Cash Inflows	P.V.F. @ 10%	Discounted Cash Flows
1	50,000	0.9091	45,455
2	90,000	0.8264	74,376
3	1,20,000	0.7513	90,145
	2,60,000		**2,09,987**

The present value of Rs. 2, 60,000 discounted @ 10% will be Rs. 2, 09,987.

Present Value of Even Cash Inflows

Calculate P.V. of Rs. 50,000 receivable for 3 years @ 10%
P.V. = Cash Flows × Annuity @ 10% for 3 years.
= 50,000 × 2.4868 = Rs. 1, 24,340/-

Present Value of an Annuity:

The present value of an annuity 'A' receivable at the end of every year for a period of n years at the rate of interest 'i' is equal to

$$PVA_n = \frac{A}{(1+i)} + \frac{A}{(1+i)^2} + \frac{A}{(1+i)^3} + \frac{A}{(1+i)^n}$$

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

$$i(1+i)^n$$

Where, $\left(\frac{(1+i)^n - 1}{i(1+i)^n}\right)$ is called the PVIFA (Present Value of Interest Factor Annuity) and it represents the present value of Rs. 1 for the given values of i and n.

Illustration 5:

Calculate the present value of Rs. 100 deposited per month for 12 months @ 12% p.a., compounded quarterly.

Solution:

Step (1) Calculate effective rate of interest per annum

$$r = \left(1 + \frac{i}{m}\right)^m - 1$$

$$= \left(1 + \frac{0.12}{4}\right)^4 - 1$$

= 1.1255 –1 = 0.1255

= 12.55%

Where, i = normal rate of interest p.a.
r = effective rate of interest p.a.
m = no. of terms compounded in a year

Step (2) Calculate effective rate of interest per month.

$= (1 + r)^{1/12} - 1$

$= (1+0.1255)^{1/12} - 1$

= 0.00990

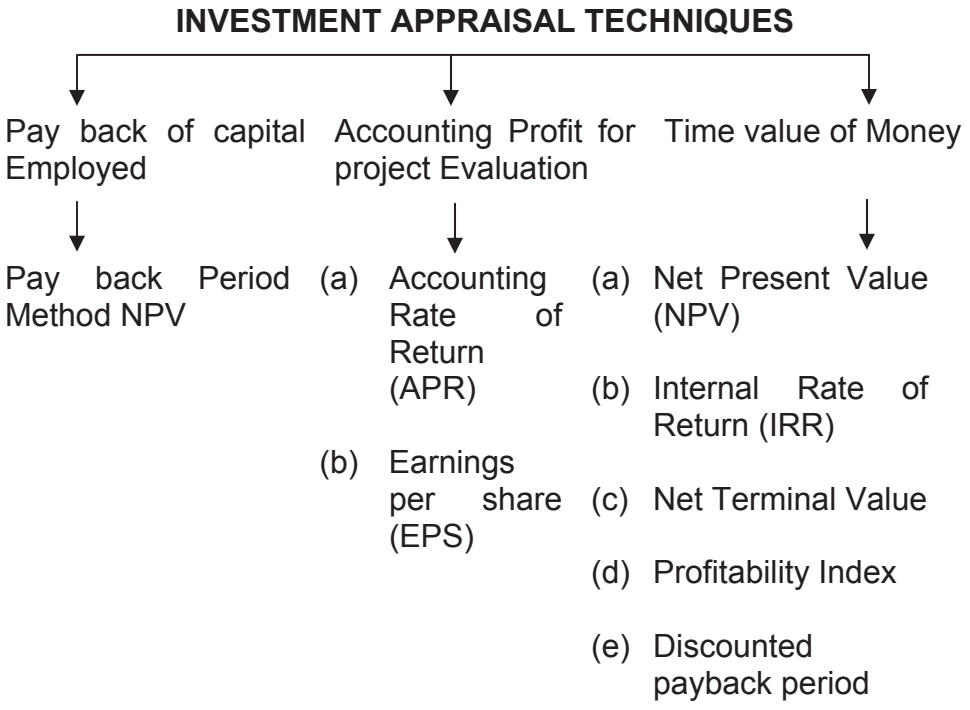
Step (3) The present value of deposits :

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

$$= 100\left(\frac{(1+0.00990)^{12} - 1}{0.00990\,(1+0.00990)^{12}}\right)$$

$$= 100\left(\frac{0.1255}{0.01114}\right) = 100 \times 11.26 \text{ = Rs. 1126}$$

9.5 INVESTMENT APPRAISAL TECHNIQUES



9.6 PAYBACK PERIOD METHOD

9.6.1 MEANING

The basic element of this method is to calculate the recovery time, by year wise accumulation of cash inflows (inclusive of depreciation) until the cash inflows equal the amount of the original investment. The time taken to recover such original investment is the "payback period" for the project.

"The shorter the payback period, the more desirable a project".

9.6.2 MERITS:

(1) No assumptions about future interest rates.

(2) In case of uncertainty in future, this method is most appropriate.

(3) A company is compelled to invest in projects with shortest payback period, if capital is a constraint.

(4) It is an indication for the prospective investors specifying the payback period of their investments.

(5) Ranking projects as per their payback period may be useful to firms undergoing liquidity constraints.

9.6.3 DEMERITS:

(1) Cash generation beyond payback period is ignored.

(2) The timing of returns and the cost of capital is not considered.

(3) The traditional payback method does not consider the salvage value of an investment.

(4) Percentage Return on the capital invested is not measured.

(5) Projects with long payback periods are characteristically those involved in long-term planning, which are ignored in this approach.

9.6.4 SOLVED PROBLEMS

Illustration 6:

Initial Investment = Rs. 1, 00,000
Expected future cash inflows Rs. 20,000, Rs. 40,000, Rs. 60,000, Rs. 70,000

Solution:

Calculation of Pay Back period.

Year	Cash Inflows (Rs.)	Cumulative Cash Inflows (Rs.)
1	20,000	20,000
2	40,000	60,000
3	60,000	1,20,000
4	70,000	1,90,000

The initial investment is recovered between the 2nd and the 3rd year.

$$\text{Payback Period} = 2 \text{ years} + \left(\frac{\text{Balance of Unrecovered Initial Investment}}{\text{Cash Inflows during the year}} \times 12 \right)$$

$$= 2 \text{ years} + \frac{\text{Initial Investment} - \text{Cumulative Cash Inflows at the end of } 2^{nd} \text{ year}}{\text{Cash Inflows in the } 3^{rd} \text{ year}} \times 12$$

$$= \frac{2 \text{ years} + \left(\frac{1,00,000 - 60,000}{60,000} \times 12 \right)}{2 \text{ years} + \left(\frac{40,000}{60,000} \times 12 \right)}$$

= 2 years 8 months.

Illustration 7:

Victory Ltd. decided to purchase a machine to increase the installed capacity. The company has four machines under consideration. The relevant details including estimated yearly expenditure and sales are given below. All sales are for cash. Corporate Tax Rate @ 33.99% (inclusive of Surcharge @ 10%, Deduction cess @ 2% and Secondary & Higher Education cess @ 1%)

Particulars	M_1	M_2	M_3	M_4
Initial Investment (Rs. lacs)	30.00	30.00	40.00	35.00
Estimated Annual Sales (Rs. lacs)	50.00	40.00	45.00	48.00
Cost of Production (Estd) (Rs. lacs)	18.00	14.00	16.70	21.00
Economic Life (yrs)	2	3	3	4
Scrap Values (Rs. lacs)	4.00	2.50	3.00	5.00

Calculate Payback Period

Solution:

Statement Showing Payback for four machines

Particulars	M_1	M_2	M_3	M_4
(1) Initial Investment (Rs. lacs)	30.00	30.00	40.00	35.00
(2) Estd. Annual Sales (Rs. Lacs)	50.00	40.00	45.00	48.00
(3) Estd. Cost of Production (Rs. lacs)	18.00	14.00	16.70	21.00
(4) Depreciation (Rs. lacs)	13.00	9.17	12.33	7.50
(5) Profit Before Tax (PBT) [2–3–4]	19.00	16.83	15.97	19.50
(6) Tax @ 33.99% (Rs. lacs)	6.4581	5.721	5.428	6.628
(7) Profit After Tax (PAT) [5–6] (Rs. lacs)	12.5419	11.109	10.542	12.872
(8) Net Cash Flow [7+4]	25.5419	20.279	22.872	20.372

$$\text{Pay back Period (Years)} = \frac{M_1}{25.5419} = \frac{30.00}{20.279} = \frac{M_3}{22.872} = \frac{40.00}{20.372} = \frac{M_4}{35.00}$$

$$\left(\frac{\text{Initial Investment}}{\text{Net Annual Cash Flow}}\right) = 1.17 = 1.48 = 1.75 = 1.72$$

Analysis: Machine 1 is more profitable, as it has the lowest payback period.

Bailout Factor

This deals with the possibility of scrapping the machine during its estimated life.

Illustration 8:

Project × costs Rs. 20 lacs and project y costs Rs. 30 lacs both have a life of 5 years. Expected cash flows Rs. 8 lacs p.a. for project × and Rs. 15 lacs p.a. for project y. Estimated scrap values of project × Rs. 5 lacs, declining at an annual rate of Rs. 1 lacs p.a. and of project y Rs. 8 lacs declining at an annual rate of Rs. 1 lac p.a.

Under Traditional payback:

Project X = $\frac{20,00,000}{8,00,000}$ = 2.5Years

Project Y = $\frac{30,00,000}{15,00,000}$ = 2 years

Under Bailout Payback:

The bailout payback time is reached if the accumulated cash inflows plus the expected salvage value at the end of a particular year equals the original/initial investment.

Project X	**Cumulative Cash Receipts (Rs.)**	**Salvage Value (Rs.)**	
End of year 1:	8,00,000	5,00,000	= 13,00,000
End of year 2:	16,00,000	4,00,000	= 20,00,000

Bailout payback period for Project X = 2 years.

Project Y	**Cumulative Cash Receipts (Rs.)**	**Salvage Value (Rs.)**	
End of year 1 :	15,00,000	8,00,000	= 23,00,000
End of year 2 :	30,00,000	7,00,000	= 37,00,000

Bailout is between years 1 & years 2.

Project Y is choosen having a lower bailout payback period, assuming that the major objective is to avoid loss.

9.6.5 PAYBACK PERIOD RECIPROCAL

Payback period may be expressed alternatively as the "payback reciprocal":

$$\text{Payback period reciprocal} = \frac{1}{\text{Payback period}} \times 100$$

Illustration 9:
If the payback period for a project is 5 years, then the payback period reciprocal would be:

$$\left(\frac{1}{5} \times 100 \right) = 20\%$$

The projects having lower payback period shall yield higher payback reciprocal, which reflects the worth of such project.

9.7 AVERAGE RATE OF RETURN

9.7.1 MEANING

This method measures the increase in profit expected to result from investment.

$$\textbf{ARR} = \frac{\textbf{Average Annual Profit After Tax}}{\textbf{Average or Initial Investment}} \times 100$$

$$= \frac{\textbf{Average EBIT (1 - t)}}{\textbf{Average Investment}} \times 100$$

Where, $\textbf{Average Investment} = \frac{\textbf{Initial Investment + Salvage Value}}{2}$

9.7.2 MERITS

(1) This method considers all the years in the life of the project.
(2) It is based upon profits and not concerned with cash flows.
(3) Quick decision can be taken when a number of capital investment proposals are being considered.

9.7.3 DEMERITS

(1) Time Value of Money is not considered.

(2) It is biased against short-term projects.

(3) The ARR is not an indicator of acceptance or rejection, unless the rates are compared with the arbitrary management target.

(4) It fails to measure the rate of return on a project even if there are uniform cash flows.

9.7.4 SOLVED PROBLEMS

Illustration 10:

A project costing Rs. 10 lacs. EBITD (Earnings before Depreciation, Interest and Taxes) during the first five years is expected to be Rs. 2,50,000; Rs. 3,00,000; Rs. 3,50,000; Rs. 4,00,000 and Rs. 5,00,000. Assume 33.99% tax and 30% depreciation on WDV Method.

Solution :

Computation of Project ARR:

Particulars	Yr 1	Yr 2 Rs.	Yr 3 Rs.	Yr 4 Rs.	Yr 5 Rs.	Average
EBITD	2,50,000	3,00,000	3,50,000	4,00,000	5,00,000	3,60,000
Less: Dep.	3,00,000	2,10,000	1,47,000	1,02,900	72,030	1,66,386
EBIT	(50,000)	90,000	2,03,000	2,97,100	4,27,970	1,93,614
Less: Tax@33.99%	--	13,596	69,000	1,00,984	1,45,467	65,809
	(50,000)	76,404	1,34,000	1,96,116	2,82,503	1,27,805

Book Value of Investment:

Begining	10,00,000	7,00,000	4,90,000	3,43,000	2,40,100
End	7,00,000	4,90,000	3,43,000	2,40,100	1,68,070
Average	8,50,000	5,95,000	4,16,500	2,91,550	2,04,085
4,71,427					

$$ARR = \frac{\text{Average EBIT (1-t) X 100}}{\text{Average Investment}} = \frac{1,27,805 \times 100}{4,71,427}$$

$$= 27.11\%$$

Note: Unabsorbed depreciation of Yr. 1 is carried forward and set-off against profits of Yr. 2. Tax is calculated on the balance of profits
= 33.99% (90,000 – 50,000)
= 13,596/-

9.8 EARNINGS PER SHARE (EPS)

EPS is one of the major criterion for capital investment appraisal. The value of a firm is maximized if the market price of equity shares is maximized.

$$EPS = \frac{\left[(EBIT - I)(1 - t) - D\right]}{n}$$

Where
EBIT = Earnings before Interest and Tax
I = Interest
t = Corporate tax rate
D = Preference Dividend
n = no. of equity shares

Note: The major drawback of this method is that it ignores cash flows, timing and risk.

9.9 NET PRESENT VALUE (NPV) METHOD

9.9.1 MEANING

Net Present Value = Present Value of Cash Inflows – Present Value of Cash Outflows

The discounting is done by the entity's weighted average cost of capital.

The discounting factors is given by : $\frac{1}{(1+i)^n}$

Where
i = rate of interest per annum
n = no. of years over which discounting is made.

9.9.2 MERITS

(1) It recognizes the Time Value of Money.

(2) It considers total benefits during the entire life of the Project.

(3) This is applicable in case of mutually exclusive Projects.

(4) Since it is based on the assumptions of cash flows, it helps in determining Shareholders Wealth.

9.9.3 DEMERITS

(1) This is not an absolute measure.

(2) Desired rate of return may vary from time to time due to changes in cost of capital.

(3) This Method is not effective when there is disparity in economic life of the projects.

(4) More emphasis on net present values. Initial investment is not given due importance.

9.9 .4 SOLVED PROBLEMS

Illustration 11:

Z Ltd. has two projects under consideration A & B, each costing Rs. 60 lacs.

The projects are mutually exclusive. Life for project A is 4 years & project B is 3 years. Salvage value NIL for both the projects. Tax Rate 33.99%. Cost of Capital is 15%.

Net Cash Inflow (Rs. Lakhs)

At the end of the year	Project A	Project B	P.V. @ 15%
1	60	100	0.870
2	110	130	0.756
3	120	50	0.685
4	50	—	0.572

Solution :

Computation of Net Present Value of the Projects.

Project A **(Rs. lakhs)**

	Yr. 1	Yr. 2	Yr. 3	Yr. 4
1. Net Cash Inflow	60.00	110.00	120.00	50.00
2. Depreciation 1	15.00	15.00	15.00	15.00
3. PBT (1–2)	45.00	95.00	105.00	35.00
4. Tax @ 33.99%	15.30	32.29	35.70	11.90
5. PAT (3–4)	29.70	62.71	69.30	23.10
6. Net Cash Flow (PAT+Depn)	44.70	77.71	84.30	38.10
7. Discounting Factor	0.870	0.756	0.685	0.572

8. P.V. of Net Cash Flows	38.89	58.75	57.75	21.79
9. Total P.V. of Net Cash Flow	= 177.18			
10. P.V. of Cash outflow (Initial Investment)	= 60.00			
Net Present Value	**= 117.18**			

Project B

	Yr. 1	**Yr. 2**	**Yr. 3**
1. Net Cash Inflow	100.00	130.00	50.00
2. Depreciation	20.00	20.00	20.00
3. PBT (1–2)	80.0	110.00	30.00
4. Tax @ 33.99%	27.19	37.39	10.20
5. PAT (3–4)	52.81	72.61	19.80
6. Next Cash Flow (PAT + Dep.)	72.81	92.61	39.80
7. Discounting Factor	0.870	0.756	0.685
8. P.V. of Next Cash Flows	63.345	70.01	27.263
9. Total P.V. of Cash Inflows	= 160.621		
10. P.V. of Cash Outflows (Initial Investment)	= 60.00		
Net Present Value	**= 100.621**		

As Project “A” has a higher Net Present Value, it has to be taken up.

9.10 INTERNAL RATE OF RETURN (IRR)

.9.10.1 MEANING

Internal Rate of Return is a percentage discount rate applied in capital investment designs which brings the cost of a project and its expected future cash flows into equality, i.e., NPV is zero.

9.10.2 MERITS:

(i) The Time Value of Money is considered.
(ii) All cash flows in the project are considered.

9.10.3 DEMERITS

(i) Possibility of multiple IRR, interpretation may be difficult.

(ii) If two projects with different inflow/outflow patterns are compared, IRR will lead to peculiar situations.

(iii) If mutually exclusive projects with different investments, a project with higher investment but lower IRR contributes more in terms of absolute NPV and increases the shareholders' wealth.

9.10.4 SOLVED PROBLEMS

Ilustration 1:

Project Cost	Rs. 1,10,000

Cash Inflows:

Year 1	Rs. 60,000
Year 2	Rs. 20,000
Year 3	Rs. 10,000
Year 4	Rs. 50,000

Calculate the Internal Rate of Return.

Solution:

Internal Rate of Return will be calculated by the trial and error method. The cash flow is not uniform. To have an approximate idea about such rate, we can calculate the "Factor". It represent the same relationship of investment and cash inflows in case of payback calculation:

F = I/C

Where F = Factor

I = Original investment

C = Average Cash inflow per annum

Factor for the project = $\frac{1,\ 10,000}{35,000}$ = 3.14

The factor will be located from the table "P.V. of an Annuity of Rs. 1" representing number of years corresponding to estimated useful life of the asset.

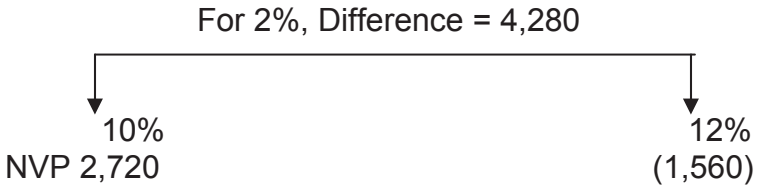
The approximate value of 3.14 is located against 10% in 4 years.

We will now apply 10% and 12% to get (+) NPV and (–) NPV [Which means IRR lies in between]

Year	Cash Inflows (Rs.)	P.V. @ 10% DCFAT		P.V. @ 12% DCFAT	
			(Rs.)		(Rs.)
1	60,000	0.909	54,540	0.893	53,580
2	20,000	0.826	16,520	0.797	15,940
3	10,000	0.751	7,510	0.712	7,120
4	50,000	0.683	34,150	0.636	31,800

P.V. of Inflows	1,12,720	1,08,440
Less : Initial Investment	1,10,000	1,10,000
NPV	**2,720**	**(1,560)**

Graphically,



IRR may be calculated in two ways :

Forward Method : Taking 10%, (+) NPV

$$IRR = 10\% + \frac{\text{NPV at 10\%}}{\text{Total Difference}} \times \text{Difference in Rate}$$

$$= 10\% + \frac{2720}{4280} \times 2\%$$

$$= 10\% + 1.27\% = 11.27\%$$

Backward Method: Taking 12%, (–) NPV

$$IRR = 12\% + \frac{(1560)}{4280} \times 2\%$$

$$= 12\% - 0.73\% = 11.27\%$$

The decision rule for the internal rate of return is to invest in a project if its rate of return is greater than its cost of capital.

For independent projects and situations involving no capital rationing, then:

Situation	Signifies	Decision
IRR = Cost of Capital	The investment is expected not to change shareholder wealth	Indifferent between Accepting & Rejecting
IRR > Cost of Capital	The investment is expected to increase shareholders wealth	Accept
IRR < Cost of Capital	The investment is expected to decrease shareholders wealth	Reject

9.11 NPV-IRR CONFLICT

Let us consider two mutually exclusive projects A & B.

	Project A	Project B	Decision
Cost of Capital	10%	10%	
IRR	13%	11%	Project A
NPV	1,00,000	1,10,000	Project B

When evaluating mutually exclusive projects, the one with the highest IRR may not be the one with the best NPV.

The conflict between NPV and IRR for the evaluation of mutually exclusive projects is due to the reinvestment assumption:

- NPV assumes cash flows reinvested at the cost of capital.
- IRR assumes cash flows reinvested at the internal rate of return.

The reinvestment assumption may cause different decisions due to:

- Timing difference of cash flows.
- Difference in scale of operations.
- Project life disparity.

Terminal Value Method

Assumption:

(1) Each cash flow is reinvested in another project at a predetermined rate of interest.
(2) Each cash inflow is reinvested elsewhere immediately after the completion of the project.

Decision-making

If the P.V. of Sum Total of the Compound reinvested cash flows is greater than the P.V. of the outflows of the project under consideration, the project will be accepted otherwise not.

Illustration 1:

Original Investment Rs. 40,000
Life of the project 4 years
Cash Inflows Rs. 25,000 for 4 years
Cost of Capital 10% p.a.
Expected interest rates at which the cash inflows will be reinvested:

Year-end	1	2	3	4
%	8	8	8	8

Solution:

First of all, it is necessary to find out the total compounded sum which will be discounted back to the present value.

Year	Cash Inflows (Rs.)	Rate of Int. (%)	Yrs. of Investment	Compounding Factor	Total Compounding (Rs.)
1	25,000	8	3	1.260	31,500
2	25,000	8	2	1.166	29,150
3	25,000	8	1	1.080	27,000
4	25,000	8	0	1.000	25,000
	1,12,650				

Present Value of the sum of compounded values by applying the discount rate @ 10%

$$\text{Present Value} = \frac{\text{Compounded Value of Cash Inflow}}{(1+i)^n}$$

$$= \frac{1,12,650}{(1.10)^4}$$

$$= 1,12,650 \times 0.683 = 76,940/-$$

[0.683 being the P.V. of Re. 1 receivable after 4 years]

Decision: The present value of reinvested cash flows, i.e., Rs. 76,940 is greater than the original cash outlay of Rs. 40,000.

The project should be accepted as per the terminal value criterion.

Profitability Index:

$$\text{Profitability Index} = \frac{\text{P.V. of cash Inflow}}{\text{P.V. of cash Outflow}}$$

If P.I > 1, project is accepted
P.I < 1, project is rejected

The PI signifies present value of inflow per rupee of outflow. It helps to compare projects involving different amounts of initial investments.

Illustration 2:
Initial investment Rs. 20 lacs. Expected annual cash flows Rs. 6 lacs for 10 years. Cost of
Capital @ 15%.
Calculate Profitability Index.

Solution:
Cumulative discounting factor @ 15% for 10 years = 5.019
P.V. of inflows = 6.00 × 5.019 = Rs. 30.114 lacs.

$$\text{Profitability Index} = \frac{\text{P.V. of Inflows}}{\text{P.V. of Outflows}} = \frac{30.114}{20} = 1.51$$

Decision: The project should be accepted.
Discounted Payback Period

In Traditional Payback period, the time value of money is not considered. Under discounted payback period, the expected future cash flows are discounted by applying the appropriate rate, i.e., the cost of capital.

Illustration 3:

Initial Investment Rs. 1,00,000
Cost of Capital @ 12% p.a.

Expected Cash Inflows

Yr. 1	Rs. 25,000
Yr. 2	Rs. 50,000
Yr. 3	Rs. 75,000
Yr. 4	Rs. 1,00,000
Yr. 5	Rs. 1,50,000

Calculate Discounted Payback Period.

Solution:

Year	Cash Inflows (Rs.)	Discounting Factor @ 12%	Discounted Cash Flows (Rs.)	Cumulative DCF (Rs.)
1	25,000	0.8929	22,323	22,323
2	50,000	0.7972	39,860	62,183
3	75,000	0.7117	53,378	1,15,561
4	1,00,000	0.6355	63,550	1,79,111
5	1,50,000	0.5674	85,110	2,64,221

The recovery was made between 2nd and 3rd year.

$$\text{Discounted Payback Period} = 2\,\text{Years} + \frac{1{,}00{,}000 - 62{,}183}{1{,}15{,}561 - 62{,}183} \times 12$$

$$= 2\,\text{Years} + \frac{37{,}817}{53{,}378} \times 12$$

= 2 years 8 ½ Months.

9.12 QUESTIONS

A - Find out the correct option:

1. Long-term decisions are called as
   a) Capita budgeting decisions
   b) Working capital decisions
   c) Future decisions

2. Capital budgeting decisions involve huge amount of risk due to
   a) Time factor
   b) Money factor
   c) Human factor

3. Payback period is
   a) The time required to recover the original investment
   b) The time required to depreciate asset
   c) The time required to pay to creditor

4. N.P.V method is
   a) Most traditional
   b) Most modern
   c) Most complicated

5. P.I is the proportion between
   a) PV of cash inflow and PV of cash outflow
   b) PV of cash inflow and total cash outflow
   c) Cash inflow and total cash outflow

6. The method which does not consider investments profitability is
   a) Payback
   b) ARR
   c) NPV
   d) IRR

7. The most reliable method for financing capital budget decision
   a) NPV
   b) ARR
   c) Payback
   d) Post audit method

8. P. Ltd is adding a new product line which requires an investment of Rs. 14,54,000. The life of the project will be 10 years and will generate cash inflow of Rs. 3,10,000 for the first year, Rs. 2,80,000 for the second year and Rs. 2,40,000 for each year thereafter for eight years. The payback period is
   a) 6 years
   b) 5 years & 7.2 months
   c) 7 years
   d) 4.5 years

9. Cost of project A is as 2, 72,000 and offers eight annual net cash inflow of Rs. 60,000. The expected rate of return is 14%. The NPV will be
   a) 6,340
   b) 7,400
   c) 8,590
   d) 4,300

10. P.I is the proportion between
    a) PV of cash inflow / scrap value
    b) PV of cash inflow / investment
    c) PV of cash inflow / life of the project
    d) None of the above

11. In replacement decision market value of existing assets is considered as
    a) Cash inflow
    b) Cash outflow
    c) Scrap value
    d) Cost of capital

12. Working capital required is treated as
    a) Cash outflow
    b) Cash inflow
    c) Cost of capital
    d) None of the above

13. Retrenchment compensation to employees is treated as
    a) Cash inflow
    b) Cash outflow
    c) Cost of capital
    d) None of the above

14. Under capital rationing situation, the method used to rank the indivisible projects is
    a) NPV
    b) PI
    c) Payback
    d) None of the above

B - State with reasons whether the following statements are true or false:

1. Investors are required to select right securities for investment of their surplus money.
2. Liquidity is convertibility of investments into cash.
3. Investors do not expect regular income.
4. Jewellery does not give recurring income.
5. Investments in shares results in dividend.
6. An investor does not expect liquidity of investment.
7. Appreciation growth in the value of investment.
8. Capital budgeting decisions are long term investment decisions.
9. Cost of investment is a part of cash outlay.
10. Depreciation should be added back to N.P. after tax to get cash inflow.
11. Capital budgeting decisions are very easy to take.
12. The project with longer payback period should be selected.
13. N P V method considers time value.

14. IRR is the best method of evaluating capital budgeting projects.
15. The cost of capital of a new projects is 18%. Two competing projects X and Y having IRR of 17% and 16% respectively project X has higher IRR. Hence it should be accepted.
16. Both IRR and NPV can be zero.
17. Cost of disposal of the existing machine is considered as cash outflow.

C - Fill in blanks.

1. Capital budgeting decision are _____.
2. Cash inflow should be after _____ buy before_____.
3. Scrap value _____cash inflow in the last year.
4. In capital _____ limited funds are allocated a among the financially viable projects.
5. Capital Rationing is done when funds are_____.
6. Tax saving on loss on sale of existing value is considered as _____.
7. Training cost of employees is considered as _____ in capital budgeting.

D - Match the Column:

	Group A		Group B
1	Capital budgeting decisions	A	$\frac{\text{Average}}{\text{Average Investment}}$
2	Capital budgeting decisions	B	Discounted cash flow
3	ARR	**D**	Considers time value of money
4	NPV	E	More risky
5	Discounted cash flow	**F**	Long term investment decisions

E – Answer the following Questions.

1. Write short notes on:
   1. DFC Technique
   2. Pay Back Period
   3. I.R.R.
2. What are the various factors that you would consider in appraising a project proposal?

10

INVESTMENT II

Unit Structure :

10.1 Objectives
10.2 Problems & Solutions

10.1 OBJECCTIVES

After studying the unit the students will be able to solve the problems related to the Investment Appraisal Techniques.

10.2 PROBLEMS & SOLUTIONS

Illustration 1 : Zenith Industrial Ltd. are thinking of investing in a project costing Rs. 20 lakhs. The life of the project is five years and the estimated salvage value of the project is zero. Straight line method of charging depreciation is followed. The tax rate is 50%. The expected cash flows before tax are as follows:

Year	1	2	3	4	5
Estimated Cash flow before depreciation and tax (Rs. lakhs)	4	6	8	8	10

You are required to determine the : (i) Payback Period for the investment, (ii) Average Rate of Return on the investment, (iii) Net Present Value at 10% Cost of Capital, (iv) Benefit-Cost Ratio.

Solution:

Calculation of Annual Cash Inflow After Tax (Rs. lakhs)

Particulars	1 year	2 year	3 year	4 year	5 year
Cash inflow before depreciation and tax	4	6	8	8	10
Less : Depreciation	4	4	4	4	4
EBT	-	2	4	4	6

Less : Tax @ 50%	-	1	2	2	3
EAT	-	1	2	2	3
Add : Depreciation	4	4	4	4	4
Cash inflow after tax	4	5	6	6	7

(i) Pay Back Period :

Year	Cash inflow after tax	Cumulative cash inflow after tax
1	4	4
2	5	9
3	6	15
4	6	21
5	7	28

Pay Back Period = 3 years + $\frac{\text{Rs.5 Lakhs}}{\text{Rs.6 Lakhs}}$ X 12 Months

= 3 Years 10 Months

(ii) Average Rate of Return

Average return = Rs.8 lakhs/5 years = Rs. 1.6 lakhs

Average investment = Rs. 20 lakhs/2 = Rs. 10 lakhs

Average rate of return = $\frac{1.6}{10}$ X100 = 16%

(iii) Net Present Value at 10% Cost of Capital (Rs. lakhs)

Year	Cash inflow after tax	Discount factor @ 20%	Present Value
1	4	0.909	3.636
2	5	0.826	4.130
3	6	0.751	4.506
4	6	0.683	4.098
5	7	0.621	4.347

P.V. of Cash Inflows	20.717
Less: Initial Investment	20.00
NPV	0.717

(iv) Benefit-Cost Ratio = $\frac{\text{P.V. of Cash Inflow}}{\text{P.V. of cash outflow}} = \frac{20.717}{20}$

= 1.036

Illustration 2:

The relevant information for two alternative systems of internal transportation are given below:(Rs. Million)

Particulars	System 1	System 2
Initial investment	6	4
Annual operating costs	1	0.9
Life	6 years	4 years
Salvage value at the end	2	1.5

Which system would you prefer if the cost of capital is 6%? Justify your recommendation with appropriate analysis.

[Present value of annuity at 6% for 6 years = 4.917 and for 4 years = 3.465. Present value of Rs. 1.00 at 6% at the end of 6the year 0.705 and that at the end of 4th year 0.792].

Solution :

P.V. of Costs of Internal Transportation - System 1 (Rs. Million)

Initial investment	(6×1.000)	6.000
Add : Annual operating cost	(1×4.917)	4.917
		10.917
Less : Salvage value at the end of 6 years	(2×0.705)	1.410
P.V. cash outflow		**9.507**

P.V. of Costs of Internal Transportation - System 2 (Rs. Million)

Initial investment (4×1.000)	4.000
Add : Annual operating cost (0.9×3.465)	3.1185
	7.1185
Less : Salvage value at the end of 6 years (1.5×0.792)	1.188
P.V. cash outflow	**5.9305**

Equivalent Annual Cost

$$\text{System 1} = \frac{9.507}{4.917} = \text{Rs. 1.93 Million}$$

$$\text{System 2} = \frac{5.9305}{3.465} = \text{Rs. 1.71 Million}$$

Analysis: The equivalent annual cost of System 2 is less than Sysem 1. Hence, System 2 is suggested to takeup.

Illustration 3:

A company is considering which of two mutually exclusive projects is should undertake. The Finance Director thinks that the

project with the higher NPV should be chosen whereas the Managing Director think that the one with the higher IRR should be undertaken especially as both projects have the same initial outlay and length of life. The company anticipates a cost of capital of 10% and the net after-tax cash flows of the projects are as follows:

Year	0	1	2	3	4	5
Cash Flows :						
Project X	(200)	35	80	90	75	20
Project Y	(200)	218	10	10	4	3

Required :

(a) Calculate the NPV and IRR of each project.

(b) State, with reasons, which project you would recommend.

(c) Explain the inconsistency in the ranking of the two projects.

The discount factors are as follows :

Year	**0**	**1**	**2**	**3**	**4**	**5**
Discount Factors: (10%)	1	0.91	0.83	0.75	0.68	0.62
(20%)	1	0.83	0.69	0.58	0.48	0.41

Solution :

(a) Calculation of the NPV and IRR of each project

NPV of Project X

Year	**Cash Flows**	**Discount Factors @ 10%**	**Discounted Values**	**Discount Factors @ 20%**	**Discounted Values**
0	(200)	1.00	(200)	1.00	(200)
1	35	0.91	31.85	0.83	29.05
2	80	0.83	66.40	0.69	55.20
3	90	0.75	67.50	0.58	52.20
4	75	0.68	51.00	0.48	36.00
5	20	0.62	12.40	0.41	8.20
NPV			+29.15		-19.35

IRR of Project X

At 20% NPV is -19.35
At 10% NPV is +29.15

$$IRR = 10 + \frac{29.15}{29.15 + 19.35} \times 10 = 10 + \frac{29.15}{48.50} \times 10 = 16.01\ \%$$

Financial Management Decisions

NPV of Project Y

Year	Cash Flows	Discount Factors @10%	Discounted Values	Discounted Factors @20%	Discounted Value
0	(200)	1.00	(200)	1.00	(200)
1	218	0.91	198.38	0.83	180.94
2	10	0.83	8.30	0.69	6.90
3	10	0.75	7.50	0.58	5.80
4	4	0.68	2.72	o.48	1.92
5	3	0.62	1.86	0.41	1.23
NPV			+18.76		-3.21
IRR of Project Y					

At 20% NPV is -3.21
At 10% NPV is +18.76

$$IRR = 10 + 18.76/18.76 + 3.21 \times 10 = 10 + 18.76/21.97 \times 10$$
$$= 18.54\%$$

(b) Both the projects are acceptable because they generate the positive NPV at the company's cost of capital at 10%. However, the company will have to select Project X' because it has a higher NPV. If the company follows IRR method, then Project Y should be selected because of higher internal rate of return (IRR). But when NPV and IRR give contradictory results, a project with higher NPV is generally preferred because of higher return in absolute terms. Hence project X should be selected.

(c) The inconsistency in the ranking of the projects arises because of the difference in the pattern of cash flows. Project X's major cash flows occur mainly in the middle three years, whereas Y generates the major cash flows in the first itself.

Illustration 4:

Projects X and Y are analyzed and you have determined the following parameters. Advice the investor on the choice of a project:

Particulars	Project X	Project Y
Invest	Rs. 7 cr.	Rs. 5 cr.
Project life	8 years	10 years
Construction period	3 years	3 years
Cost of capital	15%	18%
N.P.V. @ 12%	Rs. 3,700	Rs. 4,565
N.P.V. @ 18%	Rs. 325	Rs. 325
I.R.R.	45%	32%
Rate of return	18%	25%
Payback	4 years	6 years
B.E.P.	45%	30%
Profitability index	1.76	1.35

Solution:
Relative Ranking of Project X and Project Y

Particular's	Rank	
	Project X	Project Y
IRR	I	II
Rate of Return	II	I
Pay back	I	II
Profitability index	I	II
NVP @ 12%	II	I
NVP @ 18%	Equal	Equal
B.E.P.	II	I
Cost of Capital	I	II

Analysis: The major criterion i.e., IRR, Pay back and Profitability Index in which Project X is ranking first and hence it could be selected.

Illustration 5:

A company is contemplating to purchase a machine. Two machine A and B are available, each costing Rs. 5 lakhs. In comparing the profitability of the machines, a discounting rate of 10% is to be used and machine is to be written off in five years by straight-line method of depreciation with nil residual value. Cash inflows after tax are expected as follows:

(Rs. in lakhs)

Year	Machine A	Machine B
1	1.5	0.5
2	2.0	1.5
3	2.5	2.0
4	1.5	3.0
5	1.0	2.0

Indicate which machine would be profitable using the following methods of ranking investment proposals:

(i) Pay back method : (ii) Net present value method; (iii) Profitability index method; and (iv) Average rate of return method.

The discounting factors at 10% are—

Year	1	2	3	4	5
Discount factors	.909	.826	.751	.683	.621

Solution:

(i) Payback Period (PB) = $\frac{\text{Initial Investment}}{\text{Annual cash inflows}}$

Calculation of payback period:
Machine A

Year	Cash Inflows		Payback years required
	Total	Needed	
1	1.50	1.50	1 year
2	2.00	2.00	1 year
3	2.50	1.50	$\left(\frac{1.50}{2.50} \times 12 \text{ Months}\right) = 7.2$

Year	Cash Inflows		Payback years required
	Total	Needed	
1	0.50	.50	1 year
2	1.50	1.50	1 year
3	2.00	2.00	1 year
4	3.00	1.00	(1/3 X 12) = 4 Months
		5.00	

Payback period for Machine B = 3 years 4 months.
Rank : Machine A – I, Machine B – II, Machine A is more profitable.

(ii) Calculation of Net present value of cash inflows for Machine A & Machine B.

Years	Cash Inflows		Discount Factor @10%	P.V. Of Cash Inflows	
	Machine A	Machine B		Machine A	Machine B
1	1.5	0.5	.909	1.36	0.45
2	2.0	1.5	.826	1.65	1.24
3	2.5	2.0	.751	1.88	1.50
4	1.5	3.0	.683	1.02	2.05
5	1.0	2.0	.621	0.62	1.24
				6.53	6.48
Total P.V.				6.53	6.48
Initial Investment				5.00	5.00
Net Present Value (NPV)				1.53	1.48

Rank: Machine – A – I, Machine B – II

Since Machine A has grater NPV compared to Machine B, Machine A is more profitable.

(iii) Calculation of profitability Index

	Machine A	Machine B
Profitability Index = Present value of Cash Inflows / Present value of Cash outflows	$\frac{6.53}{5.00} = 1.306$	$\frac{6.48}{5.00} = 1.296$
Rank	I	II

Machine A is more profitable.

iv) $\text{Calculation of Average Rate of Return} = \frac{\text{Average annual earnings}}{\text{Initial Cost}} \times 100$

Rs. in Lakhs

	Machine A	Machine B
Total Cash Inflow	8.50	9.00
Less: Deprecation for 5 years	5.00	5.00
Net earning after tax and depreciation	3.50	4.00

Life of machine (yrs)	5	5
Average earnings per year	.70	0.80
Initial Cost	5	5
ARR	$\frac{0.70}{5.00} \times 100 = 14\%$	$\frac{0.80}{5.00} \times 100 = 16\%$
Rank	II	I

Machine B is more profitable.

Illustration 6:
Determine which of the following two mutually exclusive projects should be selected if they are:

(i) One-off investments or (ii) If they can be repeated indefinitely :

(Rs.)

Particulars	Project A	Project B
Investment	40,000	60,000
Life	4 years	7 years
Annual net cash inflows	15,000	16,000
Scrap value	5,000	3,000

Cost of capital is 15%. Ignore taxation. The Present Value of annuity for 4 years and 7 years at 15% are respectively 2.8550 and 4.1604 and the discounting factors at 4 years/7 years respectively 0.5718 and 0.3759.

Solution:

(i) Project A (Rs.)			
Year	Cash flow	Discount factor	Present value
0	(40,000)	1.0000	(40,000)
1-4	15,000	2.8550	42,825
4	5,000	0.5718	2,859
NPV = 5,684			

(i) Project B (Rs.)			
Year	Cash flow	Discount factor	Present value
0	(60,000)	1.0000	(60,000)
1-7	16,000	4.1604	66,566
7	3,000	0.3759	1,128
NPV = 7,694			

Suggestion: If Projects A and B are one-off investments, then Project B is preferable.

(ii) Uniform Annual Equivalent

$$A = \frac{5,684}{2.8550} = 1,991 \qquad B = \frac{7,694}{4,1604} = 1,849$$

Suggestion: Choose Project A for continual repeats.

Illustration 7: Company X is forced to choose between two machines A and B. The two machines are designed differently, but have identical capacity and do exactly the same job. Machine A costs Rs. 1,50,000 and will last for 3 years. It costs Rs. 40,000 per year to run. Machine B is an 'economy' model costing only Rs. 1,00,000, but will last only for 2 years, and costs Rs 60,000 per year to run. These are real cash flows. The costs are forecasted in rupees of constant purchasing power. Ignore tax. Opportunity cost of capital is 10 per cent. Which machine company X should buy?

Solution :

Working Notes :

Compound present value of 3 years @ 10% = 2.486
P.V. of Running cost of Machine A for 3 years = Rs. 40,000×2.486
= Rs. 99,440
Compound present value of 2 years @ 10% = 1.735
P.V. of Running cost of Machine B for 2 years = Rs. 60,000×1.735
= Rs. 1,04,100

Statement showing evaluation of Machine A and B (Rs.)

Particulars	Machine A	Machine B
Cost of purchase	1,50,000	1,00,000
Add : P.V. of running cost for 3 years	99,440	1,04,100
	2,49,440	2,04,100
P.V. Cash outflow	2,49,440	2,04,100
	2,486	1,735

Equivalent Present value of annual Cash outflow = 1, 00,338 = 1,17,637

Analysis: Since the annual Cash outflow of Machine B is highest, Machine A can be purchased.

Illustration 8:

A particular project has a four-year life with yearly projected net profit of Rs. 10,000 after charging yearly Depreciation of Rs. 8,000 in order to write-off the capital cost of Rs. 32,000. Out of the Capital cost Rs. 20,000 is payable immediately (Year 0) and balance in the next year (which will be the Year 1 for evaluation). Stock amounting to Rs. 6,000 (to be invested in Year 0) will be required throughout the project and for Debtors a further sum of Rs. 8,000 will have to be invested in Year 1. The working capital will be recouped in Year 5. It is expected that the machinery will fetch a residual value of Rs. 2,000 at the end of 4^{th} year. Income Tax is payable @ 40% and the Depreciation equals the taxation writting down allowances of 25% per annum. Income Tax is paid after 9 months after the end of the year when profit is made. The residual value of Rs. 2,000 will also bear Tax @ 40%. Although the project is for 4 years, for computation of Tax and realisation of working capital, the computation will be required up to 5 years.

Taking Discount factor of 10%, calculate NPV of the project and give your comments regarding its acceptability.

(NPV Factors @ 10% - Year 1-0.9091; Yr. 2-0.8264; Yr. 3-0.7513; Yr. 4-0.6830; Yr. 5-0.6209).

Solution:

Calculation of NPV of Project (Rs.)

Particulars	0	1	2	3	4	5
Capital Expenditure	(20,000)	(12,000)	--	--	--	--
Working Capital	(6,000)	(8,000)	--	--	--	--
Net Profit	--	10,000	10,000	10,000	10,000	10,000
Deprecation Add back	--	--	8,000	8,000	8,000	8,000
Tax	--	--	(4,000)	(4,000)	(4,000)	(4,800)
Salvage Value	--	--	--	--	2,000	--
Recovery of Working Capital	--	--	--	--	--	14,000
Net Cash Inflow	(26,000)	(10,000)	14,000	14,000	16,000	27,200
Discount Factor @ 10%	1.000	0.9091	0.8264	0.7513	0.6830	0.6209
Present Value	(26,000)	(9,091)	11,570	10,518	10,928	16,688

Suggestion: Since NPV is Rs. 14,813 ; it is suggested to accept the proposal.

Illustration 9: Following are the data on a capital project being evaluated by the Management of X Ltd.:

Project M

Annual cost saving	Rs. 40,000
Useful life	4 years
I.R.R.	15%
Profitability Index (PI)	1.064
NPV	?
Cost of capital	?
Cost of project	?
Payback	?
Salvage value	0

Find the missing values considering the following table of discount factor only :

Discount	15%	14%	13%	12%
1 year	0.869	0.877	0.885	0.893
2 year	0.756	0.769	0.783	0.797
3 year	0.658	0.675	0.693	0.712
4 year	0.572	0.592	0.613	0.636

Solution:

Calculation of Cost of Project i.e., Initial Cash Outlay of Project M

Annual cost saving = Rs. 40,000
Useful life = 4 years
I.R.R. = 15%

At 15% I.R.R., the total present value of cash inflows is equal to initial cash outlay.

Total present value of cash inflows @ 15% for 4 years is 2.855 = Rs. 40,000 × 2.855 = Rs. 1, 14,200
Project Cost is Rs. 1, 14,200

Calculation of Payback Period of Project M

$$\text{Payback Period} = \frac{\text{Cost of Project}}{\text{Annual Cost Saving}} = \frac{1,14,000}{40,000} = 2.855$$ or 2 years 11 months (approx)

Calculation of Cost of Capital

$$\text{Profitability Index} = \frac{\text{Discounted Cash Inflows}}{\text{Cost of Project}}$$

Profitability Index = 1.064 given

Cost of Project = Rs. 1, 14,200

$$1.064 = \frac{\text{Present value of cash inflows}}{1.14,200}$$

Present value of cash inflows = 1.064 × 1, 14,200 = Rs. 1, 21,509

Cumulative Discount Factor for 4 years

$$= \frac{\text{Present Value of Cash inflows}}{\text{Annual cost saving}}$$

$$= \frac{1,21,509}{40,000}$$

$$= 3.038$$

Looking at present value table at compound discount factor for 4 years is 3.038

Cost of capital = 12%

Calculation Net Present Value of Project

N.P.V = Present Value of Total Cash Inflows - Cost of Project
= 1, 21,509 – 1, 14,200 = Rs. 7,309

Illustration 10 :

XYZ Ltd. is manufacturer of high quality running shoes. Devang. President is considering computerizing the company's ordering, inventory and billing procedures. He estimates that the annual savings from computerization include a reduction of 10 clerical employees with annual salaries of Rs. 15,000 each, Rs. 8,000 from reduced production delays caused by raw materials inventory problems, Rs. 12,000 from lost sales due to inventory stock outs and Rs. 3,000 associated with timely billing procedures.

The purchase price of the system is Rs. 2,00,000 and installation costs are Rs. 50,000. These outlays will be capitalized (depreciated) on a straight line basis to a zero book salvage value which is also its market value at the end of five years. Operation of the new system requires two computer specialists with annual

salaries of Rs. 40,000 per person. Also tax rate is 40% and rate of return (cost of capital) for this project is 12%. Maintenance & Operating expenses is Rs. 12,000 p.a.

You are required to:

(i) Find the project's initial net cash outlay.

(ii) Find the project's operating and terminal value cash flows over its 5 year life.

(iii) Evaluate the project using NPV method.

(iv) Evaluate the project using PI method.

(v) Calculate the project's payback period.

(vi) Find the project's cash flows and NPV [part (i) through (iii)] assuming that the system can be sold for Rs. 25,000 at the end of five years even though the book salvage value will be zero, and

(vii) Find the project's cash flows and NPV [part (i) though (iii)] assuming that the book salvage value for depreciation purposes is Rs. 20,000 even though the machine is worthless in terms of its resale value.

Note :

(a) Present Value of annuity of Re. 1 at 12% rate of discount for 5 years is 3.605.

(b) Present Value of Re. 1 at 12% rate of discount, received at the end of 5 years is 0.567.

Solution :

(i) Calculation of Project's initial net cash outlay	(Rs.)
Purchase price of system	2,00,000
Installation cost	50,000
Net cash outlay of project	2,50,000

(ii) Calculation of Project's Operating and Terminal Value cash flows over its 5 year life (Rs.)

Savings		
Reduction in salaries (10 clerks × Rs. 15,000 p.a.)		1,50,000
Reduction in production delays		8,000
Reduction in lost sales		12,000
Savings from timely billing procedures		3,000
	(a)	**1, 73,000**

Expenses		
Depreciation		50,000
Salaries of computer specialists		80,000
Maintenance & Operating expenses		12,000
	(b)	**1, 42,000**
Profit before tax	(a) – (b)	31,000
Less : Tax @ 40%		12,400
Profit after tax		18,600
Add : Depreciation		50,000
Net cash inflows p.a. for 1 to 5 years		68,600

(iii) Evaluation of Project using NPV method (Rs.)

Year	Cash inflow	P.V. @ 12%	Total P.V.
0	(2,50,000)	1.000	(2,50,000)
1 to 5	68,600	3.605	2,47,303

NPV –2,697

Analysis: Since NPV is negative, the project cannot be accepted under NPV method.

(iv) Evaluation of Project using PI method

$$\text{Profitability Index (PI)} = \frac{\text{Present value of cash inflows}}{\text{Present value of outflows}}$$

$$= \frac{2,47,303}{2,50,000}$$

$$= 0.99$$

Analysis: Since Profitability Index is less than 1, the Project cannot be accepted under this method.

(v) Calculation of the Project's Payback Period : (Rs.)

Year	Net cash inflows	Cumulative cash inflow
1	68,600	68,600
2	68,600	1,37,200
3	68,600	2,05,800
4	68,600	2,74,400
5	68,600	3,43,000

The payback period is 3 years and fraction of the 4th year. The fraction year is calculated as under :

$$= \frac{44,200}{68,600}$$

$$= 0.64$$

Hence, the payback period is 3.64 years.

(vi) Calculation of Project Cash flows and NPV assuming that the system can be sold for Rs. 25,000 at the end of 5 years.

Year	Cash flows	P.V. @ 12%	Total P.V.
0	(2,50,000)	1.000	(2,50,000)
1 to 5	68,600	3.605	2,47,303
5	15,000*	0.567	8,505
NPV	**5,808**		

* Post tax salvage value = 25,000 (1-0.40) = Rs. 15,000

Analysis: Since NPV is positive, the project can be selected.

(vii) Calculation of project's cash flows and NPV assuming that the book salvage value for depreciation purposes is Rs. 20,000 even though the machine is worthless in terms of its resale value :

$$\text{Depreciation p.a.} = \frac{2,50,000 - 20,000}{5 \text{ YEARS}}$$

= Rs. 46,000 p.a.

Cash Inflow p.a.	**(Rs.)**
Savings	1,73,000
Less : Depreciation	46,000
Salaries of computer specialists	80,000
Maintenance cost	12,000
	1,38,000
Profit before tax	35,000
Less : Tax @ 40%	14,000
Profit after tax	21,000
Add : Depreciation	46,000
Cash Inflow p.a.	67,000

Year	**Cash flows Rs.**	**P.V. factor @ 12%**	**Total P.V. Rs.**
0	(2,50,000)	1.000	(2,50,000)
1 to 5	67,000	3.605	2,41,535
5 (tax credit)	8,000	0.567	4,536
NPV	**(3,929)**		

Analysis : Since NPV is negative, Project can be rejected.

Illustration 11:
Xpert Engineering Ltd. is considering buying one of the following two mutually exclusive investment projects:

Project A: Buy a machine that requires an initial investment outlay of Rs. 1,00,000 and will generate the cash flows after tax (CFAT) of Rs. 30,000 per year for 5 years.

Project B: Buy a machine that requires an initial investment outlay of Rs. 1,25,000 and will generate 'cash flows after tax' (CFAT) of Rs. 27,000 per year for 8 years.

Which project should be undertaken? The company uses 10% cost of capital to evaluate the projects.

Note: Present value of Re. 1 for eight years @10% - 0.9091, 0.8264, 0.7513, 0.6830, 0.6209,
0.5645, 0.5132, and 0.4665.

Solution:

Calculation of Net Present Value

Project A		**(Rs.)**
Initial Investment	(1,00,000×1.000)	(1,00,000)
Cash Inflow After Tax	(30,000×3.791)	1,13,730
NPV 13,730		

Project B		**(Rs.)**
Initial Investment	(1,25,000×1.000)	(1,25,000)
Cash Inflow After Tax	(27,000×5.335)	1,44,045
NPV 19,045		

Equivalent Annual NPV
Project A = 13,730/3.791 = Rs. 3,622
Project B = 19,045/5.335 = Rs. 3,570

Analysis

If it is one time Project, Project B suggested, since its NPV is greater than Project A

If a Project is to be replaced every time after the end of economic life of earlier Project, then Project A is preferable, since its equivalent annual NPV is higher than Project B.

Illustration 12:

XYZ Ltd., an infrastructure company is evaluating proposal to build, operate and transfer a section of 35 kms. of road at a project cost of Rs. 200 crores to be financed as follows:

Equity Share Capital Rs. 50 crores, loan at the rate of interest of 15% p.a. from financial institutions Rs. 150 crores. The Project after completion will be opened to traffic and a toll will be collected for a period of 15 years from the vehicles using the road. The company is also required to maintain the road during the above 15 years and after the completion of that period, it will be handed over to the Highway Authorities at zero value. It is estimated that

the toll revenue will be Rs. 50 crores per annum and the annual toll collection expense including maintenance of the roads will amount to 5% of the project cost. The company considers to write off the total cost of the project in 15 years on a straight line basis. For Corporate Income-tax purposes the company is allowed to take depreciation @ 10% on WDV basis. The financial institutions are agreeable for the repayment of the loan in 15 equal annual installments consisting of principal and interest.

Calculate Project IRR. Ignore Corporate taxation.

Solution :

Road Project cost = Rs. 200 crores
Financed by:
Equity Share Capital = Rs. 50 crores
Term Loan from financial institutions @ 15% p.a. = Rs. 150 crores
Annual net cash inflows = Rs. 50 crores - 5% of Rs. 200 crores
= Rs. 40 crores
Maintenance of road = 15 years
Salvage value at the end of 15 years = NIL

Calculation of IRR

$$\text{Factor to be located} = \frac{\text{Original Investment}}{\text{Average annual cash Inflows}} = \frac{\text{Rs. 200 crores}}{\text{Rs. 40 crores}} = 5.000$$

The Present Value annuity factor appearing nearest to 5.092 for 15 years @ 18%

NPV at 18%		(Rs. Crores)
P.V. of annual cash inflow	(40×5.092)	203.68
Initial cash outlay		200.00
NPV		3.68
NPV at 19%		**(Rs. Crores)**
P.V. of annual cash inflow	(40×4.876)	195.04
Initial cash outlay		200.00
NPV		(4.96)

Now, the IRR of the Project is ascertained by method of interpolation as follows:

$$\text{IRR} = 18\% + \frac{3.68}{3.68 - (4.96)} \times 1\%$$

$$= 18\% = \frac{3.68}{8.64} \times 1\%$$

= 18% + 0.426%
= 18.43%

Illustration 13:

An oil company proposes to install a pipeline for transport of crude from wells to refinery. Investments and operating costs of the pipeline vary for different sizes of pipelines (diameter). The following details have been conducted:

(a) Pipeline diamter (in inches)	3	4	5	6	7
(b) Investment required (Rs. lakhs)	16	24	36	64	150
(c) Gross annual savings in operating Costs before depreciation (Rs. lakhs)	5	8	15	30	50

The estimated life of the installation is 10 years. The oil company's tax rate is 50%. There is no salvage value and straight line rate of depreciation is followed.

Calculate the net savings after tax and cash flow generation and recommend there from, the largest pipeline to be installed, if the company desires a 15% post-tax return. Also indicate which pipeline will have the shortest payback. The annuity P.V. factor at 15% for 10 years is 5.019.

Solution :

Determination of CFAT (Rs. Lakhs)

Pipeline Diameter (inches) (1)	Gross Savings (p.a.) (2)	Savings After tax [(2)X50%] (3)	Deprecation (4)	Tax adv.of Deprecation [(4)X50%] (5)	Total cost Savings/CFAT [(3)X5%] (6)
3	5	2.5	1.6	0.8	3.3
4	8	4.0	2.4	1.2	5.2
5	15	7.5	3.6	1.8	9.3
6	30	15.0	6.4	3.2	18.2
7	50	25.0	15.0	7.5	32.5

Payback Period in Years

Inches	Rs. lakhs	Years
3	16/3.3	4.848
4	24/5.2	4.615
5	36/9.3	3.871
6	64/18.2	3.516
7	150/32.5	4.615

Therefore, Pipeline diameter of 6 inches has shortest payback period.

Determination of NPV (Rs. in lakhs)

Pipeline dia (inches)	CFAT	PV factor for 10 years	Total PV @ 15% 10 yrs.		Cash Outflow
NPV					
3	3.3	5.019	16.5627	16	0.5627
4	5.2	5.019	26.0988	24	2.0988
5	9.3	5.019	46.6767	36	10.6767
6	18.2	5.019	91.3458	64	27.3458
7	32.5	5.019	163.1175	150	13.1175

Suggestion: Pipeline of 6 inches diameter has highest NPV and it is recommended for installation.

Illustration 14 :

Indo Plastics Ltd. is a manufacturer of high quality plastic products. Rasik, President, is considering computerizing the company's ordering, inventory and billing procedures. He estimates that the annual savings from computerization include a reduction of 4 clerical employees with annual salaries of Rs. 50,000 each, Rs. 30,000 from reduced production delays caused by raw materials inventory problems, Rs. 25,000 from lost sales due to inventory stock outs and Rs. 18,000 associated with timely billing procedures.

The purchase price of the system in Rs. 2, 50,000 and installation costs are Rs. 50,000. These outlays will be capitalised (depreciated) on a straight line basis to a zero books salvage value which is also its market value at the end of five years. Operation of the new system requires two computer specialists with annual salaries of Rs. 80,000 per person. Also annual maintenance and operating (cash) expenses of Rs. 22,000 are estimated to be required. The company's tax rate is 40% and its required rate of return (cost of capital) for this project is 12%.

Your are required to—

(i) evaluate the project using NPV method;
(ii) Evaluate the project using PI method;
(iii) Calculate the Project's payback period.

Note:

(a) Present value of annuity of Re. 1 at 12% rate of discount for 5 years is 3.605.
(b) Present value of Re. 1 at 12% rate of discount, received at the end of 5 years is 0.567.

Solution:

Determination of NPV	**(Rs.)**
Cost	2, 50,000
Installation expenses	50,000
Total net Cash Outlay	3, 00,000

Project's operating and terminal value cash flows over its 5-year life (Rs.) Savings

Reduction in clerks salaries (4×50,000)	2, 00,000
Reduction in production delays	30,000
Reduction in lost sales	25,000
Gains due to timely billing	18,000
	2, 73,000
Less : Expenses	
Depreciation (3, 00,000/5)	60,000
Add : People cost (80,000×2)	1,60,000
Maintenance cost	22,000
	2, 42,000
Profit before Tax	**31,000**
Less : Tax (40%)	12,400
Profit After Tax	**18,600**

Cash flow = Profit After Tax – Depreciation = 18,600 + 60,000 = Rs. 78,600

The cash flows is the same for the years 1 to 5.

Financial Management Decisions

(i) Evaluation of the Project by using Net Present Value (NPV) Method :

Year	Cash Flow After tax (Rs.)	PV of Annuity of Rs.1. At 12% for five years	Total present value (Rs.)
1 to 5	78,600	3,605	28,3,353
Less : Total Initial Cash Outlay			3,00,000
NPV			(16,647)

Since NPV is negative, therefore, the project is unviable.

(ii) Evaluation of the Project by using PI Method.

Profitability Index (PI) = PV of cash inflow/Initial outlay
= 2, 83,353/3, 00,000 = 0.945
Since PI is less than 1.0, the project is unviable.

(iii)Calculation of the Project Payback Period (Rs.**)**

Year	Net cash flow	Cumulative cash flow
1	78,600	78,600
2	78,600	1,57,200
3	78,600	2,35,800
4	78,600	3,14,400
5	78,600	3,93,000

Hence, the payback period is 3 years plus a fraction of the 4^{th} year. The fraction of the year can be calculated as under:

$$\frac{64,200}{78,600} = 0.82$$

Therefore, the payback period is 3.82 years.

11

INVESTMENT DECISIONS III

Unit Structure :

11.0 Objectives
11.1 Capital Rationing
11.2 Solved Problems on Capital Rationing
11.3 Important Points

11.0 OBJECTIVES

After studying the unit the students will be able to:

- Understand the meaning of Capital Rationing.
- Discuss the Factors leading to capital rationing.
- Solve the problems.

11.1 CAPITAL RATIONING

11.1.1 MEANING

Capital rationing is a situation where a constraint or budget ceiling is placed on the total size of capital expenditures during a particular period. Often firms draw up their capital budget under the assumption that the availability of financial resources is limited.

Under this situation, a decision maker is compelled to reject some of the viable projects having positive net present value because of shortage of funds. It is known as a situation involving capital rationing.

11.1.2 FACTORS LEADING TO CAPITAL RATIONING

Two different types of capital rationing situation can be identified, distinguished by the source of the capital expenditure constraint.

I. External Factors - Capital rationing may arise due to external factors like imperfections of capital market or deficiencies in market information which might have for the availability of capital.

Generally, either the capital market itself or the Government will not supply unlimited amounts of investment capital to a company, even though the company has identified investment opportunities which would be able to produce the required return. Because of these imperfections the firm may not get necessary amount of capital funds to carry out all the profitable projects.

II. Internal Factors - Capital rationing is also caused by internal factors which are as follows:

Reluctance to take resort to financing by external equities in order to avoid assumption of further risk

Reluctance to broaden the equity share base for fear of losing control.

Reluctance to accept some viable projects because of its inability to manage the firm in the scale of operation resulting from inclusion of all the viable projects.

11.1.3 SITUATIONS OF CAPITAL RATIONING

Situation I - Projects are divisible and constraint is a single period one:

The following are the steps to be adopted for solving the problem under this situation:

a. Calculate the profitability index of each project
b. Rank the projects on the basis of the profitability index calculated in (a) above.
c. Choose the optimal combination of the projects.

Situation II - Projects are indivisible and constraint is a single period one

The following steps to be followed for solving the problem under this situation:

a. Construct a table showing the feasible combinations of the project (whose aggregate of initial outlay does not exceed the fund available for investment.

b. Choose the combination whose aggregate NPV is maximum and consider it as the optimal project mix.

11.2 SOLVED PROBLEMS ON CAPITAL RATIONING

Illustration 1: In a capital rationing situation (investment limit Rs. 25 lakhs), suggest the most desirable feasible combination on the basis of the following data (indicate justification) :

(Rs. lakhs)

Year	Net cash flow	NPV
A	15	6
B	10	4.5
C	7.5	3.6
D	6	3

Project B and C are mutually exclusive.

Solution :

Determination of feasible combination in Capital Rotationing Situation (Investment Limit Rs. 25 lakhs)

(Rs. lakhs)

Combination	Total outlay	NPV
A & B	25.00	10.50
A & C	22.50	9.60
A & D	21.00	9.00
B & D	16.00	7.50
C & D	13.50	6.60

Analysis : From the above analysis it is observed that projects A&B combination give highest NPV of Rs. 10.50 lakhs. Therefore by undertaking projects A and D, the wealth maximation is possible.

Illustration 2 : The total available budget for a company is Rs. 20 crores and the total cost of the projects is Rs. 25 crores. The projects listed below have been ranked in order of profitability. There is possibility of submitting X project where cost is assumed to be Rs. 12 crores and it has the Profitability Index of 140.

Project	Cost (Rs. crores)	Profitability index (P.V. of cash inflow/PV of cash outflows) x 100
A	6	150
B	5	125
C	7	120
D	2	115
E	5	110
	25	

Which projects, including X, should be acquired by the company?

Solution :

N.P.V of Projects

Project	Cost	PI	P.V. of cash inflow	NPV
(1)	(2)	(3)	(2) x (3) = (4)	(4) - (2) = (5)
A	6	1.5	9.00	3.00
B	5	1.25	6.25	1.25
C	7	1.20	8.40	1.40
D	2	1.15	2.30	0.30
E	5	1.10	5.50	0.50
X	13	1.40	18.20	5.20

Selection of project based on NPV, subject to the availability of total funds Rs. 20 crores.

Project	NPV	Project cost
X	5.20	13
A	3.00	6
	8.20	19

The company will maximize its NPV by undertaking X and A, which require total funds of Rs.19 crores. This option is suggested even though there is no full utilisation of total funds. The surplus funds of Rs. 1 crore can be deployed elsewhere profitably.

The following combination of projects will not maximise NPV :

Project	NPV	Project cost
(i) X	5.20	13
B	1.25	5
	6.45	18
(ii) X	5.20	13
C	1.40	7
	6.60	20
(iii) X	5.20	13
B	1.25	5
D	0.30	2
	6.75	20

Illustration 3: S. Ltd., has Rs. 10,00,000 allocated for capital budgeting purpose. The following proposal and associated profitability indexes have been determined :

Project	Cost Rs.)	Profitability Index
1	3,00,000	1.22
2	1,50,000	0.95
3	3,50,000	1.20
4	4,50,000	1.18
5	2,00,000	1.20
6	4,00,000	1.05

Which of the above investment should be undertaken? Assume that projects are indivisible and there is no alternative use of the money allocated for capital budgeting.

Solution :

Statement Showing Ranking of Projects on the basis of Profitability Index (P.I.)

Project	Cost (Rs.)	P.I	Rank
1	3,00,000	1.22	1
2	1,50,000	0.95	5
3	3,50,000	1.20	2
4	4,50,000	1.18	3
5	2,00,000	1.20	2
6	4,00,000	1.05	4

Statement showing NPV of Projects (Rs.)

Project	Cost	P. I.	Cash inflow (2) x (3)	NPV (4) - (2)
(1)	(2)	(3)	(4)	(5)
1	3,00,000	1.22	3,66,000	66,000
2	1,50,000	0.95	1,42,500	(7,500)
3	3,50,000	1.20	4,20,000	70,000
4	4,50,000	1.18	5,31,000	81,000
5	2,00,000	1.20	2,40,000	40,000
6	4,00,000	1.05	4,20,000	20,000

Selection Projects

- Profitability Index method : Assuming the projects are indivisible and there is no alternative use of unutilized amount, S. Ltd. is advised to undertake investment in projects 1,3 and 5, which will give N.P.V. of Rs. 1,76,000 and unutilized amount will be Rs. 1,50,000.

- Net present value method : As per this method projects 3, 4 and 5 can be undertaken which will be Rs. 1,91,000 and no money will remain unspent.

Suggestion :

From the above analysis, we can observe that, selection of projects under NPV method will maximize S Ltd.'s net 45cash inflow by Rs. 15,000 (i.e., 1,91,000 – 1,76,000), Hence, it is suggested to undertake investment in project 3, 4 and 5.

Illustration 4

Alpha Limited is considering five capital projects for the year 2003 and 2004. The company is financed by equity entirely and its cost of capital is 12%. The expected cash flow of the projects is as below:

Year ended Cash flows

Projects	2003	2004	2005	2006
A	(70)	35	35	20
B	(40)	(30)	45	55
C	(50)	(60)	70	80
D	-	(90)	55	65
E	(60)	(20)	40	50

Note : Figures in brackets represent cash outflows.

All projects are divisible i.e., size of investment can be reduced, if necessary in relation to availability of funds. None of the projects can be or delayed or undertaken more than once.

Calculate which projects Alpha Limited should undertake if the capital available for investment is limited to Rs. 1,10,000 in 2003 and with no limitation in subsequent year. For your analysis, use the following present value factors:

Years	2003	2004	2005	2006
Factors	1.00	0.89	0.80	0.71

Solution:

Calculation of NPV and Profitability Index (PI)

Year Discount Factors @ 12%	Discounted Cash Flows				NPV	PI
	2003 1.00	2004 0.89	2005 0.80	2006 0.71		
Project						
A	(70)	31.15	28	14.20	3.35	1.048
B	(40)	(26.70)	36	39.05	8.35	1.125
C	(50)	(53.40)	56	56.80	9.40	1.091
D	--	(80.10)	44	46.15	10.05	1.125
E	(60)	(17.80)	32	25.30	25.30	1.422

Ranking of Projects Based on Profitability Index

Rank	I	II	III	IV	V
Project	E	D	B	C	A

Anlysis and Selection:
Conditions:

1. Capital available for investment is limited to Rs. 1,10,000 in 2003, with no limitation in subsequent years.
2. All projects are divisible i.e., size of investment can be reduced if necessary in relation to availability of funds.
3. None of the projects can be delayed or undertaken more than once.

Project D's cash outflow will start in the year 2004, and hence this will not form a s constraint in selection of projects. Since there is no scarcity of funds from the year 2004 onwards. This can be taken up in 2004.

Project	**Rank**	**Initial investment (Rs.)**
E	I	60,000
B	II	40,000
C	IV	10,000*

* Since the project C is divisible, the balance funds of Rs. 10,000 (i.e., 1,10,000–60,000–40,000) can be allocated to project C. One of the condition in the problem is none of the projects can be undertaken more than once. Hence project C will continue with initial investment of Rs. 10,000. Project D can be undertaken in the year 2004 since there is no scarcity of funds from the year 2004.

Ranking of Projects excluding 'D' which is to start in 2004 when no limitation on capital availability :

Project	E	B	C	A
Rank	I	II	III	IV

Illustration 5:

Five Projects M, N, O, P and Q are available to a company for consideration. The investment required for each project and the cash flows it yields are tabulated below. Projects N and Q are mutually exclusive. Taking the cost of capital @ 10%, which combination of projects should be taken up for a total capital outlay not exceeding Rs. 3 lakhs on the basis on NPV and Benefit-Cost Ratio (BCR)?
(Rs.)

Project	Investment	Cash flow p.a.	No of years	P.V. @ 10%
M	50,000	18,000	10	6.145
N	1, 00,000	50,000	4	3.170
O	1, 20,000	30,000	8	5.335
P	1, 50,000	40,000	16	7.824
Q	2, 00,000	30,000	25	9.077

Solution:

Total Capital outlay < Rs. 3.00 lakhs

Computation of Net Present Value and Benefit – cost Ratio for 5 Projects. (Rs.)

Project	Investment	Cash Flow p.a.	No. of Years	P.V. @ 10%	P.V.	NPV	BCR (PV/Investment)
M	50,000	18,000	10	6.145	1,10,610	60,610	2.212
N	1,00,000	50,000	4	3.170	1,58,500	58,500	1.585
O	1,20,000	30,000	8	5.335	1,60,050	40,050	1.334
P	1,50,000	40,000	16	7.824	3,12,960	1,62,960	2.086
Q	2,00,000	30,000	25	9.077	2,72,310	72,310	1.362

Statement showing Feasible Combiation of Projects and NPV, BCR

Feasible Combination Of projects	Investment (Rs.)	NPV (Rs.)	Rank	BCR	Rank
(i) M, N and P	3,00,000	2,82,070	1	1.940	1
(ii) M, N and O	2,70,000	1,59,160	4	1.589	4
(iii) O & P	2,70,000	2,03,010	3	1.752	3
(iv) M & Q	2,50,000	1,32,920	5	1.532	5
(v) N & P	2,50,000	2,21,460	2	1.886	2
(vi) N & Q	3,00,000	1,30,810	6	1.436	6

Illustration 6 :
C Ltd. is considering its capital investment programme for 2010 and 2011. The company is financed entirely by equity shares and has a cost of capital of 15% per annum. The company have reduced their initial list of projects to five, the expected cash flows of which are as follows :

Project	Cash Flows			
	2010	2011	2012	2013
A	- 60,000	+ 30,000	+25,000	+25,000
B	- 30,000	- 20,000	+25,000	+45,000
C	- 40,000	- 50,000	+60,000	+70,000
D	0	- 80,000	+45,000	+55,000
E	- 50,000	+ 10,000	+,30,000	+40,000

None of the above projects can be delayed. All the projects are divisible, outlays may be reduced by any proportion and net inflows will then be reduced in the same proportion. No project can be undertaken more than once. C Ltd. is able to invest surplus funds in a bank deposit account yielding an annual return of 10%. C Ltd. cost of capital is 15%.

Required :
(i) Prepare calculations showing which projects C. Ltd. should undertake, if capital is expected to be available as indefinitely large amounts at 15% per annum during all future periods.

(ii) Show how your answer to (i) would vary if capital available for investment was limited to Rs. 1, 00,000 in 2011 but was not limited thereafter.

(iii) Provide a mathematical programming formulation which would assist C Ltd. in choosing investment projects if capital available in 2010 is limited to Rs. 1,00,000, capital is available in 2011 is limited to Rs. 90,000, capital available thereafter without limit at 10% per annum, and the shareholders required return from the company was 15% per annum at all relevant times.

Ignore taxation. Present value factors at 15% year 1-0.8696; 2-0.7561; 3-0.6575.

Solution :

(i) Net Present Value Calculations

	(Rs.)
Project A =	(60,000) + 30,000 × .8696 + 25,000 × .7561 + 25,000×.6575 = 1,428
Project B =	(30,000) + (20,000) × .8696 + 25,000 × .7561 + 45,000×.6575 = 1,098
Project C =	(40,000) + (50,000) × .8696 + 60,000 × .7561 + 70,000×.6575 = 7,911
Project D =	(80,000) × .8696 + 45,000 × .7561 + 55,000× .6575 = 619
Project E =	(50,000) + 10,000 × .8696 + 30,000 × .7561 + 40,000×.6575 = 7,679

Every project should be accepted since each has a positive Net Present Value.

(ii) Preferred Investments.

Project	**Rs.**	**Ranking**
D	0	I
C	40,000	II
E	50,000	III
B	10,000	IV
	1,00,000	

Z (in maximise) 1428 A + 1098 B + 7911 C + 619 D + 7679 E – 0.44F
= 60,000 A + 30,000 B + 40,000 C + 50,000 E + F ≤ 1, 00,000
= 20,000 B + 50,000 C + 80,000 D ≤ 1.1F+30,000 A+10,000 E + 90,000
A, B, C, D, E, F

Working: If invested in Bank Deposit, Yield @ 10% = 1.1
Cost of Capital (if not invested) @15% = 1.15
The Decision of not investing will yield a loss of revenue.
The revised NPV of revenue from the project will be = $\left(\frac{1.1}{1.15}-1\right)=044F$

Illustration 7:

A company is considering a cost saving project. This involves purchasing a machine costing Rs. 7,000 which result in annual savings on wage costs of Rs. 1,000 and on material costs of Rs. 400.

The following forecasts are made of the rates of inflation each year for the next 5 years :

Wages costs	10%
Material costs	5%
General prices	6%

The cost of capital of the company, in monetary terms, is 15%. Evaluate the project, assuming that the machine has a life of 5 years and no scrap value.

Solution:

Calculation of Net Present Value

Year	Labour Cost Saving	Material Cost Saving	Total Savings	DCF @ 15%	Present Value
1	1000 X (1.1) = 1,100	400 X (1.05) = 420	1,520	0.870	1,322
2	1000 X (1.1)2 = 1,210	400 X (1.05)2 = 441	1,651	0.756	1,248
3	1000 X (1.1) 3= 1,331	400 X (1.05) 3= 463	1,794	0.658	1,180
4	1000 X (1.1)4 = 1,464	400 X (1.05) 4= 486	1,950	0.572	1,115
5	1000 X (1.1) 5= 1,610	400 X (1.05) 5= 510	2,120	0.497	1,054
Present Value of Total Savings					5,919
Less: Initial Cash Outflow					7,000
Net Present Value (Negative)					(1,081)

Analysis: Since the present value of cost of project exceeds the present value of savings it is not suggested to purchase the machine.

Illustration 8:

D Limited, has under review a project involving the outlay of Rs. 55,000 and expected to yield the following net cash savings in current terms:

Year	1	2	3	4
Rs.	10,000	20,000	30,000	5,000

The company's cost of capital, incorporating a requirement for growth in dividends to keep pace with cost inflation is 20%, and

this is used for the purpose of investment appraisal. On the above basis the divisional manager involved has recommended rejection of the proposal.

Having regard to your own forecast that the rate of inflation is likely to be 15% in year 1 and 10%, in each of the following years, you are asked to comment fully on his recommendation. (Discounting figures at 20% are 0.833, 0.694, 0.579 and 0.482 respectively for year 1 to year 4.)

Solution :
Calculation of Net Present Value

Year	Cash Inflows	Discount Factor (20%)	Present Value
1	10,000	0.833	8,330
2	20,000	0.694	13,880
3	30,000	0.579	17,370
4	5,000	0.482	2,410
P.V. of cash inflows			41,990
Less: Initial Investment			55,000
Net Present Value			(13,010)

Analysis: Since NPV is negative it is suggested not to take up the project. Company's cost of capital is fixed at 20% keeping in view the requirement for growth in dividend as well as cost inflation.

Calculation: Net Present Value based on Inflation Adjusted Cash Flow (Rs.)

Year	Cash Flow	Inflation Adjustment	Inflation Adjustment	DCF @ 20%	Present Value of Cash Flow
1	10,000	1.15	11,500	0.833	9,580
2	20,000	1.15X1.10	25,300	0.694	17,558
3	30,000	1.15X1.102	41,745	0.579	24,170
4	5,000	1.15X1.103	7,653	0.482	3,689
Present Value of Inflation Adjusted cash Inflows					54,997
Less: Initial Investment					55,000
Net Present Value					(-) 3

Analysis :

The negative NPV is due to rounding of, otherwise it would be zero. Hence, it is indifferent to suggest or reject the proposal.

Illustration 9:

A company is considering a new project. The project would involve an initial investment of Rs. 1, 20,000 in equipment which would have a life of 5 years and no scrap value. The selling price now (year 0) would be Rs. 60 and is expected to increase in line with the retail price index. Sales are expected to be constant at 2000 units each year. The following estimates about unit costs are available:

Cost Element	Cost at year 0 Price Rs.	Rate of Increase
Wages	20	2% per annum faster than retail prices
Other	25	In line with retail prices
Total	45	

All transactions take place at yearly intervals on the last day of the year. No increase in working capital will be required. The following estimates of the rate of increase in retail prices and of interest rates are available :

Year	Rates of increase in retail prices%	Interest rate%
1	15	16
2	20	20
3	25	22
4	40	20
5	30	18

Assuming Purchasing Power Parity Theorem hold in the present case, changes in interest rates will affect the money value. Hence Cost of Capital is taken in money terms.

Solution :

Year	0	1	2	3	4	5
Inflation rate for contribution before wages (interest over previous year)		1.15	1.20	1.25	1.40	1.30
Inflation rate for wages (interest over previous year)		1.17	1.22	1.27	1.42	1.32
Contribution before wages, per unit sold	Rs. 30	Rs. 40.25	Rs. *48.30	Rs. 60.38	Rs. 84.53	Rs. 109.88
Wages per unit	20	23.40	28.55	**36.26	51.49	67.97
Contribution after wages, per unit sold	15	16.85	19.75	24.12	33.04	41.91
Total contribution from 2000 units sold	30,000	33,700	39,500	48,240	66,080	83,820

*35x1.15x1.20; similarly other figures in this row.
**20x1.17x1.22x1.27; similarly, other figures in this row.

Calcaulation of Net Present Value using Money Estimates (Rs.)

Year	Money cash flow	Money discount factor	Present value
0	(1,20,000)	1.000	(1,20,000)
1	33,700	0.862 [1x1/1.16]	29,049
2	39,500	0.718 [0.862x1/1.2]	28,361
3	84,240	0.589 [0.718x1/1.22]	28,413
4	66,080	0.491 [0.589x1/1.2]	32,445
5	83,820	0.416 [0.491x1/1.18]	34,869

NPV - 33,137

Analysis : Since the NPV is Positive, the project is worthwhile.

Illustration 10 : E. Ltd. is considering the replacement of a machine used exclusively for the manufacture of one of its Product Y. The existing machine have a book value of Rs. 65,000 after deducting straight line depreciation from historical costs. However, it could be sold only for Rs. 45,000. The new machine would cost Rs. 1, 00,000. E. Ltd. expects to sell Product Y for four more years. The existing machine could be kept in operation for that period of time if it were economically desirable to do so. After four years, the scrap value of both the existing machine and new machine would be zero.

The current costs per unit for manufacturing Y on the existing machine and on a new machine are as follows :

	Existing Machine			New Machine
Material		22.00		20
Labour	(32 hours @ Rs. 1.25)	40.00	(16 Hrs. @ Rs. 1.25)	20
Overheads	(32 Hours @ 0.60)	19.20	(16 Hrs. @ Rs. 1.80)	28.80
Total Cost		81.20		68.80

Overheads are area allocated to products on the labour hour rate method. The hourly rates are of 0.60 and 1.80 comprise 0.25 and 0.625 for variable overheads and 0.35 and Rs. 1.175 for fixed overheads, including depreciation.

Current sales of Y are 1000 units per annum at Rs. 90 each, if the new machine were purchased, output would be increased to 1200 units and selling price would be reduced it Rs. 80.

E. Ltd. requires a minimum rate of return on investment of 20 per cent per annum in money terms. Material cost, overheads and selling prices are expected to increase at the of 15% per annum, in line with the index of retail prices. Labour costs are expected to increase at the rate of 20% per annum.

You are required to ;-
(i) Give calculations to show whether purchase of the machine would be worthwise.
(ii) Comments on the treatment of inflation and the estimation of 20% money cost of capital.

Solution :
(i) Cost of replacement = 1,00,000 – 45,000 = Rs. 55,000

Manufacturing cost
Fixed items, including depreciation, should be disregarded o the assumption :

(a) Fixed costs do not change as a result of machine.
(b) Additional 200 units of extra production would be sold.
(c) All variable elements in the costs given represent cash flow (i.e., labour, material and variable overheads).

Operating cash flow Comparison

Particular	New Machine (1200 Units) P.U.	Total	Existing Machine (1000 Units)		Incremental Cash Flow
Sales	80	96,000	90	90,000	6,000
Materials	20	24,000	22	22,000	(2,000)
Labour	20	24,000	40	40,000	16,000
Overheads	10	12,000	8	8,000	(4,000)
Net Cash Flows		36,000		20,000	16,000

Operating savings are Rs. 16,000 p.a. in Case of new machine.

Notes :
a. Current prices are assumed in the above table i.e., prices at time 0.

b. Time increase in revenue from new machine Rs. 6,000 is exactly offset by the increases in materials and variable overheads i.e. Rs. 6,000. Revenue, materials and variable overheads are stated to be subject to the same rate of inflation i.e. 15% and therefore will continue to increase at the same rate.

c. The net savings of Rs. 16,000 represent the saving on labour costs which is expected to
increase @ 20% p.a.

Operating cash flow Comparison (Rs.)

Year	Cash Flows	Discount factor @ 20%	PV
0	(55,000)	1.000	(55,000)
1	*19,200	0.833	15,994
2	23,040	0.694	15,990
3	27,648	0.579	16,008
4	33,178	0.482	15,992

Net Present Value 8,984 * 1,600×12

Saving is compounded @ 20% p.a. inflation rate, discounted at 20% money cost of capital, will be Rs. 16,000 p.a.

For 4 years Rs. 16,000×4 = Rs. 64,000.
NPV Rs. 64,000 – Rs. 55,000 = Rs. 9,000.
The above result is due to approximation.

(ii) The relationship between money cost of capital and real cost of capital is given by - (1+m) = (1–r) (1+i) Where, m = money cost of capital

r = real cost of capital
i = is the inflation rate

Hence, 1 + 0.20 = (1+r) (1+0.15)
Hence, r = 4.3%

Analysis : Real cost of capital consists of time value of money return required on a relatively risk less security in a non-inflationary situation and the risk premium to compensate investors for the uncertainty associated with the investment in the said security 4.3% is a very low figure and therefore when inflation is @ 15% p.a., money cost of capital should much higher than 20%. This project might have been rejected if money cost of capital is calculated correctly.

Illustration 11:
A Company is reviewing an investment proposal in a project involving a capital outlay of Rs. 90, 00,000 in plant and machinery. The project would have a life of 5 years at the end of which the plant and machinery could reach a resale value of Rs. 30, 00,000. Further the project would also need a working capital of Rs. 12, 50,000 which would be built during the year 1 and to be released from the project at the end of year 5. The project is expected to yield the following cash profits :

Year	Cash profit (Rs.)
1	35,00,000
2	30,00,000
3	25,00,000
4	20,00,000
5	20,00,000

A 25% depreciation for plant and machinery is available on WDV basis as Income-tax exemption. Assume that the Corporate Tax is paid one year in arrear of the periods to which it relates and the first year's depreciation allowance would be claimed against the profits of year 1.

The Assistant Management Accountant has calculated NPV of the project using the company's corporate target of 20% pre-tax rate of return and has ignored the taxation effect in the cash flows.

As the newly recruited Management Accountant, you realise that the project's cash flows should incorporate the effects of tax. The Corporate Tax is expected to be 35% during the life of the project and thus the company's rate of return post-tax is 13% (65% of 20%).

Your Assistant is surprised to note the difference between discounting the pre-tax cash flows at a pre-tax DCF rate and post-tax cash flows at a post-tax rate.

Required:
a. Calculate the NPV of the project as the Assistant Management Accountant would have calculated it;
b. Re-calculate the NPV of the project taking tax into consideration;
c. Comment on the desirability of the project vis-a-vis your findings in (b).

Solution :
a. Assistant Management Accountant's Calculation (i.e., Ignoring taxation)

Year	Investment		Cash Profit	Net Cash Flows	Discount Factor At 20%	Present Value
	Plant And Machinery	Working Capital				
0	(90.0)	--	--	(90.0)	1.00	(90,000)
1	--	(12.5)	35.0	22.5	0.83	18,675
2	--		30.0	30.0	0.69	20,700
3	--		25.0	25.0	0.58	14,500
4	--		20.0	20.0	0.48	9,600
5	30.0	12.5	20.0	62.5	0.40	25,000
					NPV	(1,525)

It is assumed that working capital (debtors, stocks etc.) reduce cash flows in year 1 and would be recovered soon after the end of year 5. The working capital cash flows are therefore assigned to years 1 and 5.

Here it is observed that NPV is negative and hence, the Assistant Management Accountant would have concluded that the project should be rejected.

(b) Allowing for taxation :
(i) Tax on Cash Profit

Year	Cash Profit	Tax 35%	Year of Tax Payment
1	35	12.25	2
2	30	10.50	3
3	25	8.75	4
4	20	7.00	5
5	20	7.00	6

Year	Reducing Balance	Deprecation	Tax Rebate (Tax payable)	Year of Cash Flows
0	90,000	--	--	--
1	67,500	22,500	7,875	2
2	50,625	16,875	5,906	3
3	37,969	12,656	4,430	4
4	28,476	9,492	3,322	5
5	21,357	7,119	2,492	6
* Profit on Sale of Plant & Machinery (30,000 – 21,357)		(8,643)*	(3,025)	6

Calculation of NPV of the Project:

Year	Investment		Depen. Allow. Tax	Cash Profit	Tax on Profit	Net Cash Flows at 13%	Disc. Factor	Present Value
	Plant & machinery	Working Capital Saved						
0	(90,000)	--	--	--	--	(90,000)	1.00	(90,000)
1	--	(12,500)	--	35,000	--	22,500	0.88	19,800
2	--	--	7,875	30,000	(12,500)	25,625	0.78	19,988
3	--	--	5,906	25,000	(10,500)	20,406	0.69	14,080
4	--	--	4,430	20,000	(8,750)	15,680	0.61	9,565
5	30,000	12,500	3,322	20,000	(7,000)	58,822	0.54	31,764
6	--	--	(0.533)	--	(7,000)	(7,533)	0.48	(3,616)
							NVP	+ 1,581

(c) The NPV is positive, although it is very small in relation to the Capital outlay of Rs. 90 lakhs. It is also apparent the positive NPV depends heavily on the assumption that the plant and machinery would have a resale value of Rs. 30 lakhs at the end of year 5. Such projects which rely on their residual values for their positive NPV should normally be regarded high risk venture. It can be further seen that a drop of around 10% i.e., Rs. 3 lakhs in resale value would make the project negative.

Illustration 12:
SCL Limited, a highly profitable company, is engaged in the manufacture of power intensive products. As part of its diversification plans, the company proposes to put up a Windmill to generate electricity. The details of the scheme are as follows:

(1) Cost of the Windmill - Rs. 300 lakhs

(2) Cost of Land - Rs. 15 lakhs
(3) Subsidy from State Government to be received at the end of - Rs. 15 lakhs
First year of installation

(4) Cost of electricity will be Rs. 2.25 per unit in year 1. This will increase by Rs. 0.25 per unit every year till year 7.
After that it wil increase by Rs. 0.50 per unit.

(5) Maintenance cost will be Rs. 4 lakhs in year 1 and the same will increase by Rs. 2 lakhs
every year.

(6) Estimated life 10 years.

(7) Cost of capital 15%.

(8) Residual value of Windmill will be nil. However land value will go up to Rs. 60 lakhs, at the end of year 10.
(9) Depreciation will be 100% of the cost of the Windmill in year 1 and the same will be allowed for tax purposes.

(10) As Windmills are expected to work based on wind velocity, the efficiency is expected to be an average 30%. Gross electricity generates at this level will be 25 lakh units per annum. 4% of this electricity generated will be committed free to the State Electricity Board as per the agreement.

(11) Tax rate 50%.

From the above information you are required to :
(a) Calculate the net present value. [Ignore tax on capital profits.]
(b) List down two non-financial factors that should be considered before taking a decision.
For your exercise use the following discount factors.

Years	1	2	3	4	5	6	7	8	9	10
Discount Factors	0.87	0.76	0.66	0.57	0.50	0.43	0.38	0.33	0.28	0.25

Solution :

Working Notes:
1. Initial Investment (Rs. lakhs)

Cost of Land	15
Cost of Windmills	300
Total	315

2. Net units generated (No. of units)

Gross units gendered	25 lakhs
Less : 4% Free Supply to SEB	1 lakh
Net Units sold	24 lakhs

3. Cost per unit Rs. 2.25 per unit in year 1. It will increase by Rs. 0.25 per unit every year till year 7. After that it will increase by Rs. 0.50 per unit. Maintenance Cost will be Rs. 4 lakhs in year 1 and the same will increase by Rs. 2 lakhs every year.

Calculation of Net Present Value (Rs. lakhs)

Year Unit Cost (Rs.)	1 2.25	2 2.50	3 2.75	4 3.00	5 3.25	6 3.50	7 3.75	8 4.25	9 4.75	10 5.25
Saving										
(24 lakh unit x unit cost)	54	60	66	72	78	84	90	102	114	126
Maintenance Cost	4	6	8	10	12	14	16	18	20	22
Gross Saving	50	54	58	62	66	70	74	84	94	104
Less: Tax @ 50%	25	27	29	31	33	35	37	42	47	52
Saving after Tax	25	27	29	31	33	35	37	42	47	52
Add: Tax Saving on Depreciation	150	--	--	--	--	--	--	--	--	--
Subsidy	15	--	--	--	--	--	--	--	--	--
Net Savings	190	27	29	31	33	35	37	42	47	52
Discount Factor 15%	0.87	0.76	0.66	0.57	0.50	0.43	0.38	0.33	0.28	0.25
Present Value	165.30	20.52	19.14	17.67	16.50	15.05	14.06	13.86	13.16	13.00

Total Present Value	308.26
Add: Present Value of land (Rs. 60 Lakhs x 0.25)	15.00
	323.26
Less: Initial Cost	315.00
Net Present Value	8.26

(b) Non-financial Factor: The following non-financial factors may be taken into consideration while taking the investment decision.

- Cost of purchase of electricity from State Electricity Board.
- Machinery and skilled manpower availability.
- Wind velocity in the proposed project area.
- Risk coverage.
- Technology availability.
- Authorisation in the Memorandum of Association to take the business etc.

Illustration 13:

TSL Ltd., a highly profitable and taxpaying company is planning to expand its present capacity by 100%. The estimated cost of the project is Rs. 1,000 lakhs out of which Rs. 500 lakhs is to be met out of loan funds. The company has received two offers from their bankers:

	Option 1	Option @
Value of loan	Rs. 500 lakhs	US $ 14 lakhs equal to Rs. 500 lakhs
Interest	15% payable yearly	6% payable (fixed yearly in US $)
Period of Repayment	5 years (in 5 installment is payable after draw down)	5 Years
Other expenses (to be treated as revenue Expenditure)	1% of the value of the loan	1% at US $ = Rs. 36 (Average)
Future Exchange Rate	--	End of 1 year 1 US $ = Rs. 38 thereafter to increase by Rs. 2 per annum

The company is liable to pay income-tax at 35% and eligible for 25% depreciation on W.D. value. You may assume that at the end of 5th year the company will be able to claim balance in WDV for tax purposes. The company follows Accounting Standard AS-11 for accounting changes in Foreign Exchange Rate.

(1) Compare the total outflow of cash under the above options.
(2) Using discounted cash flow technique, evaluate the above offers.
(3) Is there any risk, which the company should take care of?
(4) In case TSL has large volume of exports would your advice be different. The following discounting table may be adopted :

Year	0	1	2	3	4	5
Discount Factor	1	0.921	0.848	0.781	0.720	0.663

Solution :
Option I

Years	Repayment of Principal	Interest At 15%	Other Expenses	Tax saving	Net outflow
0	--	--	5.00	1.75	3.25
1	100	75	--	26.25	148.75
2	100	60	--	21.00	139.00
3	100	45	--	15.75	129.25
4	100	30	--	10.50	119.50
5	100	15	--	5.25	109.75
Total Outflows	500	+225	+5.00	-80.50	649.50

Exch ange rate	Year	Repay ment of principal US $	Inter- est US$	Other Charg es US $	Total Amt. US $	Repayment of principle Rs. (lakhs)	Balance Being Premiium (Rs. lakh)	Interest (Rs.lakh)	Other Charges (Rs. lakh)	Total Payment (Rs.lakh)	Tax Savings (Rs.lakh)	Net Out Flow (Rs. lakhs)
36	0	--	--	0.140	0.140	--	--	--	5.04	5.04	1.764	3.276
38	1	2.8	0.840	--	3.640	100.00	6.4	31.920		138.32	11.732	126.588
40	2	2.8	0.672	--	3.472	100.00	12.0	26.880		138.88	10.878	128.002
42	3	2.8	0.504	--	3.304	100.00	17.6	21.168		138.768	10.048	128.720
44	4	2.8	0.336	--	3.136	100.00	23.2	14.784		137.984	9.184	128.800
46	5	2.8	0.168	--	2.968	100.00	28.8	7.728		136.528	24.814	111.714

As per AS-11, the premium paid on exchange rate difference, on loans acquired for the purpose of capital expenditure should be capitalised. The same is applicable under the Indian Income-tax Act for tax calculations also.

Tax Savings on Premium Capitalization (Rs.)

Year	Opening Vlaue	Premium	Total	Deprecation on Premium at 25%	Tax Saving at 35%	Cloainfg WDV
1	--	6.40	6.40	1.60	0.56	4.80
2	4.80	12.00	16.80	4.20	1.47	12.60
3	12.60	17.60	30.20	7.55	2.64	22.65
4	22.65	23.20	45.85	11.46	4.01	34.39
5	34.39	28.80	63.19*	63.19	22.11	NIL

*Assumed that full benefit will be claimed for tax purposes.

Tax Saving on Interest, Other Charges and Premium (Rs. lakhs)

Years	Amount of Interest & other charges	Tax savings	Tax saving on premium	Total Tax savings
0	5.040	1.764	-	1.764
1	31.920	11.172	0.560	11.732
2	26.880	9.408	1.470	10.878
3	21.168	7.408	2.640	10.048
4	14.784	5.174	4.010	9.184
5	7.728	2.704	22.110	24.814

(2) Discount Cash Flow : Option I

Year	Net Out flow	Discounting factor	Discounted value
0	3.250	1.000	3.25
1	148.750	0.921	136.99
2	139.000	0.848	117.87
3	129.250	0.781	100.94
4	119.500	0.720	86.04
5	109.750	0.663	72.76
			517.85

Discount Cash Flow: Option II

Year	Gross outflow	Total tax saving	Net outflow	Discounting factor	Discounting value
0	5.040	1.764	3.276	1.000	3.276
1	138.320	11.732	126.588	0.921	116.587
2	138.880	10.878	128.002	0.848	108.545
3	138.768	10.048	128.720	0.781	100.530
4	137.984	9.184	128.800	0.720	92.736
5	136.528	24.814	111.714	0.663	74.066
					495.740

(3) The discounted value of Option II seems to be better than Option I. However the company has to be careful about future exchange rate. The rate indicated is more by rule of thumb than based on any scientific approach. The company should cover the foreign exchange rate and then work out the value.

(4) In case the company has good volume of exports, then it may help the company to hedge the future payments with outflow. In that case the company may take a lenient view of the possible exchange risk.

Illustration 14 :
A large profit making company is considering the installation of a machine to process the waste produced by one of its existing manufacturing process to be converted into a marketable product. At present, the waste is removed by a contractor for disposal on payment by the company of Rs. 50 lakhs per annum for the next four years. The contract can be terminated upon installation of the aforesaid machine on payment of compensation of Rs. 30 lakhs

before the processing operation starts. This compensation is not allowed for deduction of tax purposes.

The machine required for carrying out the processing will cost Rs. 200 lakhs to be financed by a loan repayable in 4 equal installments commencing from the end of year 1. The interest rate is 16% per annum. At the end of the 4th year, the machine can be sold for Rs. 20 lakhs and the cost of dismantling and removal will be Rs. 15 lakhs.

Year	**1**	**2**	**3**	**4**
Sales	**322**	**322**	**418**	**418**
Material consumption	30	40	85	85
Wages	75	75	85	100
Other expenses	40	45	54	70
Factory overheads	55	60	110	145
Depreciation (as per income-tax rules)	50	38	28	21

Initial stock of materials required before commencement of the processing operations is Rs. 20 lakhs at the start of year 1. The stock levels of materials to be maintained at the end of year 1, 2 and 3 will be Rs. 55 lakhs and the stocks at the end of year 4 will be nil. The store of materials will utilise space which would otherwise have been rented out for Rs. 10 lakhs per annum. Labour costs include wages of 40 workers, whose transfer to this process will reduce idle time payments of Rs. 15 lakhs in year 1 and Rs. 10 lakhs in year 2. Factory overheads include apportionment of general factory overheads except to the extent of insurance charges of Rs. 30 lakhs per annum payable on this venture. The company's tax rate is 50%.

Present value factors for four years are as under :

Year	1	2	3	4
Present value factors	0.870	0.756	0.658	0.572

Advice the management on the desirability of installing the machine for processing the waste. All calculations should form part of the answer.

Solution :

Statement of Incremental p

Particulars	Year			
	1	2	3	4
Sales (A)	322	322	418	418
Costs				
Material	30	40	85	85
Wages	60	65	85	100
Other Expenses	40	45	54	70
Factory Overheads (Insurance)	30	30	30	30
Loss of Rent	10	10	10	10
Interest	32	24	16	8
Depreciation (as per IT Act)	50	38	28	21
(B)	252	252	308	324
Incremental profit (A) - (B)	70	70	110	94
Tax @ 50%	35	35	55	47

Statement of Incremental Profit

Particulars	Year				
	0	1	2	3	4
Stokes of Materials Increases	(20)	(35)	-	-	-
Compensation for Contract	(30)	-	-	-	-
Saving of Contract Payment	-	50	50	50	50
Tax on Contract Payment	-	(25)	(25)	(25)	(25)
Incremental Profit	-	70	70	110	94
Tax on incremental Profit	-	(35)	(35)	(55)	(47)
Depreciation added back	-	50	38	28	21
Loan Repayment	-	(50)	(50)	(50)	(50)
Profit on sale of Machinary	-	-	-	-	5
Total Incremental Cash flows	(50)	25	48	58	48
P.V. Factor @	1.00	0.870	0.756	0.658	0.572
NPV OF Cash flow	(50)	21.75	36.288	38.164	27.456

Net Present Value = Rs. 73.66 lakhs.

Analysis: Since the NPV of Cash flows of proposal to install a machine to process the waste into marketable product is positive, the proposal can be accepted.

Assumptions: The following assumptions were considered while computation of NPV of the proposal:
– Material stock increase will lead to cash outflow.
– Idle-time wages are also taken into consideration while calculation of wages.
– Insurance charges are only taken as relevant for Computation of cashflow.
– Interest is calculated at 16% p.a. based on diminishing balance. The repayment of loan is in 4 equal installments.
– Capital gains tax ignored on profit on sale of machinery.
– Saving in contract payment and income-tax thereon considered in computation of cash flows.

Illustration 15:

A company produces main product 'Super' and a co-product 'Mild' . The main product is sold entirely to its collaborator, but the product 'Mild' is sold at the local market. The company increased its capacity as a reslut of which the output of 'Mild' increased to 15,000 m/t per annum at a price Rs. 1,000 per m.t.

However, in the face of increased competition to sell the entire output of 15,000 m/t of 'Mild' the company will have to reduce the sale price by Rs. 50 per m.t. every year for next 5 years and hereafter the price will stabilize at Rs. 750 per m.t.

As an alternative, the company can convert 'Mild' into 'Medium' at a variable cost of Rs. 200 per (metric) tonne. However to enter the market the sale price will have to be Rs. 1,200 per m.t. in the first year and Rs. 1,300 per m.t. in the second year and so on.

The sale of Medium will be 1,000 m/t in the first year and there upon going up by 1,000 m/ t each year. The company will have to invest Rs. 30 lakhs in capital outlay to produce 'Medium'. You are required to present the projected sales volume (quantity and value) of products 'Mild' and 'Medium' and also appraise the investment of Rs. 30 lakhs at 12% per annum for the period of next 5 years.

Present value of Rupee one at 12% p.a.

Year	1	2	3	4	5
Discounted factor	0.89	0.79	0.71	0.64	0.57

Solution:
Alternative I
Present Value of Sales of Mild Product

(Rs. Lakhs)

Year	Quantity M.T.	Price Per M.T. Rs.	Sales	DCF @ 12%	Present value
1	15,000	950	142.5	0.89	126.83
2	15,000	900	135.0	0.79	106.65
3	15,000	850	127.5	0.71	90.52
4	15,000	800	120.0	0.64	76.80
5	15,000	750	112.5	0.57	64.13

Total Present Value of Net Sales 464.93

Calculation of NPV:

Total present values of Net Sales	464.93
Less : Initial investment	30.00
Net Present Value of Alternative	434.93

Alternative II

Year	Quantity M.T.	Contribution Per M.T.	Net Sales	DCF @ 12%	Present value
1	1,000	1,000	10.00	0.89	8.90
2	2,000	1,100	22.00	0.79	17.38
3	3,000	1,200	36.00	0.71	25.56
4	4,000	1,300	52.00	0.64	33.28
5	5,000	1,400	70.00	0.57	39.90
Total Present Value of Net Sales 125.02					

Present Value of Sales of Mild

Year	Quantity M.T.	Price Per M.T. Rs.	Sales	DCF @ 12%	Present value
1	14,000	950	133.00	0.89	118.37
2	13,000	900	117.00	0.79	92.43
3	12,000	850	102.00	0.71	72.42
4	11,000	800	88.00	0.64	56.32
5	10,000	750	75.00	0.57	42.75
Total Present Value of Sales 382.29					

Calculation of NPV

P.V of Sales of medium	125.02
P.V. of sales of mild	382.29
Total present value	507.31
Less : Initial investment	30.00
Net Present Value of Alternative II	477.31

Analysis : Since NPV is higher for alternative II, it is suggested to select Alternative II.

Illustration 16:
B Ltd. is considering whether to set up a division in order to manufacture a new Product A. The following statement has been prepared, showing the projected profitability per unit of the new product :

(Rs.)

Selling price			22.00
Less : Direct labour	(2 hours @ Rs. 2.50 per hour)	5.00	
Material	(3 kg. @ Rs. 1.50 per kg.)	4.50	
Overheads		11.50	21.00
Net profit per unit			1.00

A feasibility study, recently undertaken at a cost of Rs. 50,000, suggests that a selling price of Rs. 22 per unit should be set. At this price, it is expected that 10,000 units of A would be sold each year. Demand for A is expected to cease after 5 years. Direct Labour and Material Costs would be incurred only for the duration of the product life.

Overhead per unit have been calculated as follows :

	(Rs.)
Variable overheads	2.50
Rent (Note 1 : Rs. 8,000/7,000 units)	0.80
Manager's salary (Note 2 : Rs. 7,000/10,000 units)	0.70
Depreciation (Note 3 : Rs. 50,000/10,000 units)	5.00
Head office costs (Note 4 : 2 hours @ Rs. 1.25 per hour)	2.50
	11.50

Notes :

1. Product A would be manufactured in a factory rented specially for the purpose. Annual rental would be Rs. 8,000 payable only for as long as the factory was occupied.

2. A manager would be employed to supervise production of Product A, at a salary of Rs. 7,000 p.a. The Manager is at present employed by B Ltd. but is due to retire in the near future on an annual pension of Rs. 2,000, payable by the company. If he continued to be employed, his pension would not be paid during the period of his employment. His subsequent pension rights would not be affected.

3. Manufacturing of the Product A would require a specialised machine costing Rs. 2, 50,000. The machine would be capable of producing Product A for an indefinite period, although due to its specialised nature, it would not have any resale or scrap value when the production of Product A ceased. It is the policy of B Ltd. to provide depreciation on all fixed asset using Straight Line Method. The annual charge of Rs. 50,000 for the new machine is based on a life of five years, equal to the period which Product A to the company to be produced.

4. B Ltd. allocates its head office fixed costs to all products at the rate of Rs. 1.25 per direct labour hour. Total head office fixed costs would not be affected by the introduction of the Product A to the company's range of products.

The Cost of capital of B Ltd. is estimated at 5% p.a. in real terms and you may assume that all costs and prices given above will remain constant in real terms. All cash flows would arise at the end of each year, with the exception of the cost of the machine which would be payable immediately.

The Management of B Ltd. is very confident about the accuracy of all the estimates given above, with the exception of those relating to product life, the annual sales volume and material cost per unit of Product A.

You are required to:

(i) Decide whether B Ltd. should proceed with manufacture of the Product A.

(ii) Prepare a statement showing how sensitive the NPV of manufacturing Product A is to errors of estimation in each of the three factors : Product life. Annual sales volume and material cost per unit of Product A.

Ignore taxation.
The Present Value of annuity for 3 years, 4 years and 5 years at 5% respectively are 2.72, 3.55 and 4.33.

Solution :

Working Notes :
1. Cost of Machine at 0 years = Rs. 2,50,000

2. Variable Production Cost per annum (Rs.)

Material cost P.U.	4.50
Direct Labour cost P.U.	5.00
Variable overheads P.U.	2.50
	12.00
Total Cost Per annum (10,000 units × Rs. 12)	1,20,000

3. Salary Cost per annum (Rs.)
Salary payable p.a. 7,000
Less : Pension not payable 2,000
Net salary payable 5,000

4. Depreciation is a non-cash item, need not be considered in computation of cash flow.

5. Head office cost is committed cost and is irrelevant for decision-making.

Calculation of N.P.V. (Rs.)

Sales p.a.		2, 20,000
Less : Variable production cost p.a.	1,20,000	
Manager salary p.a.	5,000	
Factory Rent p.a.	8,000	1, 33,000
Cash inflow p.a.		87,000
Present value of cash inflows for 1 to 5 years		
Discount factor @ 5% (87,000×4.33)		3, 76,710
Less : Cost of machine		-2,50,000
Net present value		**1, 26,710**

Since, Net Present Value is positive, it is suggested to manufacture Product A.
(ii) Sensitive of Forecast Errors :

a. Product Life 3.2 years 36% lower limit of error
b. Annual Sales Volume 7074 units 29% lower limit
c. Material Cost Rs. 7,426 65% upper limit

Illustration 17:
ABC Company Ltd. has been producing a chemical product by using Machine Z for the last two years. Now the management of the company is thinking to replace this Machine either by X or by Y Machine. The following details are furnished to you :

(Rs.)

Machine	Z	X	Y
Book Value	1,00,000	--	--
Resale Value Now	1,10,000	--	--
Purchase Price	--	1,80,000	2,00,000
Annual Fixed Cost (including Depreciation)	92,000	1,08,000	1,32,000
Variable Running Costs (Including Labour) per Unit	3	1.50	2.50
Production Per Hour	8	8	12

You are also provided with the following details:

Selling price per unit Rs. 20
Cost of materials per unit Rs. 10
Annual operating hours 2,000
Working life of each of the three machines (as from now) 5 years

Salvage value of Machines Z - Rs. 10,000; X - Rs. 15,000; Y - Rs. 18,000.

The company charges depreciation using straight line method. It is anticipated that an additional cost of Rs. 8,000 per annum would be incurred on special advertising to sell the extra output of Machine Y. Assume tax rate of 50% and cost of capital 10%. The present value of Re. 1 to be received at the end of the year at 10% is as under.

Year	1	2	3	4	5
Present Value	.909	.826	.751	.683	.621

Using NPV Method, you are required to analysis the feasibility of the proposal and make recommendations.

Solution:

Statement showing Computation of Annual Cash Inflow of Three Machine.

	Machines		
	Z	X	Y
Sales (unit)	16,000	16,000	24,000
Sales @ Rs. 20 P.U. (A)	3,20,000	3,20,000	4,80,000
Costs:			
Variable Running Cost	48,000	24,000	60,000
Material Cost	1,60,000	1,60,000	2,40,000
Fixed Cost	92,000	1,08,000	1,32,000
Special Advertising	--	--	8,000
B	3,00,000	2,92,000	4,40,000
PBT (A) – (B)	20,000	28,000	40,000
Less: Tax @ 50%	10,000	14,000	20,000
PAT	10,000	14,000	20,000
Add: Deprecation	20,000	33,000	36,400
Annual Cash Inflow	30,000	47,000	56,400

Computation of Net Present Value:

Year	Discounting Factors @ 10%	Machine					
		Z		X		Y	
		Cash Flow	P.V.	Cash Flow	P.V.	Cash Flow	P.V.
0	1.000	(1,10,000)	(1,10,000)	(1,80,000)	(1,80,000)	(2,00,000)	(2,00,000)
1	0.909	30,000	27,270	47,000	42,723	56,400	51,268
2	0.826	30,000	24,780	47,000	38,822	56,400	46,586
3	0.751	30,000	22,530	47,000	35,297	56,400	42,356
4	0.683	30,000	20,490	47,000	32,101	56,400	38,521
5	0.621	30,000	18,630	47,000	29,187	56,400	35,025
5*	0.621	10,000	6,210	15,000	9,315	18,000	11,178
Net Present Value			9,910		7,445		24,934

* Salvage Value at the end of 5th Year.

Calculation of Profitability Index (PI) = $\frac{\text{P.V. Cash Inflows}}{\text{P.V. Cash inflows}}$

Machine Z = $\frac{1,19,910}{1,10,000} = 1.09$

Machine X = $\frac{1,87,445}{1,80,000} = 1.041$

Machine Y = $\frac{2,24,934}{2,00,000} = 1.12$

Analysis : Based on NPV method, Machine Y is to be selected, since its NPV is highest at Rs. 24,934. But the initial investment of three machines is different, NPV method is not appropriate. Profitability Index Method is most suitable for evaluation. The Profitability Index of Machine Y is highest and hence Machine Z is to be replaced with Machine Y.

Illustration 17:

The Super Specialists Ltd. constructs customized parts for satellites to be launched by USA and China. The parts are constructed in eight locations (including the central head quarters) around the world. The Finance Director, Ms. Kamni, chooses to implement video conferencing to speed up the budget process and save travel costs. She finds that, in earlier years, the company sent two officers from each location to the central headquarters to discuss the budget twice a year. The average travel cost per perosn, including air fare, hotels and meals, is Rs. 18,000 per trip. The cost of using video conferencing is Rs. 550,000 to set up a system at each location plus Rs. 300 per hour average cost of telephone time to transmit signals. A total 32 hours of transmission time will be needed to complete the budget each year. The company depreciates this type of equipment over five years by using straight line method. An alternative approach is to travel to local rented video conferencing facilities, which can be rented for Rs. 1,500 per hour plus Rs. 400 per hour averge cost for telephone charges.

You are Senior Officer of Finance Department. You have been asked by Ms. Kamni to evaluate the proposal and suggest if it would be worthwhile for the company to implement video conferencing.

Solution :

Option I : Cost of travel, in case Video Conferencing facility is not provided (Rs.)

Total Trip = No. of Locations × No. of Persons × No. of Trips per Person 7×2×2 = 28 Trips

Total Travel Cost (including air fare, hotel accommodation and meals) (28 trips × Rs. 18,000 per trip) 5,04,000

Option II : Video Conferencing Facility is provided by Installation of Own Equipment at Different Locations (Rs.)

Cost of Equipment at each location (Rs. 5, 50,000 ×8 locations) 44, 00,000
Economic life of Machines (5 years)
Annual depreciation (44, 00,000/5) 8, 80,000
Annual transmission cost (32 hrs. transmission×8 locations × Rs. 300 per hour) 76,800
Annual cost of operation (8, 80,000+76,800) 9, 56,800

Option III : Engaging Video Conferencing Facility on Rental Basis (Rs.)
Rental cost (32 hrs. ×8 location × Rs. 1,500 per hr) 3, 84,000
Telephone cost (32 hrs.×8 locations ×Rs. 400 per hr.) 1, 02,400
Total rental cost of equipment (3, 84,000+1, 02,400) 4, 86,400

Analysis: The annual cash outflow is minimum, if video conferencing facility is engaged on rental basis. Therefore, Option III is suggested.

Illustration 18:
X Ltd. an existing profit-making company, is planning to introduce a new product with a projected life of 8 years. Initial equipment cost will be Rs. 120 lakhs and additional equipment costing Rs 10 lakhs will be needed at the beginning of third year. At the end of the 8 years, the original equipment will have resale value equivalent to the cost of removal, but the additional equipment would be sold for Rs. 1 lakh. Working Capital of Rs. 15 lakhs will be needed. The 100% capacity of the plant is of 4, 00,000 units per annum, but the production and sales-volume expected are as under :

Year	Capacity (%)
1	20
2	30
3-5	75
6-8	50

A sale price of Rs. 100 per unit with a Profit-Volume Ratio of 60% is likely to be obtained. Fixed Operating Cash Cost are likely to be Rs. 16 lakhs per annum. In addition to this the advertisement expenditure will have to be incurred as under.

Year	**1**	**2**	**3-5**	**6-8**
Expenditure	**30**	**15**	**10**	**4**

The company is subject to 50% tax, straight-line method of depreciation, (permissible for tax purposes also) and taking 12% as appropriate after tax cost of capital, should the project be accepted?

Solution :

Present Value of Cash outflow (Rs.)

Year 0 Equipment cost (1, 20, 00,000 × 1,000)	1,20,00,000
Year 0 Working capital (15, 00,000 × 1,000)	15,00,000
Year 2 Additional equipment (10, 00,000 × 0.797)	7,97,000
P.V. of Cash outflow	**1,42,97,000**

Calculation of cash inflows

Year	1	2	3-5	6-8
Capacity Utilization	20%	30%	75%	50%
Production & Sales (Units)	80,000	1,20,000	3,00,000	2,00,000
Contribution @ 60 p.u. (i)	48,00,000	72,00,000	1,80,00,000	1,20,00,000
Fixed Cost	16,00,000	16,00,000	16,00,000	16,00,000
Advertisement	30,00,000	15,00,000	10,00,000	4,00,000
Depreciation	15,00,000	15,00,000	16,50,000	16,50,000
(ii)	61,00,000	46,00,000	42,50,000	36,50,000
PBT (i) – (ii)	(13,00,000)	26,00,000	1,37,50,000	83,50,000
Less: Tax 50%	--	13,00,000	68,75,000	41,75,000
PAT	(13,00,000)	13,00,000	68,75,000	41,75,000
Add: Deprecation	15,00,000	15,00,000	16,50,000	16,50,000
Cash Inflow	2,00,000	28,00,000	85,25,000	58,25,000

Calculation of Present Value of Cash inflows (Rs.)

Year	Cash inflow	Discount factor	Present Value
1	2,00,000	0.893	1,78,600
2	28,00,000	0.797	22,31,600
3	85,25,000	0.712	60,69,800
4	85,25,000	0.636	54,21,900
5	85,25,000	0.567	48,33,675
6	58,25,000	0.507	29,53,275
7	58,25,000	0.452	26,32,900
8	58,25,000	0.404	23,53,300
8	15,00,000	0.404	6,06,000
	1,00,000	0.404	40,400

P.V. of cash inflow 2, 73, 21,450

NPV = 2, 73, 21,450 – 1, 42, 97,000 = Rs. 1, 30, 24,450

Analysis: Since NPV is positive, the Project can be accepted.

Illustration 19:

Playmates Ltd. manufactures toys and other short-lived fad items. The Research and Development Department has come up with an item that would make a good promotional gift for office equipment dealers. As a result of efforts by the Sales personnel, the firm has commitments for this product. To produce the quantity demanded Playmates Ltd. will need to buy additional machinery and rent additional space. It appears that about 25,000 sq. ft. will be needed; 12,500 sq. ft. of presently unused space, but leased at the rate of Rs. 3 per sq. ft. per year is available. There is another 12,500 sq. ft. adjoining the facility available at the annual rent of Rs. 4 per sq. ft.

The equipment will be purchased for Rs. 9, 00,000. It will require Rs. 30,000 in modification and Rs. 1, 50,000 for installation. The equipment will have a salvage value of about Rs. 2, 80,000 at the end of the third year. It is subject to 25% depreciation on Reducing Balance Basis. The firm has no other assets in this block. No additional general overhead costs are expected to be incurred.

Estimates of revenue and costs for this product for three years have been developed as follows:

Particulars	Year 1	Year 2	Year 3
Sales	10,00,000	20,00,000	8,00,000
Less: Costs:			
Material, Labour and Overheads	4,00,000	7,50,000	3,50,000
Overheads Allocated	40,000	75,000	35,000
Rent	50,000	50,000	50,000
Depreciation	2,70,000	2,02,500	NIL
Total Costs	7,60,000	10,77,500	4,35,000
Earnings before taxes	2,40,000	9,22,500	3,65,000
Less: Taxes	84,000	3,22,875	1,27,750
Earnings after taxes	1,56,000	5,99,625	2,37,250

If the company sets a required rate of return of 20% after taxes, should this project be accepted?

Note : P.V. factor @ 20% for Year 1 = 0.833; Year 2 = 0.694; and Year 3 = 0.579

Solution :

Tax rate = $\frac{84,000}{2,40,000} \times 100 = 35\%$

Calculation of Loss on Sale of Equipment

		(Rs.)
Cost of equipment	9, 00,000	
Modification & installation cost	(30,000+1, 50,000)	1, 80,000
Initial cash outlay	10, 80,000	
Less : 1st Year Depreciation	(10,80,000 ×25/100)	2,70,000
		8,10,000
Less : 2nd Year Depreciation	(8,10,000 ×25/100)	2,02,500
Written down value at the beginning of 3rd year		6, 07,500
Less : Salvage value	2,80,000	
Loss on sale of equipment	3, 27,500	

Opportunity cost of lease rent lost = 12,500 sq. ft. × Rs. 3 = Rs. 37,500

Calculation of Cash Inflow:

Particulars	Year 1	Year 2	Year 3
Sales (i)	10,00,000	20,00,000	8,00,000
Incremental Cost			
Materials, Labour and Overhead	4,00,000	7,50,000	3,50,000
Opportunity cost of lease rent lost	37,500	37,500	37,500
Rent payable	50,000	50,000	50,000
Deprecation	2,70,000	2,02,500	--
(ii)	7,57,500	10,40,000	4,37,500
EBT (i) - (ii)	2,42,500	9,60,000	3,62,500
Less: Tax @ 35%	84,875	3,36,000	1,26,875
EAT	1,57,625	6,24,000	2,35,625
Add: Deprecation	2,70,000	2,02,500	--
Cash Inflow after tax	4,27,625	8,26,500	2,35,625

Calculation Present Value of Cash Inflow After Tax

Year	Cash Inflow	Discount factor	Present Value after tax @ 20%
1	4,27,625	0.833	3.56.212
2	8,26,500	0.694	5.73.591
3	2,35,625	0.579	1.36.427
3 (Salvage value)	2.80.000	0.579	1.62.120
3 Tax advantage on short term loss	1,14,625	0.579	66,368

P.V. of Cash inflow 12, 94,718

NPV = 12, 94,715 – 10, 80,000 = Rs. 2,14,718

Analysis: Since NPV of the Project is positive, it is suggested to accept the Project.

Illustration 20:
X Ltd. has for some years manufactured a product called C which is used as a component in a variety of electrical items. Although the product C is in demand, the technology of the design is becoming

obsolete. The company has developed a new product D which is based on new technology.

The management of X Ltd. is considering whether to continue production of C or discontinue the C and start production of D. The company do not have the resources to produce both the products.

If C is produced, units Sales in year 1 are forecasted to be 24,000 but declining by 4,000 units in each subsequent year. Additional equipment costing Rs. 70,000 must be purchased now if production of C is to continue.

If D produced, then unit sales in year 1 are forecasted to be 6,000 but after that the sales will increase rapidly. Additional equipment costing Rs. 6, 20,000 should be purchased now if production of D is to start.

Relevant details of the two products are as follows : (Rs.)

	C	D
Variable cost per unit	25	50
Selling price per unit	55	105

The company appraises investments using 12% per annum compound cost of Money and ignores cash flows beyond five year from the start of investment.
(a) Advise the company on the minimum annual growth in units sales of D needed to justify starting production of D now. Support your answer with financial evaluation.

(b) Advise management of the number of years to which its investment appraisal time horizon (Currently five years) would have to be extended in order to justify starting production D now if the forecast annual increase in D sales is 2,800 units.

P. V of Re. 1 at 12% discount are as follows:

Year	1	2	3	4	5	6	7	8
P.V.	0.8929	0.7972	0.7118	0.6355	0.5674	0.5067	0.4523	0.4039

Solution:

(a) The minimum annual growth in unit sales of D needed to justify production of D now is approximately 3400 units per annum. As existing fixed costs are unaffected by the decision and the alternatives are mutually exclusive, the relevant cash flows are the extra investment cost for and contributions from D.

Assume that the sales of D Increase by 6000 units per annum

Year	Net Investment	Contribution Foregone from C	Contribution from D	Net cash flow	Discount flow	Present value
0	* (5,50,000)	--	--	(5,50,000)	1.00	(5,50,000)
1	--	(7,20,000)	3,30,000	(3,90,000)	0.8929	(3,48,230)
2	--	(6,00,000)	6,60,000	60,000	0.7972	47,830
3	--	(4,80,000)	9,90,000	5,10,000	0.7118	3,63,000
4	--	(3,60,000)	13,20,000	9,60,000	0.6355	6,10,100
5	--	(2,40,000)	16,50,000	14,10,000	0.5674	8,00,000
NPV						9,22,700

(b) Additional sales of D increase by 2,800 units p.a.

Year	Net Investment	Contribution Foregone from C	Contribution from D	Net cash flow	Discount factor	Present value
0	* (5,50,000)	--	--	(5,50,000)	1.00	(5,50,000)
1	--	(7,20,000)	3,30,000	(3,90,000)	0.8929	(3,48,200)
2	--	(6,00,000)	4,84,000	(1,16,000)	0.7972	(92,500)
3	--	(4,80,000)	6,38,000	1,58,000	0.7118	1,12,500
4	--	(3,60,000)	7,92,000	4,32,000	0.6355	2,74,500
5	--	(2,40,000)	9,46,000	7,06,000	0.5674	4,00,600
					NVP =	(2,03,100)
6		(1,20,000)	11,00,000	9,80,000	0.5066	4,96,500

Therefore the time horizon is extended by approximately $\frac{2,03,100}{4,96,500} = 0.41$ if a year (i.e. 5 months) to 5 years and 5 months.

Illustration 21

Sugar Industries is planning to introduce a new product with projected life of 8 years. The project to be set up a backward region qualifies for a one time (as it's starting) tax free subsidy from the government of Rs. 20 lakhs. Initial equipment cost will be Rs. 140 lakhs and additional equipment costing Rs. 10 lakhs will needed at the beginning of third year. At the end of 8 years, the original equipment will have no resale value, but the supplementary equipment can be sold for Rs. 1 lakh. A working capital of Rs. 15 lakhs will be needed. The sales volume over the eight year period have been forecast as follows :

Year	Units
1	80,000
2	1,20,000
3-5	3,00,000
6-8	2,00,000

A sale price of Rs. 100 per unit is expected and variable expense will amount to 40% of sales revenue. Fixed cash operating costs will amount to Rs. 16 lakhs per year. In addition, an extensive advertising campaign will be implemented, requiring annual outlay as follows :

Year	Rs. (in lakhs)
1	30
2	15
3-5	10
6-8	4

The company is subject to 50**%** tax rate and considers 12% to an appropriate after tax cost of capital for this project. The company follows the straight line method of depreciation.

Should the project be accepted? Assume that the company has enough income from its existing products.

Note : The present value of Rs. 1 at 12% rate of discount is as follows :

Year	1	2	3	4	5	6	7	8
P.V. Facture	.893	.797	.712	.363	.567	.507	.452	.404

Solution :

By comparing the present value of investment and P.V. of cash inflow (NPV), it can be determined whether the project is to be accepted or not.

A. Investment (Cash Outflow) :

Rs. 140 lakhs

Initial Equipment Cost	Rs. 20 lakhs
Less : Tax-free Subsidy (initially)	Rs. 120 lakhs
Add : Working Capital Required	Rs. 15 lakhs
	Rs. 135 lakhs

Add : Additional Equipment ae the end of 2nd year.

Rs. 10 lakhs x 0.797 = (Present value of Rs. 10 lakhs) Rs. 7.97 lakhs

Total Investment Rs. 142.97 lakhs

As the additional equipment is to be purchased after 2 years, it means Rs. 10 lakhs is to be invested after 2 years, and so the p.v. of Rs. 10 lakhs after 2 years is Rs. 7.97 lakhs.

B. Calculation of cash flow for eight years :

Particulars	Year 1	Year 2	Year 3-5	6-8 Year
Sales 80,000 x Rs. 100 etc.	80	120	300	200
Cost of Sales : Variable Expenses 40% of Sales	32	48	120	80
Fixed Costs	16	16	16	16
Advertisement Expenses	30	15	10	4
Depreciation Rs. 140 / 8 years	17.50	17.50	19	19
Total Cost	95.50	96.50	165	119
Profit / Loss	-15.50	23.50	135	81
50% Taxation	-	4.00	67.50	40.50
Profit / Loss After Taxation	-15.50	19.50	67.50	40.50
Add : Depreciation	17.50	17.50	19.00	19.00
Cash Flow	2.00	37.00	86.50	59.50

Note :

1. The depreciation for first two years has been calculated on the initial investment of Rs. 140 lakhs, which is Rs. 140 lakhs / 8 years = Rs. 17.50 lakhs on the basis of its 8 year-life. But from the third year, additional depreciation has to be calculated on additional equipment of Rs. 10 lakhs which is Rs. 1.50 lakhs (Rs. 10 lakhs – Rs. 1 lakhs re-sale value = Rs. 9 lakhs / 6 years = Rs. 1.50 lakhs). Thus from 3rd year onwards, the total depreciation would be Rs. 17.50 lakhs = Rs. 1.50 lakhs = 19 lakhs.

2. During the first year, no tax is payable as there is a loss. This loss can be carried forward upto 8 years to be set off against the profits of the future 8 years. Hence during the 2nd year, this loss of Rs. 15.50 lakhs is set off against the profit of Rs. 23.50 lakhs and so tax is calculated only on balance profit of Rs. 8 lakhs (Rs. 23.50 – Rs. 15.50) and so tax of only Rs. 4 lakhs at 50% on Rs. 8 lakhs has been considered.

3. The cash flow for 8th year :

As per above calculation Rs. 59.50 lakhs + Working Capital released Rs. 15.00 lakhs + Sale of Equipment Rs. 1.00 lakhs Total cash Flow Rs. 75.50 lakhs

C. Calculation of Net Present Value

Year	Cash Flow (Rs.)	Discounted Factor (Rs.)	Present Value (Rs.)
1	2,00,000	0.863	1,78,600
2	37,00,000	0.797	29,48,900
3	86,50,000	0.712	61,58,800
4	86,50,000	0.636	55,01,400
5	86,50,000	0.567	49,04,500
6	5,95,000	0.507	30,16,650
7	5,95,000	0.452	26,89,400
8	75,50,000	0.404	30,50,200
			2,84,48,500

Net present Value = P.V. of Cash Inflow – P.V. of Investment
= Rs. 2, 84, 48,500 – 1, 42, 97,000
= Rs. 1, 41, 51,500

Recommendation : Net present value (NPV) is positive (+), So the project should be accepted.

Illustration 22:

Nine Gems Ltd. has just installed Machine R at a cost of Rs. 2, 00,000. The machine has a five year life with no residual value. The annual volume of production is estimated at 1, 50,000 units which can be sold at Rs. 6 per unit. Annual operating costs are estimated at Rs. 2, 00,000 (excluding depreciation) at this output level. Fixed costs are estimated at Rs. 3 per unit for the same level of production.

Nine Gems Ltd. has just come across another model called Machine – S capable of giving the same output at an annual perating cost of Rs. 1, 80,000 (excluding depreciation). There will be no change in fixed costs. Capital cost of this machine is Rs. 2, 50,000 and the estimated life is five year with nil residual value.

The company has an offer for sale of machine: R at Rs. 1, 00,000. But the cost of dismantling and removal will amount Rs. 30,000. As the company has not yet commenced operations, it wants to sell Machine –R and purchase machine –S.

Nine Gems Ltd. will be a zero-tax company for seven years in view of several incentives and allowances available.

The cost of capital may be assumed at 14% P.V. factors for five years are as follows :

Year	P.V. Factors
1	0.877
2	0.675
3	0.675
4	592
5	0.519

Advise whether the company should opt for the replacement.

Solution :

A. Present Value of Investment :

Cost of Machine – S	Rs. 2, 50,000
Less : Sales Price of Machine – R	1,00,000
- Removal Exp. 30,000	Rs. 70,000
Net Investment	1, 80,000

B. Calculation of Annual Cash Flow :

	Machine R	Machine S
Sale : 1,50,000 units x Rs. 6 = 9,00,000		
Less : Operating Expenses :		
1. Depreciation :		
R : 2,00,000 / 5 year -	40,000	
S : 2,50,000 / 5 year -	50,000	
2. Fixed Costs : 1,50,000 Units x Rs. 34,50,000		4,50,000
3. Annual Operating Costs	2,00,000	1,80,000
Total Cost	6, 90,000	6, 80,000
Profit before tax	2, 10,000	2, 20,000

(Which is as good as after tax profit)

Because the company is not required to Pay tax for 7 years)		
Add : Depreciation	40,000	50,000
Annual Cash Flow	2,50,000	2,70,000

Additional (Incremental) Cash flow from Machine S = Rs. 2, 70,000 – Rs. 2, 52,000 = Rs. 20,000.

P.V. of Incremental Cash Flow = 20,000 x 3,432 = Rs. 68,640

Therefore NPV of Machine S = 68,640 – 1, 80,000 = - 1, 11,360

As NPV is negative, replacement is not recommended.

C. Net Present Value (Independent Evaluation)

As the amount of cash flow from both the machines is constant for all the years, it would be better to calculate combined P.V. by totaling the P.Vs.

0.877 + 0.769 + 0.675 + 0.592 + 0.519 = 3.432

Present Value of Cash Flow

Machine – R Rs. 2, 50,000 x 3.432 = Rs. 8, 58,000
Machine – S Rs. 2, 70,000 x 3.432 = Rs. 9, 27,000

Net Present Value (NPV)

Machine – R Rs. 8, 58,000 - Rs. 2, 00,000 = Rs. 6,58,000
Machine – S Rs. 9, 27,000 - Rs. 2, 50,000 = Rs. 7,68,000

69,000	50,000

Machine S must be installed as its NPV is more than that of R. Secondly, its excess cash flow or machine R as compared to Machine S is Rs. 69,000, whereas the additional investment is only Rs. 50,000. Hence, it is profitable to install Machines – S.

Illustration 23:

Foresight Ltd. provides you the following information :

	(Rs.)
Purchase Price of each Machine	12, 00,000
Working Capital	6, 00,000
Life of Machine	5 years
Estimated Salvage Value	2, 00,000
Actual Salvage Value Realised at the end of life	2, 40,000
Method of Deprecation	Straight Line
Tax Rate	30%
Cost of Capital	10%
E.B.D. & Tax	

Year	Machine A Rs.	Machine B Rs.	P.V. 10%
1	6,00,000	--	.909
2	6,00,000	2,00,000	.826
3	6,00,000	4,00,000	.751
4	6,00,000	6,00,000	.683
5	6,00,000	24,00,000	.621

Solution:

Cash Outflow:
Machine A: 12, 00,000 + 6, 00,000 = 18, 00,000
Machine B: 12, 00,000 + 6, 00,000 = 18, 00,000

Computation of NPV

Year	1	2	3	4	5
EBD & T	6,00,000	6,00,000	6,00,000	6,00,000	6,00,000
Less: Deprecation $\frac{12,00,000 - 2,00,000}{5}$	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
E.B.T.	4,00,000	4,00,000	4,00,000	4,00,000	4,00,000
Less Tax 30%	1,20,000	1,20,000	1,20,000	1,20,000	1,20,000
EAT	2,80,000	2,80,000	2,80,000	2,80,000	2,80,000
Add: Depreciation	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
Cash Inflow	4,80,000	4,80,000	4,80,000	4,80,000	4,80,000
Add: Release of Working Capital					6,00,000
Add: Salvage Value of Realized					2,40,000
Less: Tax on profit on sale					(12,000)
30% (2,40,000 – 2,00,000) CFAT	4,80,000	4,80,000	4,80,000	4,80,000	13,08,000
P.V. at 10%	.909	.826	.751	.683	.621
P.V. of CFAT	4,36,320	3,96,480	3,60,480	3,27,840	8,12,268

	(Rs.)
Total P.V. of Cash Flow after Tax	23, 33,388
Less P.V. of Cash Outflow	18, 00,000
NPV	5, 33,388

Computation of NPV

Year	1	2	3	4	5
EBD & T	-	2,00,000	4,00,000	6,00,000	24,00,000
Less Depreciation	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
EBT	-2,00,000	-	2,00,000	4,00,000	22,00,000
Less Tax 30%	60,000	-	60,000	1,20,000	6,60,000
EAT	(1,40,000)	-	1,40,000	2,80,000	15,40,000
Add Depreciation	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
CFAT	60,000	2,00,000	3,40,000	4,80,000	17,40,000
Add Working Capital Released					6,00,000
Add Cash Salvage					2,40,000
Less Tax (30% of 40,000)					(12,000)
Total CFAT	60,000	2,00,000	3,40,000	4,80,000	25,68,000
PV Factor	.909	.826	.751	.683	.621
P.V. of CFAT	54,540	1,65,200	2,55,340	3,27,480	15,94,728

	Rs.
Total P.V. of cash	23, 97,648
Less: Total P.V. of Cash Outflow	18, 00,000
	5, 97,648

Note: It is assumed that the company has taxable income from other sources against which the loss can be adjusted. There will be tax saving of Rs. 60,000 on negative profit of Rs. 2, 00,000.

Conclusion: Machine B is more profitable than Machine A.

Illustration 24

Project Ltd. Furnished following information:

	Rs.
Purchase Price of New Machine	20,00,000
Erection Charges	3,00,000
Training Cost of Workers	1,00,000
Subsidy received from the Government	50% purchase price
Working Capital	6,00,000
Life of Machine	5 Years
Estimated Salvage Value	2,00,000
Cash Salvage Value	2,40,000

Method of Depreciation	Fixed Instilment
Rate of Tax	30%
Cost of Capital	10%
Sales in Units	

Year	Units
1	2,00,000
2	4,00,000
3	6,00,000
4	8,00,000
5	10,00,000

Initial selling price per unit Rs. 20 for first two years and thereafter Rs. 25 per unit.

Variable cost 40% of sales annual fixed cost other than deprecation will be Rs. 4, 00,000 which will increase to Rs. 6, 00,000 after 3rd year calculate NPV.

Solution:

1. P.V. of Cash Outflow		
	P.V.	**Rs.**
Purchase Price of Machine	1	20,00,000
Creation Changes	1	3,00,000
Cost of Training	1	1,00,000
Less: Subsidy from Government	1	(12,00,000)
Add: Working Capital	1	6,00,000
Total P.V. of Cash out flow		18,00,000
2. Depreciation		
Purchase Price of Machine		20,00,000
Less: Subsidy 60%		8,00,000
Add: Erection Charges		3,00,000
Training Cost		1,00,000
		12,00,000
Less: Salvage		2,00,000
		10,00,000

$$\text{Deprecation} = \frac{10,00,000}{5 \text{ years}}$$

$$= 2,\ 00,000$$

Year	1	2	3	4	5
Units	2,00,000	4,00,000	6,00,000	8,00,000	10,00,000
S.P. (Rs.)	20	20	25	25	25
Sales (A)	40,00,000	80,00,000	1,50,00,000	2,00,00,000	2,25,00,000
Less : Cost Variable Cash	16,00,000	32,00,000	60,00,000	80,00,000	1,00,00,000
Depreciation	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
Fixed Cost	4,00,000	4,00,000	4,00,000	6,00,000	6,00,000
(B)	22,00,000	38,00,000	66,00,000	88,00,000	1,08,00,000
N.P.T. (A-B)	18,00,000	42,00,000	84,00,000	1,12,00,000	1,42,00,000
Less tax 30%	5,40,000	12,60,000	25,20,000	33,60,000	42,60,000
NPAT	12,60,000	29,40,000	58,80,000	78,40,000	99,40,000
Add Depreciation	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
C FAT	14,60,000	31,40,000	60,80,000	80,40,000	1,01,40,000
Add Release of Working Capital					6,00,000
Add Cash Salvage					2,40,000
Less Tax on Profit on Sale 30% (2,40,000 – 2,00,000)	-	-	-	-	(12,000)
Total CFAT	14,60,000	31,40,000	60,80,000	80,40,000	1,09,68,000
P.V at 10%	.909	.826	.751	.683	.621
P.V of CFAT	13,27,140	25,93,640	45,66,080	54,91,320	68,11,128

Total P.V. Of Cash Flow = 207, 89,308
Less P.V. of Cash Outflow = 18, 00,000
NPV = 1, 89, 89,308

11.3 IMPORTANT POINTS

1. Depreciation should be ignored in the following cases.

(a) If the question does not mention any thing about depreciation & tax.

(b) If there is an instruction in the question that ignore taxes and depreciation.
(c) If it is mentioned in the company is a zero tax bracket and enjoys tax holiday period.

2. Unless otherwise specially mentioned.

(a) Same amount of working capital invested earlier is released.
(b) Same amount of salvage value is assumed to be realized at the life of the project.
(c) It should be assumed that the company has taxable income from other sources. Hence the loss should be adjusted.
(d) The method of depreciation followed is straight line method.

12

MANAGEMENT OF WORKING CAPITAL- I

Unit Structure :

12.0 Objectives
12.1 Introduction
12.2 Definition and Classification of Working Capital
12.3 Need for Working Capital
12.4 Determinants of Working Capital
12.5 Measurement of Working Capital
12.6 Importance or Advantages of Adequate Working Capital
12.7 Excess or Inadequate Working Capital
12.8 Working Capital Financing
12.9 Financing and Policies of Working Capital, and their Impact
12.10 Exercise

12.0 OBJECTIVES

After studying the unit the students will be able to:

- Define the concept Working Capital and classify the same.
- Elaborate the determinants of Working Capital.
- Explain the advantages of maintaining adequate amount of working capital.
- Discuss the disadvantages of inadequate amount of working capital

12.1 INTRODUCTION

The term working capital is commonly used for the capital required for day-to-day working in a business concern, such as for purchasing raw material, for meeting day-to-day expenditure on salaries, wages, rents rates, advertising etc. But there are much disagreement among various financial authorities (Financiers, accountants, businessmen and economists) as to the exact meaning of the term working capital.

12.2 DEFINITION AND CLASSIFICATION OF WORKING CAPITAL

12.2.1 MEANING AND DEFINITION

Working capital refers to the circulating capital required to meet the day to day operations of a business firm. Working capital may be defined by various authors as follows:

1. **According to Weston & Brigham -** "Working capital refers to a firm's investment in short term assets, such as cash amounts receivables, inventories etc."
2. "Working capital means current assets." **— Mead, Baker and Malott**
3. "The sum of the current assets is the working capital of the business" **— J.S.Mill**

Working capital is defined as "the excess of current assets over current liabilities and provisions". But as per accounting terminology, it is difference between the inflow and outflow of funds. In the Annual Survey of Industries (1961), working capital is defined to include "Stocks of materials, fuels, semi-finished goods including work-in-progress and finished goods and by-products; cash in hand and bank and the algebraic sum of sundry creditors as represented by (a) outstanding factory payments e.g. rent, wages, interest and dividend; b) purchase of goods and services; c) short-term loans and advances and sundry debtors comprising amounts due to the factory on account of sale of goods and services and advances towards tax payments".

The term "working capital" is often referred to "circulating capital" which is frequently used to denote those assets which are changed with relative speed from one form to another i.e., starting from cash, changing to raw materials, converting into work-in-progress and finished products, sale of finished products and ending with realization of cash from debtors.

Working capital has been described as the "life blood of any business which is apt because it constitutes a cyclically flowing stream through the business.

Working Capital may be classified in two ways
A) Concept based working capital
B) Time based working capital

12.2.2 CONCEPTS OF WORKING CAPITAL

1. Gross Working Capital: It refers to the firm's investment in total current or circulating assets.

2. Net Working Capital: The term "Net Working Capital" has been defined in two different ways:

i. It is the excess of current assets over current liabilities. This is, as a matter of fact, the most commonly accepted definition. Some people define it as only the difference between current assets and current liabilities. The former seems to be a better definition as compared to the latter.

ii. It is that portion of a firm's current assets which is financed by long-term funds.

3. Permanent Working Capital: This refers to that minimum amount of investment in all current assets which is required at all times to carry out minimum level of business activities. In other words, it represents the current assets required on a continuing basis over the entire year. Tandon Committee has referred to this type of working capital as "Core current assets".

4. Temporary Working Capital: The amount of such working capital keeps on fluctuating from time to time on the basis of business activities. In other words, it represents additional current assets required at different times during the operating year. For example, extra inventory has to be maintained to support sales during peak sales period. Similarly, receivable also increase and must be financed during period of high sales. On the other hand investment in inventories, receivables, etc., will decrease in periods of depression.

Suppliers of temporary working capital can expect its return during off season when it is not required by the firm. Hence, temporary working capital is generally financed from short-term sources of finance such as bank credit.

5. Negative Working Capital: This situation occurs when the current liabilities exceed the current assets. It is an indication of crisis to the firm.

12.3 NEED FOR WORKING CAPITAL

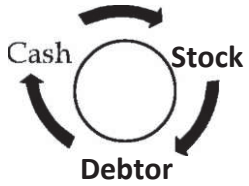
Working capital is needed till a firm gets cash on sale of finished products. It depends on two factors:

i. Manufacturing cycle i.e. time required for converting the raw material into finished product; and

ii. Credit policy i.e. credit period given to Customers and credit period allowed by creditors. Thus, the sum total of these times is called an **"Operating cycle"** and it consists of the following six steps:

1. Conversion of cash into raw materials.
2. Conversion of raw materials into work-in-process.
3. Conversion of work-in-process into finished products.
4. Time for sale of finished goods—cash sales and credit sales.
5. Time for realization from debtors and Bills receivables into cash.
6. Credit period allowed by creditors for credit purchase of raw materials, inventory and creditors for wages and overheads.

In case of trading concern, the operating cycle will be
Cash → Stock → Debtors → Cash



12.4 DETERMINANTS OF WORKING CAPITAL:

The factors influencing the working capital decisions of a firm may be classified as two groups, such as internal factors and external factors. The internal factors includes, nature of business size of business, firm's product policy, credit policy, dividend policy, and access to money and capital markets, growth and expansion of business etc. The external factors include business fluctuations, changes in the technology, infrastructural facilities, import policy and the taxation policy etc. These factors are discussed in brief in the following lines.

I. Internal Factors

1. Nature and size of the business

The working capital requirements of a firm are basically influenced by the nature and size of the business. Size may be measured in terms of the scale of operations. A firm with larger scale of operations will need more working capital than a small firm. Similarly, the nature of the business - influence the working capital decisions. Trading and financial firms have less investment in fixed assets. But require a large sum of money to be invested in working capital. Retail stores, business units require larger amount of working capital, where as, public utilities need less working capital and more funds to invest in fixed assets.

2. Firm's production policy

The firm's production policy (manufacturing cycle) is an important factor to decide the working capital requirement of a firm. The production cycle starts with the purchase and use of raw

material and completes with the production of finished goods. On the other hand production policy is uniform production policy or seasonal production policy etc., also influences the working capital decisions. Larger the manufacturing cycle and uniform production policy -larger will be the requirement of working capital. The working capital requirement will be higher with varying production schedules in accordance with the changing demand.

3. Firm's credit policy

The credit policy of a firm influences credit policy of working capital. A firm following liberal credit policy to all customers require funds. On the other hand, the firm adopting strict credit policy and grant credit facilities to few potential customers will require less amount of working capital.

4. Availability of credit

The working capital requirements of a firm are also affected by credit terms granted by its suppliers - i.e. creditors. A firm will need less working capital if liberal credit terms are available to it. Similarly, the availability of credit from banks also influences the working capital needs of the firm. A firm, which can get bank credit easily on favorable conditions will be operated with less working capital than a firm without such a facility.

5. Growth and expansion of business

Working capital requirement of a business firm tend to increase in correspondence with growth in sales volume and fixed assets. A growing firm may need funds to invest in fixed assets in order to sustain its growing production and sales. This will, in turn, increase investment in current assets to support increased scale of operations. Thus, a growing firm needs additional funds continuously.

6. Profit margin and dividend policy

The magnitude of working capital in a firm is dependent upon its profit margin and dividend policy. A high net profit margin contributes towards the working capital pool. To the extent the net profit has been earned in cash, it becomes a source of working capital. This depends upon the dividend policy of the firm. Distribution of high proportion of profits in the form of cash dividends results in a drain on cash resources and thus reduces company's working capital to that extent. The working capital position of the firm is strengthened if the management follows conservative dividend policy and vice versa.

7. Operating efficiency of the firm:

Operating efficiency means the optimum utilization of a firm's resources at minimum cost. If a firm successfully controls operating

cost, it will be able to improve net profit margin which, will, in turn, release greater funds for working capital purposes.

8. Co-ordinating activities in firm

The working capital requirements of a firm is depend upon the co-ordination between production and distribution activities. The greater and effective the co-ordinations, the pressure on the working capital will be minimized. In the absence of co-ordination, demand for working capital is reduced.

II. External Factors

1. Business fluctuations

Most firms experience fluctuations in demand for their products and services. These business variations affect the working capital requirements. When there is an upward swing in the economy, sales will increase, correspondingly, the firm's investment in inventories and book debts will also increase. Under boom, additional investment in fixed assets may be made by some firms to increase their productive capacity. This act of the firm will require additional funds. On the other hand when, there is a decline in economy, sales will come down and consequently the conditions, the firm try to reduce their short-term borrowings. Similarly the seasonal fluctuations may also affect the requirement of working capital of a firm.

2. Changes in the technology

The technological changes and developments in the area of production can have immediate effects on the need for working capital. If the firm wish to install a new machine in the place of old system, the new system can utilize less expensive raw materials, the inventory needs may be reduced there by working capital needs.

3. Import policy

Import policy of the Government may also effect the levels of working capital of a firm since they have to arrange funds for importing goods at specified times.

4. Infrastructural facilities

The firms may require additional funds to maintain the levels of inventory and other current assets, when there is good infrastructural facilities in the company like, transportation and communications.

5. Taxation policy

The tax policies of the Government will influence the working capital decisions. If the Government follow regressive taxation policy, i.e. imposing heavy tax burdens on business firms, they are

left with very little profits for distribution and retention purpose. Consequently the firm has to borrow additional funds to meet their increased working capital needs. When there is a liberalized tax policy, the pressure on working capital requirement is minimized.

Thus the working capital requirement of a firm is influenced by the internal and external factors.

12.5 MEASUREMENT OF WORKING CAPITAL

There are 3 methods for assessing the working capital requirement as explained below:

a) Percent of Sales Method

Based on the past experience, some percentage of sale may be taken for determining the quantum of working capital

b) Regression Analysis Method

The relationship between sales and working capital and its various components may be plotted on Scatter diagram and the average percentage of past 5 years may be ascertained. This average percentage of sales may be taken as working capital. Similar exercise may be carried out at the beginning of the year for assessing the working capital requirement. This method is suitable for simple as well as complex situations.

c) Operating Cycle Method

As a first step, we have to compute the operating cycle as follows:

i) Inventory period: Number of days consumption in stock = $I / \frac{M}{365}$

Where I - Average inventory during the year
M = Materials consumed during the year

ii) Work-in-process: Number of days of work in process = $W / \frac{K}{365}$

Where W = Average work-in-process during the year
K = Cost of work in process i.e. Material + Labour + Factory Overheads.

iii) Finished products inventory period = $G / \frac{F}{365}$

Where G = Average finished products inventory during the year
F = Cost of finished goods sold during the year

iv) Average collection period of Debtors = $D / \frac{S}{365}$

Where D = Average Debtors balances during the year
S = Credit sales during the year

v) Credit period allowed by Suppliers = $C = \frac{P}{365}$

Where C = Average creditors' balances during the year
P = credit purchases during the year

vi) Minimum cash balance to be kept daily.
Formula: O.C. = M + W + F + D – C

Note : It is also known as working capital cycle. Operating cycle is the total time gap between the purchase of raw material and the receipt from Debtors.

12.6 IMPORTANCE OR ADVANTAGES OF ADEQUATE WORKING CAPITAL

Working capital is the life blood and nerve centre of a business. Just as circulation of blood is essential in the human body for maintaining life, working capital is very essential to maintain the smooth running of a business. No business can run successfully without an adequate amount of working capital. The main advantages of maintaining adequate amount of working capital are as follows:

1. **Solvency of the business:** Adequate working capital helps in maintaining solvency of the business by providing uninterrupted flow of production.

2. **Goodwill:** Sufficient working capital enables a business concern to make prompt payments and hence helps in creating and maintaining goodwill.

3. **Easy loans:** A concern having adequate working capital, high solvency and good credit standing can arrange loans from banks and other on easy and favourable terms.

4. **Cash discounts:** Adequate working capital also enables a concern to avail cash discounts on the purchases and hence it reduces costs.

5. **Regular supply of raw materials:** Sufficient working capital ensures regular supply of raw materials and continuous production.

6. **Regular payment of salaries, wages and other day-to-day commitments:** A company which has ample working capital can make regular payment of salaries, wages and other day-to-day commitments which raises the morale of its employees, increases their efficiency, reduces wastages and costs and enhances production and profits.

7. **Exploitation of favourable market conditions:** Only concerns with adequate working capital can exploit favourable market conditions such as purchasing its requirements in bulk when the prices are lower and by holding its inventories for higher prices.

8. **Ability to face crisis:** Adequate working capital enables a concern to face business crisis in emergencies such as depression because during such periods, generally, there is much pressure on working capital.

9. **Quick and regular return on investments:** Every Investor wants a quick and regular return on his investments. Sufficiency of working capital enables a concern to pay quick and regular dividends to its investors as there may not be much pressure to plough back profits. This gains the confidence of its investors and creates a favourable market to raise additional funds i.e., the future.

10. **High morale:** Adequacy of working capital creates an environment of security, confidence, high morale and creates overall efficiency in a business.

12.7 EXCESS OR INADEQUATE WORKING CAPITAL

Every business concern should have adequate working capital to run its business operations. It should have neither redundant or excess working capital nor inadequate or shortage of working capital. Both excess as well as short working capital positions are bad for any business. However, out of the two, it is the inadequacy of working capital which is more dangerous from the point of view of the firm.

12.7.1 Disadvantages of Redundant or Excessive Working Capital

1. Excessive Working Capital means ideal funds which earn no profits for the business and hence the business cannot earn a proper rate of return on its investments.
2. When there is a redundant working capital, it may lead to unnecessary purchasing and accumulation of inventories causing more chances of theft, waste and losses.
3. Excessive working capital implies excessive debtors and defective credit policy which may cause higher incidence of bad debts.
4. It may result into overall inefficiency in the organization.
5. When there is excessive working capital, relations with banks and other financial institutions may not be maintained.

6. Due to low rate of return on investments, the value of shares may also fall.
7. The redundant working capital gives rise to speculative transactions.

12.7.2 Disadvantages or Dangers of Inadequate Working Capital

1. A concern which has inadequate working capital cannot pay its short-term liabilities in time. Thus, it will lose its reputation and shall not be able to get good credit facilities.
2. It cannot buy its requirements in bulk and cannot avail of discounts, etc.
3. It becomes difficult for the firm to exploit favourable market conditions and undertake profitable projects due to lack of working capital.
4. The firm cannot pay day-to-day expenses of its operations and it creates inefficiencies, increases costs and reduces the profits of the business.
5. It becomes impossible to utilize efficiently the fixed assets due to non-availability of liquid funds.
6. The rate of return on investments also falls with the shortage of working capital.

12.8 WORKING CAPITAL FINANCING

1. Accruals

The major accrual items are wages and taxes. These are simply what the firm owes to its employees and to the government.

2. Trade Credit

Trade credit represents the credit extended by the supplier of goods and services. It is a spontaneous source of finance in the sense that it arises in the normal transactions of the firm without specific negotiations, provided the firm is considered creditworthy by its supplier. It is an important source of finance representing 25% to 50% of short-term financing.

3. Working Capital Advance by Commercial Banks

Working capital advance by commercial banks represents the most important source for financing current assets.

Forms of Bank Finance:

Working capital advance is provided by commercial banks in three primary ways: (i) cash credits / overdrafts, (ii) loans, and (iii) purchase / discount of bills. In addition to these forms of direct

finance, commercials banks help their customers in obtaining credit from other sources through the letter of credit arrangement.

i. **Cash Credit / Overdrafts:** Under a cash credit or overdraft arrangement, a pre-determined limit for borrowing is specified by the bank. The borrower can draw as often as required provided the out standings do not exceed the cash credit / overdraft limit.

ii. **Loans:** These are advances of fixed amounts which are credited to the current account of the borrower or released to him in cash. The borrower is charged with interest on the entire loan amount, irrespective of how much he draws.

iii. **Purchase / Discount of Bills:** A bill arises out of a trade transaction. The seller of goods draws the bill on the purchaser. The bill may be either clean or documentary (a documentary bill is supported by a document of title to gods like a railway receipt or a bill of lading) and may be payable on demand or after a usance period which does not exceed 90 days. On acceptance of the bill by the purchaser, the seller offers it to the bank for discount /purchase. When the bank discounts / purchases the bill it releases the funds to the seller. The bank presents the bill to the purchaser (the acceptor of the bill) on the due date and gets its payment.

iv. **Letter of Credit:** A letter of credit is an arrangement whereby a bank helps its customer to obtain credit from its (customer's) suppliers. When a bank opens a letter of credit in favour of its customer for some specific purchases, the bank undertakes the responsibility to honour the obligation of its customer, should the customer fail to do so.

Regulation of Bank Finance

Concerned about such a distortion in credit allocation, the Reserve Bank of India (RBI) has been trying, particularly from the mid 1960s onwards, to bring a measure of discipline among industrial borrowers and to redirect credit to the priority sectors of the economy. From time to time, the RBI issues guidelines and directives relating to matters like the norms for inventory and receivables, the maximum permissible bank finance, the form of assistance, the information and reporting system, and the credit monitoring mechanism. The important guidelines and directives have stemmed from the recommendations of various committees such as the Dehejia Committee, the Tandon Committee, the Chore Committee, and the Marathe Committee.

However, in recent years, in the wake of financial liberalisation, the RBI has given freedom to the boards of individual banks in all matters relating to working capital financing.

From the mid-eighties onwards, special committees were set up by the RBI to prescribe norms for several other industries and revise norms for some industries covered by the Tandon Committee.

Maximum Permissible Bank Finance: The Tandon Committee had suggested three methods for determining the maximum permissible bank finance (MPBF).

Lending Norms The recommendation of the Tandon Committee regarding the "Lending norms" has far - reaching implications. The lending norms have been suggested in view of the realization that the banker's role as a lender in only to supplement the borrower's resources and not to meet his entire working capitals needs. In the context of this approach, the committee has suggested three alternative methods for working out the maximum permissible level of bank borrowings. Each successive method reduces the involvement of short-term bank credit to finance the current assets.

First Method: According to this method, the borrower will have to contribute a minimum of 25% of the working capital gap from long-term funds, i.e., owned funds and term borrowings. This will give a current ratio of 1.17:1.

The term working capital gap refers to the total of current assets less current liabilities other than bank borrowings.

This can be understood with the help of following example:

Example 1

	Rs.
Total Current assets required by the borrower as per norms	20,000
Current liabilities	5,000
Amount of maximum permissible bank borrowings as per the first method can be ascertained as follows: -	
Working Capital gap (Rs. 20,000 - Rs. 5,000)	15,000
Less: 25% from long-term sources	3,750
Maximum permissible bank borrowings	11,250

Second Method: Under this method the borrower has to provide the minimum of 25% of the total current assets that will give a current ratio of 1.33:1.

Example 2: On the basis of the data given in Example 1, the maximum permissible bank borrowings as per second method can be ascertained as follows:

	Rs.
Current assets as per norms	20,000
Less: 25% to be provided from long - term funds	5,000
	15,000
Less: Current liabilities other than bank borrowings	5,000
Maximum permissible bank borrowings	**10,000**

Third Method : In this method, the borrower's contribution from long term funds will be to the extent of the entire core current assets and a minimum of 25% of the balance of the current assets. The term core current assets refers to the absolute minimum level of investment in all current assets which is required at all times to carry out minimum level of business activities.

Example 3: On the basis of the information given in Example 1, the amount of maximum permissible bank finance can be arrived at the follows if the core current assets are Rs. 2,000

	Rs.
Current assets as per norms	20,000
Less: Core Current Assets	2,000
	18,000
Less: 25% to be provided from long-term funds	4,500
	13,500
Less: Current Liabilities	5,000
Maximum permissible bank borrowings	**8,500**

It will thus be seen that in the third method current ratio has further improved.

Reserve Bank's directive: The Reserve Bank of India accepted the recommendations of the Tandon Committee. It instructed the commercial banks in 1976 to put all the borrowers having aggregate credit limits from banking system in excess of Rs.10 lakhs, under the first method of lending.

Public Deposits

Many firms, large and small, have solicited unsecured deposits from the public in recent years, mainly to finance their working capital requirements.

Inter-corporate Deposits

A deposit made by one company with another, normally for a period up to six months, is referred to as an inter-corporate deposit. Such deposits are usually of three types.

a. **Call Deposits :** In theory, a call deposit is withdrawable by the lender on giving a day's notice. In practice, however, the lender has to wait for at least three days. The interest rate on such deposits may be around 10 percent per annum.

b. **Three-months Deposits :** More popular in practice, these deposits are taken by borrowers to tide over a short-term cash inadequacy that may be caused by one or more of the following factors: disruption in production, excessive imports of raw material, tax payment, delay in collection, dividend payment, and unplanned capital expenditure. The interest rate on such deposits is around 12 percent per annum.

c. **Six-months Deposits :** Normally, lending companies do not extend deposits beyond this time frame. Such deposits, usually made with first-class borrowers, and carry interest rate of around 15 percent per annum.

Short-term Loans from Financial Institutions

The Life Insurance Corporation of India and the General Insurance Corporation of India provide short-term loans to manufacturing companies with an excellent track record.

Rights Debentures for Working Capital

Public limited companies can issue "Rights" debentures to their shareholders with the object of augmenting the long-term resources of the company for working capital requirements. The key guidelines applicable to such debentures are as follows:

(a) The amount of the debenture issue should not exceed (a) 20% of the gross current assets, loans, and advances minus the long-term funds presently available for financing working capital, or (b) 20% of the paid-up share capital, including reference capital and free reserves, whichever is the lower of the two.

(b) The debt. -equity ratio, including the proposed debenture issue, should not exceed 1:1.

(c) The debentures shall first be offered to the existing Indian resident shareholders of the company on a pro rata basis.

Commercial Paper

Commercial paper represents short-term unsecured promissory notes issued by firms which enjoy a fairly high credit rating. Generally, large firms with considerable financial strength are able to issue commercial paper. The important features of commercial paper are as follows:

(a) The maturity period of commercial paper usually ranges from 90 days to 360 days.

(b) Commercial paper is sold at a discount from its face value and redeemed at its face value. Hence the implicit interest rate is a function of the size of the discount and the period of maturity.

(c) Commercial paper is directly placed with investors who intend holding it till its maturity.

Hence there is no well developed secondary market for commercial paper.

Factoring:

Factoring, as a fund based financial service, provides resources to finance receivables as well as facilitates the collection of receivables. It is another method of raising short-term finance through account receivable credit offered by commercial banks and factors. A commercial bank may provide finance by discounting the bills or invoices of its customers. Thus, a firm gets immediate payment for sales made on credit. A factor is a financial institution which offers services relating to management and financing of debts arising out of credit sales. Factoring is becoming popular all over the world on account of various services offered by the institutions engaged in it. Factors render services varying from bill discounting facilities offered by commercial banks to a total take over of administration of credit sales including maintenance of sales ledger, collection of accounts receivables, credit control and protection from bad debts, provision of finance and rendering of advisory services to their clients. Factoring, may be on a recourse basis, where the risk of bad debts is borne by the client, or on a non-recourse basis, where the risk of credit is borne by the factor.

At present, factoring in India is rendered by only a few financial institutions on a recourse basis. However, the Report of the Working Group on Money Market (Vaghul Committee) constituted by the Reserve Bank of India has recommended that banks should be encouraged to set up factoring divisions to provide speedy finance to the corporate entities.

In spite of many services offered by factoring, it suffers from certain limitations. The most critical fall outs of factoring include (i) the high cost of factoring as compared to other sources of short-term finance, (ii) the perception of financial weakness about the firm availing factoring services, and (iii) adverse impact of tough stance taken by factor, against a defaulting buyer, upon the borrower resulting into reduced future sales.

12.9 FINANCING AND POLICIES OF WORKING CAPITAL, AND THEIR IMPACT

After arriving the estimation of working capital for any firm, the next step is how to finance the working capital requirement. It is of two sources of financing:

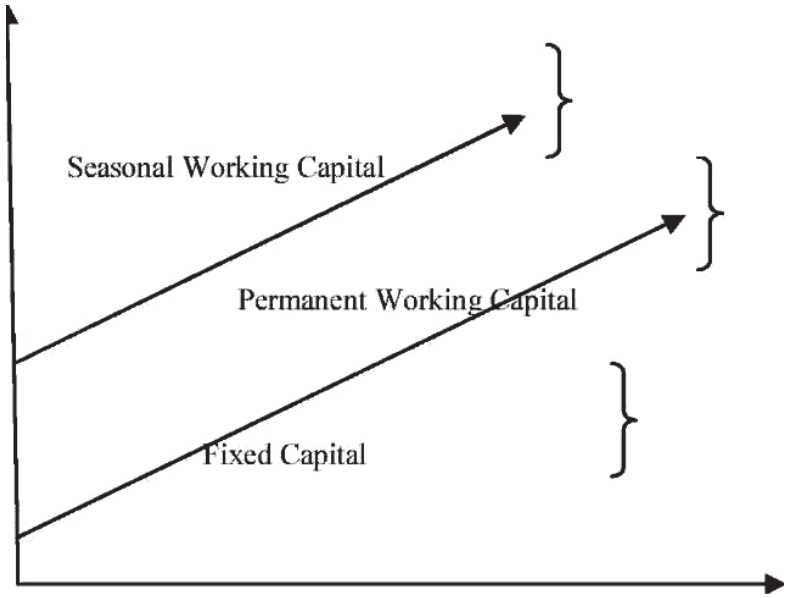
1. Short –term
2. Long – term

Short-term financing refers to borrowing funds or raising credit for a maximum of 1 year period i.e., the debt is payable within a year at the most. Whereas, the Long - term financing refers to the borrowing of funds or raising credit for one year or more. The finance manager has to mix funds from these two sources optimally to ensure profitability and liquidity. The mixing of finances from long-term and short term should be such that the firm should not face either short of funds or idle funds. Thus, the financing of working capital should not result in either idle or shortage of cash funds.

Policy is a guideline in taking decisions of business. In working capital financing, the manager has to take a decision of mixing the two components i.e., long term component of debt and short term component of debt. The policies for financing of working capital are divided into three categories. Firstly, conservative financing policy in which the manager depends more on long term funds. Secondly, aggressive financing policy in which the manager depends more on short term funds, and third, are is a moderate policy which suggests that the manager depends moderately on both long tem and short-term funds while financing. These policies are shown diagrammatically here under.

Matching Approach

The question arising here is how to mix both short term and long term funds while financing required working capital. The guiding approach is known as 'matching approach'. It suggests that if the need is short term purpose, raise short - term loan or credit and if the need is for a long term, one should raise long term loan or credit. Thus, maturity period of the loan is to be matched with the purpose and for how long. This is called matching approach. This matches the maturity period of the loan with the period for how long working capital requires. The following diagram shows the graphic presentation of the matching approach.



Types of Funds	Working capital requirement
Short – term	- Seasonal Working Capital
Long – term	- Permanent Working Capital
Equity Capital	- Fixed Assets

Impact of Working Capital Policies

A firm's sales are Rs. 25 lakhs, and having an EBIT - Rs. 3 lakhs. It has fixed assets of Rs. 8 lakhs. The firm is thinking to hold current assets of different size of Rs. 5 lakhs; Rs. 6 lakhs or Rs. 8 lakhs. Assuming profits and fixed assets do not vary, the impact of these working capital policies are in the following manner which is explained is a hypothetical illustration:

	Types of Policy (Rs. in lakhs)		
	Aggressive	**Moderate**	**Conservative**
Sales	25	25	25
EBIT	3	3	3
Current Assets	5	6	8
Fixed Assets	8	8	8
Total Assets	13	14	16
Return on Assets % (EBIT/total assets)	23.07	21.42	18.75

Lower the level of current assets (aggressive) higher the returns (23.07 percent) higher the level of current assets (conservative) lower the returns (18.75 percent).

Optimal Size of Current Assets

As we have discussed in the earlier paragraphs, current assets and their size depends upon several factors.

Arriving appropriate size of current assets such as cash, raw materials, finished goods and debtors is a challenge to the financial manager of a firm. It happens some times excess or shortage. We have also discussed in the fore-gone paragraphs about the evils of excess working capital and inadequate working capital. Very few firms arrive optimum level of working capital by their sheer experience and scientific approach. The ratio of current assets to fixed assets helps in measuring the performance of working capital management. The higher the ratio, conservative the firm is in maintaining its current assets and lower the ratio, aggressive the firm is in maintaining its current assets. So every firm should balance their level of current assets and make it optimum.

Liquidity Vs. Profitability

Any exercise in working capital management will influence either liquidity or profitability. The working capital management is a razor edge exercise for financial manager of an enterprise. In this context the financial manager has to take several decisions of routine and non-routine such as:

Sufficient cash balance to be maintained;
To raise long term or short term loans decide the rate of interest and the time of repayment; Decide the purchase policy to buy or not to buy materials;

To determine the economic order quantity for inputs,
To fix the price at which to buy the inputs if any;
To sell for credit or not and terms of credit;
To decide the terms of purchase;
To decide the credit period and extent of credit;

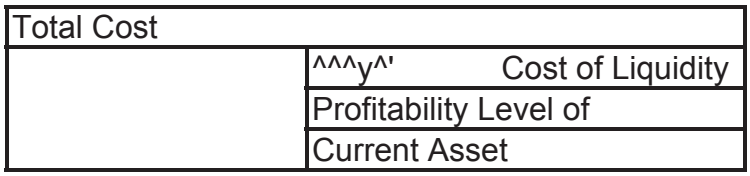
In all these aspects the financial manager has to take decisions carefully so that the firm's twin objectives such as profitability and solvency are not affected.

Trade off between Liquidity and Profitability:

If a firm maintains huge amount of current assets its profitability will be affected though it protects liquidity.

If a firm maintains low current assets, its liquidity is of course weak but the firm's profitability will be high.

The trade off between liquidity and illiquidity are shown in the following diagram.



Optimum Level of Current Asset

A Trade off between Profitability and Liquidity

12.10 EXERCISE

A - Find out the correct option:

1. Working capital is
   a) Excess of fixed assets over current assets
   b) Excess of current assets over current liability
   c) Excess of share capital over loans
   d) None of the above

2. Gross working capital is equal to
   a) Gross fixed assets
   b) Gross current liabilities
   c) Gross current assets
   d) None of the above

3. Permanent working capital is
   a) Minimum working capital required
   b) Seasonal in nature at all the time
   c) Permanently blocked up in stock
   d) None of the above

4. Seasonal working capital is
   a) Permanently required
   b) Fluctuating in nature
   c) Required to meet seasonal needs of
   d) None of the above the organisation

5. Longer the process period
   a) Lesser will be the working capital
   b) Larger will be the working capital
   c) Minimum working capital
   d) None of the above

6. Shortage of working capital may result in
   a) Poor credit worthiness
   b) Higher trade discount
   c) Higher cash discount
   d) None of the above

7. Operating cycle period can be reduced by
   a) Increasing the period of the credit allowed
   b) Decreasing the raw material storage period by creditors
   c) Decreasing the processing period
   d) None of the above

8. Cost of material consumption 67,500
   Opening stock of materials 12,500
   Closing stock of materials 10,000
   One year 360 days

9. Excessive investment in current assets results in
   a) High profitability
   b) Low profitability
   c) High liquidity
   d) b & c

10. higher cash/Bank balance
    a) Decrease profitability
    b) Increase profitability
    c) Increases operating efficiency
    d) None of the above

11. Working capital finance is raised from
    a) Bank overdraft
    b) Cash credit
    c) Bill finance
    d) All of the above

12. Spontaneous source of working capital
    a) Trade creditors
    b) Bills payable
    c) Notes payable
    d) All of the above

13. Internal long term source include
    a) Retained profit
    b) Depreciation
    c) a and b
    d) Share capital

14. External short term source include
    a) Bank overdraft
    b) Cash credit
    c) Public deposits
    d) All of the above

15. Cash credit is permitted against
    a) Pledge
    b) Hypothecation
    c) Mortgage
    d) a and b

16. MPBF refers to
    a) Maximum permissible Bank finance
    b) Minimum permissible bank finance
    c) Bank overdraft
    d) Cash credit

17. Public Deposits are accepted for a maximum of
    a) 2 years
    b) 3 years
    c) 5 years
    d) 1 years

B - State with reasons whether the following statements are true or false:

1. Working capital is excess of current assets over current liabilities.
2. Manufacturing organization requires higher working capital.
3. Cash cost approach is the appropriate basis of estimation of working capital.
4. Stock of finished goods should be valued at cost of production.
5. Longer the period of credit allowed by suppliers lesser will be the requirement of working capital .
6. Credit granted by suppliers reduces working capital requirement.
7. Trade credit is a source of working capital.

8. Average holding period of current assets decides requirement of working capital.
9. Depreciation is an internal source of finance.
10. MPBF stands for minimum bank finance.
11. Floating charge is on a certain asset.

C – Fill in blanks

1. Working capital at cash cost is called _____ capital.
2. Advance from customers brings _____ the requirement of working capital.
3. Margin of safety is _____ to net current assets to get working capital.
4. An organization which grants longer period of credit requires _____ working capital.
5. Bank overdraft is an _____ source of finance.
6. Retained profit is long term _____ source of finance.
7. _____ committee has recommended three norms of working capital finance.
8. Cash credit is a_____ facility.

D- Match the column

1.

	Group A		Group B
1	Gross Working capital	**A**	Minimum working capital
2	Net Working Capital	**B**	To meet seasonal requirements
3	Permanent Working capital	**C**	Valued at cost or at S.P.
4	Seasonal Working capital	**D**	Current assets less current liabilities
5	Debtors	**E**	Total current assets
6	Margin of safety	**F**	Added to net current assets to get working capital
7	Outstanding expenses	**G**	Lag in payment of expenses
8	Large Scale operation	**H**	Larger working capital

2.

	Group A		Group B
1	Open A/c	A	Maximum permissible bank finance
2	MPBF	B	Sale of bill to a bank
3	Bill discounting	C	Goods in possession of bank
4	Pledge	D	Possession of goods with the borrower
5	Hypothecation	E	25%
		F	Credit without legal evidence

E – Answer the following Questions.

1. Discuss the factors determining requirement of adequate working capital.
2. Explain the significance of working capital in the smooth running of a business enterprise and also discuss the various components of working capital.
3. Define working capital
4. Explain the importance of working capital in business.
5. What are the factors that affect the requirements of Working capital?
6. What is cash Working Capital? How is it calculated?
7. Write short notes on ‘positive and Negative Working Capital’.
8. What are the short term sources of working capital finance?
9. Explain equity shares as a source of finance.
10. What are the merits and limitations of Public Deposits as a source of finance?
11. Write short notes on:
    a. Cash credit
    b. Bills Discounting
    c. Bank overdraft
    d. Retained earnings
    e. Depreciation as a source of finance

13

MANAGEMENT OF WORKING CAPITAL II

Unit Structure :

13.1 Objectives
13.2 Management of Working Capital
13.3 Problems & Solutions

13.1 OBJECTIVES

After studying the unit the students will be able to solve the problems of management of working capital

13.2 MANAGEMENT OF WORKING CAPITAL

Working Capital Management involves management of different components of working capital such as cash, inventories, accounts receivable, creditors etc. A brief description follows regarding the various issues involved in the management of each of the above components of working capital.

13.3 PROBLEMS & SOLUTIONS

The working capital estimation as per the method of operating cycle, is the most systematic and logical approach. In this case, the working capital estimation is made on the basis of analysis of each and every component of the working capital individually. As already discussed, the working capital, required to sustain the level of planned operations, is determined by calculating all the individual components of current assets and current liabilities. The calculation of net working capital may also be shown as follows;

Working Capital	=	Current Assets - Current Liabilities
	=	(Raw Materials + Work-in-progress Stock + Finished Goods Stock + Debtors + Cash Balance) – (Creditors + Outstanding Wages + Outstanding Overheads.)

Where,

Raw Materials	= Cost (Average) of Materials in Stock.
Working in Progress	= Cost of Materials + Wages + Overhead of Work-in-progress
Finished Goods Stock	= Cost of Materials + Wages + Overhead of Finished Goods
Creditors for Material	= Cost of Average Outstanding Creditors
Creditors for wages	= Averages Wages Outstanding
Creditors for Overheads	= Average Overheads Outstanding

Thus Working Capital	= Cost of Materials in Stores, in Work-in-progress, in Finished Goods and in Debtors.
	Less : Creditors for Materials
	Plus : Wages in Work-in-progress, in Finished Goods and in Debtors.
	Less : Creditors for Wages.
	Plus : Overheads in Work-in-progress, in Finished Goods and in Debtors.
	Less : Creditors for Overheads

The work sheet for estimation of working capital requirements under the operating cycle method may be presented as follows.

Estimation of Working Capital Requirements	Amount	Amount	Amount
I. Current Assets :			
Minimum Cash Balance		****	
Inventories:			
Raw Materials	****		
Work-in-progress	****		
Finished Goods	****	****	
Receivables:			
Debtors	***		
Bills	***	***	***
Gross Working Capital (CA)			
II Current Liabilities:			
Creditors for Purchases	****		

Creditors for Wages	****		
Creditors for Overheads	****	****	***
Total Current Liabilities (CL)	****		***
Excess of CA over CL			***
+ Safety Margin		****	**
Net Working Capital		****	***

The following points are also worth noting while estimating the working capital requirement:

1. Depreciation: An important point worth noting while estimating the working capital requirement is the depreciation on fixed assets. The depreciation on the fixed assets, which are used in the production process or other activities, is not considered in working capital estimation. The depreciation is a non-cash expense and there is no funds locked up in depreciation as such and therefore, it is ignored. Depreciation is neither included in valuation of work-in-progress nor in finished goods. The working capital calculated by ignoring depreciation is known as cash basis working capital. In case, depreciation is included in working capital calculations, such estimate is known as total basis working capital.

2. Safety Margin: Sometimes, a firm may also like to have a safety margin of working capital in order to meet any contingency. The safety margin may be expressed as a % of total current assets or total current liabilities or net working capital. The safety margin, if required, is incorporated in the working capital estimates to find out the net working capital required for the firm. There is no hard and fast rule about the quantum of safety margin and depends upon the nature and characteristics of the firm as well as of its current assets and current liabilities.

Illustration 1

The Cost Sheet of POR Ltd. Provides the following data:

	Cost Per Unit
Raw Material	Rs. 50
Direct Labour	20
Overheads	40
Total Cost	110
Profits.	20
Selling Prices.	130

Average Raw Material in stock is for one month. Average material in work-in- progress is for half month credit by suppliers. One month credit allowed to debtors one month.

Average time lag in payment of wages 10 days average time lag in payment of overheads 30 days 25% of the sales are on cash basis. Cash Balance expected to be Rs. 1,00,000. Finished good lie in the warehouse for one month.

You are required to prepare a statement of the working capital needed to finance a level of the activity of 54,000 Units Of output. Production is carried on evenly throughout the year and wages and overhead accrue similarly. State your assumptions if any clearly.

Solution:

As the annual level of activity is given at 54,000 units, it means that the monthly turn over would be 54,000\ 12=4,500. The Working capital requirement for this Monthly turn over can now be estimated as follow.

Estimate OF Working Capital Requirements.

I. Current Assets.	**Amounts.(Rs.)**
Minimum Cash Balance	1,00,000
Inventories :	
Raw Material (4,500xRs.50)	2,25,000
Work In Progress :	
Material (4,500xRs. 50)/2	1,25,500
Wages 50% of (4,500x Rs.20)/20	22,500
Overheads 50% of (4,500xRs. 30)/2	33,750
Finished Good (4,500xRs. 100)	4,50,000
Debtors (4,500x Rs. 100x75%)	3,75,500
Gross Working Capital	12,81,250
II. Current Laibilities:	
Creditors for Materials (4,500xRs. 50)	2,25,000
Creditors for Wages (4,500xRs. 20)/3	30,000
Creditors for overheads (4,500xRs. 30)	1,35,000
Total Current Laibilities	3,90,000
Net Working Capital	**8,91,250**

Working notes:

(a) The overheads of Rs. 40 per unit include a depreciation of Rs. 10 per unit, which is a non – cash item. This depreciation cost has been ignored for valuation of work – in – progress, finished goods and debtors. The overhead cost, therefore, has been taken only at Rs. 30 per unit.

(b) In the valuation of work in progress, the raw material have been taken at full requirements for 15 days; but the wages and overheads have been taken only at 50% on the assumption that on an average all units in work – in – progress are 50% complete.

(c) Since, the wages are paid with a time lag of 10 days, the working capital provided b wages has been taken by dividing the monthly wages by 3 (assuming a month to consist of 30 days).

Illustration 2

Grow More Ltd. is presently operating at 60% level, producing 36,000 units per annum. In view of favourable market conditions, it has been decided that from 1st January 2009, the company would operate at 90% capacity. The following information's are available:

(1) Existing cost – price structure per unit if given below:

Raw material	4.00
Wages	2.00
Overheads (Variable)	2.00
Overheads (Fixed)	1.00
Profit	1.00

(2) It is expected that the cost of raw material, wages rate expenses and sales per unit will remain unchanged in 2009.

(3) Raw materials remain in store for 2 months before these are issued to production. These units remain in production process for 1 month.

(4) Finished goods remain in godown for 2 months.

(5) Credit allowed to debtors is 2 months. Credit allowed by creditor is 3 month.

(6) Lag in wages and overhead payments is 1 months. It may be assumed that wages and overhead accrue evenly throughout the production level.

You are required to :

a) Prepare profit statement at 90% capacity level; and

b) Calculate the working capital requirements an estimated basis to sustain the increased production level.

Assumption made f any, should be clearly indicate.

Solution:

Statement of Profitability at 90% Capacity

Units (At 90% Capacity)	54,000
Sales (54,000 x Rs.10) (A)	Rs. 5,40,000
Cost:	
Raw Materials (54,000 x Rs. 4)	2,16,000
Wages (54,000 x Rs. 2)	1,08,000
Varaiable overhead (54,000 x Rs. 2)	1,08,000
Fixed overhead (Rs. 1x36,000)	36,000
Total Cost (B)	4,68,000
Net Profit (A-B)	72,000

Statement of Working Capital Requirement

A. current Assets:	**Rs.**	**Rs.**
Stock of Raw materials (2 Months x 4,500 x Rs. 4)		36,000
Work – in – progress:		
Materials (1 month x 4,500 x Rs. 4)	18,000	
Wages (1/2 month)	4,500	
Overheads (1/2 months)	6,000	28,500
Finished Goods (2 months)		78,000
Debtors (2 months x 4,68,000 / 12)		78,000
Total Current Assets		2,20,500
B. CURRENT LIABILITIES		
Sundry creditors (Goods) – 3 Months		54,000
Outstanding wages (`1 month)		9,000
Outstanding overheads (1 month)		12,000
Total Current Liabilities		75,000
Working Capital requirement		1,45,500

Working Notes:
Overhead and wages – The work in progress period is one month. So, the wages and overheads included in work in progress, are on an average, for half month or 1/24 of a year.

$$\text{Wages} = \frac{\text{Rs. } 1,08,000}{24} = 4,500$$

$$\text{Overhead} = \frac{\text{Rs. } 1,08,000 + 36,000}{24} = 6,000$$

The valuation of finished goods can also be arriving at as follows:
Number of units = 4,500 x 2 = 9,000
Variable cost = Rs. 8 per unit
Fixed cost (Rs. 36,000 / 12) x 2 = Rs. 6,000
Total cost of finished goods (9,000 x 8) + 6,000 =Rs. 78,000

As the decision to increase the operating capacity from 60% to 90% is already taken, it has been assumed that the opening balance of raw materials, work in progress and finished goods have already been brought to the desired level. Consequently, goods purchased during the period will be only for the production requirement and not for increasing the level of stock.

Illustration 3
The management of Royal Industries has called for a statement showing the working capital to finance a level of activity of 1,80,000 units of output for the year. The cost structure for the company's product for the above mentioned activity level is detailed below:

	Cost per unit
Raw Materials	Rs. 20
Direct Labour	5
Overheads (include depreciation of Rs. 5 per unit)	15
	40
Profit	10
Selling Price	50

Additional Information:

(a) Minimum desire cash balance is Rs. 20,000

(b) Raw Materials are held in stock, on an average, for two months.

(c) Work in progress (assume 50% competition stage) will approximate to half – a – month's production.

(d) Finished goods remain in warehouse, on an average for a month.

(e) Suppliers of materials extend a month's credit and debtors are provided two month's credit; cash sales are 25% of total sale.

(f) There is time lag in payment of wages of a month; and half – a month in the case of overheads.

From the above facts, you are required to prepare a statement showing working capital requirements.

Solution:

Statement of Total Cost

Raw Material (1,80,000 x Rs. 20)	Rs. 36,00,000
Direct labour (1,80,000 x Rs. 5)	9,00,000
Overheads (excluding depreciation) (1,80,000 x Rs. 10)	18,00,000
Total Cost	63,00,000

Statement of Working Capital requirement

1. Current Assets:	
Cash Balance	20,000
Raw Materials (1/6 of Rs. 36,00,000)	6,00,000
Work – in – progress (Total cost / 24 x 50%)	1,31,250
Finished Goods (Total Cost / 12)	5,25,000
Debtors (75% Rs. 63,00,000) x 1/6	7,78,500
Total Current Assets	20,63,750
2. Current Liabilities:	
creditors (Rs. 36,00,000) x 1/12	3,00,000
Direct Labour (Rs. 9,00,000) x 1/12	75,000
Overheads (Rs. 18,00,000) x 1/24 (excluding dep.)	75,000
Total Current Liabilities	4,50,000
Net working Capital requirement	16,13,750

Note: Depreciation is a non – cash item, therefore, it has been excluded from total cost as well as working capital provided by overheads. Work in progress has been assumed to be 50% complete in respect of materials as well as labour and overheads expenses.

Illustration 4

XYZ Ltd. sells its products on a gross profit of 20% of sales. The following information is extracted from its annual accounts for the year ending 31st March, 2009.

Sales (at 3 months credit)	Rs. 40,00,000
Raw Materials	12,00,000
Wages (15 days in arrears)	9,60,000
Manufacturing and General expenses (1 months in arrears)	12,00,000
Administration expenses (1 month in arrears)	4,80,000
Sales Promotion expenses (payable half yearly in advance)	2,00,000

The company enjoys one months credit from the suppliers of raw materials and maintains 2 months stock of raw materials and 1 ½ months finished goods. Cash balance is maintained at Rs. 1,00,000 as a precautionary balance. Assuming a 10% margin, find out the working capital requirement of XYZ Ltd.

Solution:

Statement of Working Capital Requirement

1. Current Assets:	**Amt. (Rs.)**
Debtors (40,00,000 x 3 / 12 x 80%) (at cost of goods sold)	8,00,000
Raw Materials stock 2/12 of 12,00,000	2,00,000
Finished Goods stock (1 ½ Months of cost of production) (Cost of Production being 80% of sales of 40,00,000	4,00,000
Advance payment of Sales promotion	1,00,000
Cash	1,00,000
Total Current Assets	16,00,000
2. Current Liabilities	
Sundry Creditors (1/12 of 12,00,000)	1,00,000
Wages (arrears for 15 days) (1/24 of 9,60,000)	40,000
Manu, and Gen, exp. (arrears for 1 month) (1/12 of 12,00,000)	1,00,000

Administrative exp. (arrears for 1 month) (1/12 of 4,80,000)	40,000
Total current liabilities	2,80,000
Excess of current assets and current liabilities	13,20,000
Add 10% Margin	1,32,000
Net working capital	14,52,000

Illustration 5

Hi – Tech Ltd. plans to sell 30,000 units next year. The expected cost of goods sold is as follows:

	(Rs. Per unit)
Raw Material	100
Manufacturing expenses	30
Selling, Administration and financial expenses	20
Selling price	200

The Duration at various stages of the operating cycle is expected to be as follows:	
Raw Materials Stage	2 months
Work in progress stage	1 month
Finished stage	½ months
Debtors Stage	1 month

Assuming the monthly sales level of 2,500 units, estimate the gross working capital requirement. Desired cash balance is 5% of the gross working capital requirement, and work – in – progress in 25% complete with respect to manufacturing expense.

Solution:

Statement of Working Capital Requirement

1. Current Assets:		
Stock of Raw Material (2,500 x 2 x 100)		5,00,000
Work in progress:		
Raw Materials (2,500 x 100)	2,50,000	
Manufacturing Expenses 25% of (2,500 x 30)	18,750	2,68,750
Finished Goods:		
Raw Materials (2,500 x ½ x 100)	1,25,000	

Manufacturing Expenses (2,500 x ½ x 30)	37,500	1,62,500
Debtors (2,500 x 150)		3,75,000
		13,06,250
Cash Balance (13,06,350 x 5/95)		68,750
Working Capital Requirement		13,75,000

Note: selling, administration and financial expenses have not been included in valuation of closing stock.

Illustration 6
Calculate the amount of working capital requirement for SRCC Ltd. from the following information.

	Rs. (Per unit)
Raw Material	160
Direct labour	60
Overheads	120
Total Cost	340
Profit	60
Selling Price	400

Raw Materials are held in stock on an average for one month. Materials are in process on an average for half – a – month. Finished goods are in stock on an average for one month.

Credit allowed by suppliers is one month and credit allowed to debtors is two months. Time lag in payment of wages is 1 ½ weeks. Time lag in payment of overheads expenses is one month. One fourth of the sales are made on cash basis.

Cash in had and at the bank is expected to be Rs. 50,000; expected level of production amount to 1,04,000 units for a year of 52 weeks.

You may assume that production is carried on evenly throughout the year and a time period of four weeks is equivalent of month.

Solution:
Statement of working capital Requirement

1. Current Assets	**Amt. (Rs.)**	**Amt. (Rs.)**
Cash Balance		50,000
Stock of Raw Materials (2,000x160x4)		12,80,000
Work in progress:		
Raw Materials (2,000 x 160 x 2)	6,40,000	
Labour and Overheads (2,000 x 180 x 2) x 50%	3,60,000	10,00,000
Finished Goods (2,000 x 340 x 4)		27,20,000
Debtors (2,000 x 75% 340 x 8)		40,80,000
Total Current Assets		91,30,000

2. Current Liabilities:		
Creditors (2,000 Rs. 160 x 4)		12,80,000
Creditors for wages (2,000 Rs. 60 x 1½)		1,80,000
Creditors for overheads (2,000 Rs. 120 x 4)		9,60,000
Total Current Liabilities		24,20,000
Net Working Capital (CA – CL)		67,10,000

Illustration 7
X Ltd. sells goods at a gross profit of 20%. It includes deprecation as part of cost of production. The following figures for the 12 months ending 31st Dec. 2008 are given to enable you to ascertain the requirement of working capital of the company on a cash cost basis.

In you working, you are required to assume that:
(i) A safety margin of 15% will be maintained;
(ii) Cash is to be held to the extent of 50% of current liabilities.
(iii) There will be no work – in progress;
(iv) Tax is to be ignored.
Stocks of raw materials and finished goods are kept at one month's requirements. All working notes are to form part of your answer.

Sales at 2 Months credit	27,00,000
Materials consumed (suppliers credit is for 2 months)	6,75,000
Total wages (paid at the beginning of the next month)	5,40,000
Manufacturing expenses outstanding at the end of the year (These expenses are paid one month in arrears)	60,000
Total administrative expense (paid as above)	1,80,000
Sales promotion expenses paid quarterly and in advance	90,000

Solution:

Calculation of Manufacturing Cost–(Cash Cost only)

Materials Consumed	Rs.	6,75,000
Wages		5,40,000
Cash manufacturing expenses (Rs. 60,000×12)		7,20,000
A) Cash manufacturing cost		**19,35,000**
B) Cost of sales (cash cost only)		
Cash manufacturing cost (as per 'A' above)		19,35,000
Administrative expenses		1,80,000
Sales promotion expenses		90,000
		22,05,000
C) Current Liabilities		
Creditors for goods (1/6 of materials consumed)		1,12,500
Outstanding wages (1 month) (Rs. 5,40,000/12)		45,000
Cash manufacturing cost (outstanding one month)		60,000
Administrative expenses (outstanding one month)		15,000
		2,32,500
D) Current assets		
Debtors (at cost of sales) (Rs. 22,05,000/12)×2		3,67,500
Stock of raw materials (Rs. 6,75,000/12)		56,250
Finished stock (1/12 of Rs. 19,35,000)		1,61,250
Cash in hand–50% of current liabilities		1,16,250
Advance payment of expenses (sales promotion)		22,500
Total Current assets		**7,23,750**
– Current liabilities		2,32,500
Excess of current assets over current liabilities		**4,91,250**
+ Safety margin 15%		73,687
Working capital on cash cost basis		**5,64,937**

It may be noted that Gross Profit ratio is given at 20%. So, the cost of production (inclusive of depreciation is 80%. For Sales of Rs. 27,00,000, the total cost of goods sold comes to Rs. 21,60,000 (i.e., 80% of 27,00,000). But the cash manufacturing cost

is only Rs. 19,35,000. Therefore, depreciation would have been Rs. 2,25,000 (i.e., Rs. 21,60,000–Rs. 19,35,000).

Illustration 8

A Company has applied a short-term loan to a commercial bank for financing its working capital requirement. You are asked by the bank to prepare an estimate of the requirement of the working capital for that company. Add 10% to your estimated figure to cover unforeseen contingencies. The information about the project Profit and Loss A/c of the company is as under:

Sales		Rs.	21,00,000
Cost of goods sold			15,30,000
Gross Profit			5,70,000
Administrative expenses	Rs. 1,40,000		
Selling expenses	1,30,000		2,70,000
Profit before Tax			3,00,000
Provision for Tax			1,00,000

Cost of goods sold has been derived as follows:

Materials used	8,40,000	
Wages and Manufacturing expenses	6,25,000	
Depreciation	2,35,000	17,00,000
–Stock of finished goods (10% of total production)		1,70,000
		15,30,000

The figure given above relate only to the goods that have been finished and not to W.I.P. goods which is equal to 15% of the year's production (in terms of physical units) on an average, requiring full materials but only 40% of the other expenses. The company believes in keeping 2 months consumption of material in stock.

All expenses are paid one month in arrears. Suppliers of materials extend 1½ months credit. Sales are 20% cash, rest are at 2 months credit. You can make such other assumptions as you deem necessary for estimating working capital requirement.

Solution :

1. Current Assets:

Stock of Raw Materials (2/12 of 8,40,000)	Rs.	1,40,000

Work-in-progress:

Raw materials (15/100 of 8,40,000)	Rs.	1,26,000
Wages and manufacturing (6,25,000×40%×15%)		37,500
		1,63,500
Stock finished goods: [10% of (8,40,000+6,25,000)]		1,46,500

Debtors (2 months):	
Cost of goods sold	15,30,000
–Depreciation (2,35,000–23,500)	2,11,500
	13,18,500
Adm. Expenses	1,40,000
Selling Expenses	1,30,000
Total Cost	**15,88,500**
–Cash sales @ 20%	3,17,700
	12,70,800
Debtors (2/12 of 12,70,800)	2,11,800
	6,61,800

2. Current Liabilities:	
Creditors (8,40,000/12×1½)	1,05,000
O/S Wages and Manufacturing exp. (1/12 of 6,25,000)	52,083
O/S Administrative expenses (1/12 of 1,40,000)	11,667
Selling expenses (1/12 of 1,30,000)	10,833
	1,79,583
Excess of current assets over current liabilities	4,82,217
+ 10% for contingencies	48,222
Working capital requirement	5,30,439

Illustration 9

JBC Ltd. sells goods on a gross profit of 25%. Depreciation is considered as a part of cost of production. The following are the annual figures given to you:

Sales (2 months credit)	Rs. 18,00,000
Materials consumed (1 months credit)	4,50,000
Wages paid (1 month lag in payment)	3,60,000
Cash manufacturing expenses (1 month lag in payment)	4,80,000
Administrative expenses (1 month lag in payment)	1,20,000
Sales promotion expenses (paid quarterly in advance)	60,000

The company keeps one month's stock each of raw materials and finished goods. It also keeps Rs. 1,00,000 in cash. You are required to estimate the working capital requirements of the company on cash cost basis, assuming 15% safety margin.

Solution:

Statement of Working Capital Requirement

1. Current Assets:	Amt. (Rs.)
Cash-in-hand	1,00,000
Debtors (cost of sales i.e. 14,70,000×2/12)	2,45,000
Prepaid Sales Promotion expenses	15,000

Inventories:

Raw Materials (4,50,000/12)	37,500
Finished goods (12,90,000/12)	1,07,500
Total current assets	5,05,000

2. Current Liabilities:

Sundry creditors (4,50,000/12)	37,500
Outstanding Manufacturing exp. (4,80,000/12)	40,000
Outstanding Administrative exp. (1,20,000/12)	10,000
Outstanding Wages (3,60,000/12)	30,000
Total current liabilities	1,17,500
Excess of CA and CL	3,87,500
+ 15% for contingencies	58,125
Working capital required	**4,45,625**

Working Notes:

1. Cost Structure		**Rs.**
Sales		18,00,000
– Gross profit 25% on sales		4,50,000
Cost of production		13,50,000
– Cost of materials	Rs.	4,50,000
– Wages		3,60,000
		8,10,000
Manufacturing expenses (Total)		5,40,000
– Cash Manufacturing expenses		4,80,000
Therefore, Depreciation		60,000

2. Total cash cost:

Cost of production	13,50,000
– Depreciation	60,000
+ Administrative expenses	1,20,000
+ Sales promotion expenses	60,000
Total Cash Cost	14,70,000

Illustration 10

Prepare a working capital forecast from the following information:

Production during the previous year was 10,00,000 units. The same level of activity is intended to be maintained during the current year.

The expected ratios of cost to selling price are:

Raw material 40%

Direct Wages 20%

Overheads 20%

The raw materials ordinarily remain in stores for 3 months before production. Every unit of production remains in the process for 2 months and is assumed to be consisting of 100% raw material, wages and overheads. Finished goods remain in the warehouse for 3 months. Credit allowed by creditors is 4 months

from the date of the delivery of raw material and credit given to debtors is 3 months from the date of dispatch.

The estimated balance of cash to be held Rs. 2,00,000
Lag in payment of wages 1/2 month
Lag in payment of expenses 1/2 month

Selling price is Rs. 8 per unit. Both production and sales are in a regular cycle. You are required to make a provision of 10% for contingency (except cash). Relevant assumptions may be made.

Solution:
Total Sales = 10,00,000×8=Rs. 80,00,000

Statement of Working Capital Requirement

A. Current Assets:	**Rs.**
Debtors (80,00,000×80%×3/12)	16,00,000
Finished Goods (80,00,000×80%×3/12)	16,00,000
Work-in-progress (80,00,000×80%×2/12)	10,66,667
Raw Materials (80,00,000×40%×3/12)	8,00,000
Total current assets	50,66,667
	50,66,667
B. Current Liabilities:	
Creditors (80,00,000×40%×4/12)	10,66,667
Wages (80,00,000×20%×1/24)	66,667
Expenses (80,00,000×20%×1/24)	66,666
	12,00,000
Excess of CA over CL	38,66,667
+ 10% contingency	3,86,667
	42,53,334
Cash	2,00,000
Working Capital Requirement	**44,53,334**

Illustration 11
On 1st January, 2009, the Board of Directors of Dowell Co. Ltd. wishes to know the amount of working capital that will be required to meet the program of activity they have planned for the year. The following information's are available:

i) Issued and paid-up capital Rs. 2,00,000.

ii) 5% Debentures (secured on assets) Rs. 50,000.

iii) Fixed assets valued at Rs. 1,25,000 on 31.12.2008.

iv) Production during the previous year was 60,000 units. It is planned that the level of activity should be maintained during the present year.

v) The ratios of cost to selling price are—raw materials 60%., direct wages 10%, and overheads 20%.

vi) Raw materials are expected to remain in stores for an average of two months before these are issued for production.

vii) Each unit of production is expected to be in process for one month.

viii) Finished goods will stay in warehouse for approximately three months.

ix) Creditors allow credit for 2 months from the date of delivery of raw materials.

x) Credit allowed to debtors is 3 months from the date of dispatch.

xi) Selling price per unit is Rs. 5.

xii) There is a regular production and sales cycle.

Prepare— a) Working capital requirement forcast; and
b) An estimated Profit and Loss Account and Balance Sheet at the end of the year.

Solution:
Statement of Working Capital Requirement

A. Current Assets:	**Amt. (Rs.)**
Raw Materials (1,80,000/6)	30,000
Work in progress (1 month)	18,750
Finished goods (3 months)	67,500
Debtors (3 months) (2,70,000/4)	67,500
Total Current Assets	**1,83,750**
B. Current Liabilities:	
Creditors (2 months consumption of RM)	30,000
Net working capital (CA–CL)	1,53,750

Working Notes:

1. Computation of Cost and Sales for 60,000 units:

Sales @ Rs. 5 per unit	3,00,000
Cost of production:	
Raw Material (60% of 3,00,000)	1,80,000
Direct Wages @ Rs. 0.50 per unit	30,000
Overheads @ Rs. 1 per unit	60,000
Total Cost of Sales	2,70,000

2. Calculation of work in progress (1 month production):

Raw material (Rs. 1,80,000/12)	Rs.	15,000
Direct Wages (Rs. 30,000/12)×50%		1,250
Overheads (Rs. 60,000/12)×50%		2,500
		18,750

The direct wages and overheads are assumed to have accrued evenly throughout the month. So, only 1/2 month wages and overheads are included in work in progress.

Projected Profit and Loss Account for the year ending December 2009.

Sales (60,000×5)	Rs.	3,00,000
–Raw material @ 60%	Rs.	1,80,000
–Direct Wages @ 10%		30,000
–Overheads @ 20%		60,000
		2,70,000
Gross Profit		30,000
–Debenture Interest @ 5% on 50,000		2,500
New Profit		27,500

Projected Balance Sheet as on Dec. 31, 2009

Liabilities	Amt. (Rs.)	Assets	Amt. (Rs.)
Share capital	2,00,000	Fixed assets	1,25,000
Profit and Loss A/c (Bal. Fig.)	8,750	Raw materials	30,000
Profit for the year 2009	27,500	Finished goods	67,500
5% Debentures	50,000	Work-in-progress	18,750
Creditors	30,000	Debtors	75,000
	3,16,250		**3,16,250**

Illustration 12

Prepare an estimate of net working capital requirement for the WCM Ltd. adding 10% for contingencies from the information given below:

Estimated cost per unit of production Rs. 170 includes raw materials Rs. 80, direct labour Rs. 30 and overheads (exclusive of depreciation) Rs. 60. Selling price is Rs. 200 per unit. Level of activity per annum 1,04,000 units. Raw materials in stock : average 4 weeks; work-in-progress (assume 50% completion stages) : average 2 weeks; finished goods in stock : average 4 weeks; credit allowed by suppliers ; average 4 weeks; credit allowed to debtors : average 8 weeks; lag in payment of wages : average 1.5 weeks, and cash at bank is expected to be Rs. 25,000. You may assume that production is carried on evenly throughout the year (52 weeks) and wages and overheads accrue similarly. All sales are on credit basis only. You may state your assumptions, if any.

Solution:

Statement of Working Capital Requirement

A. Current Assets:	**Rs.**	**Rs.**
i) Raw materials in stock (1,04,000×80×4)/52		6,40,000
ii) Work-in-progress:		
a) Raw materials (1,04,000×80×2)/52		3,20,000
b) Direct Labour 50% of (1,04,000×30×2)/52		60,000
c) Overheads 50% of (1,04,000×60×2)/52		1,20,000
iii) Finished Good Stock (1,04,000×170×4)/52		13,60,000
iv) Debtors (1,04,000×170×8)/52		27,20,000
v) Cash at Bank		25,000
Total Current Assets		**52,45,000**
B. Current Liabilities:		
i) Creditors (1,04,000×80×4)/52		6,40,000
ii) Wages (Lag-in-payment): (1,04,000×30×1½)/52		90,000
Total current liabilities:		7,30,000
Net Working Capital (CA–CL)		45,15,000
+ 10% Contingencies		4,51,500
Working Capital Requirement		49,66,500

Assumptions: Net working capital requirement has been estimated on cash cost basis. Hence, investment in debtor has been computed on cash cost.

Illustration 13

Gulfam Ltd. is presently operating on single shift basis and has the following cost structure (per unit):

Selling Price Rs. 36	Raw Materials	Rs. 12
	Wages (60% Variable)	Rs. 10
	Overheads (20% Variable)	Rs. 10
		Rs. 32

For the year ending March, 31, 2009; the sales amounted to Rs. 8,64,000 and the current asset position on that day was as follows:

Raw material	Rs.	72,000
Finished Goods		1,44,000
Working in progress (Prime Cost)		44,000
Debtors		2,16,000

At present the company receives a credit of 2 months from the Supplier of raw materials and Wages & expenses are payable with a time lag of half a month.

In order to meet the extra demand, the company is preparing to work in double shift. The increase production will enable the firm to get a 10% discount from the supplier of raw materials. There will not be any change in fixed cost, credit policy etc.

Ascertain the effect on requirement for working capital if the proposal of double shift materializes.

Solution:

In order to calculate the working capital requirement for double shift operations, the existing parameters should be ascertained as follows:

Present Position : Sales (Rs. 8,64,000÷36) = 24,000 Units of 2,000 units per month

Debtors : (2,16,000÷8,64,000)×12 = 3 months Outstanding.

Raw Material : (72,000 ÷ 12)=6,000 Units or 3 months requirement.

Work in Process : (44,000 ÷ 22)=2,000 Units or 1 months

Finished Goods : (1,44,000÷32) = 4,500 units or 2.25 months requirement.

New Cost of Raw Material : Rs. 12–10% of 12 = Rs. 10.80

Working Capital Requirement

Single Shift (Present Position)		**Double Shift (Proposed Position).**	
Current Assets Amount		**Current Assets : Amount**	
Raw Materials (Given)	72,000	Raw Material (4,000×3×10.80)	1,29,600
Work in process (Given) (2000x22)	44,000	Work in process (4,000×20.80)	83,200
Finished Goods Given	1,44,000	Finished Goods (4,000×2.25×30.80)	2,77,200
Debtors at cost (4,000×32)	1,92,000	Debtors at cost (4,000×3×3080)	3,69,600
Total Current Assets	**4,52,000**	**Total Current Assets**	**8,59,600**
Less Current Liabilities:		**Less Current Liabilities:**	
Creditors : (2,000×12×2)	48,000	Creditors (4,000×10.80×2)	86,400
Wages & Expenses (2,000×20×½)	20,000	Wages & Expenses (4,000×20×½)	40,000
Working Capital Requirement	3,84,000	Working Capital Requirement	7,33,200

So, the Working Capital requirement will increase by (Rs. 7,33,200–3,84,000) = Rs. 3,49,200 due to change from single shift to double shift operations.

Illustration 14

XYZ Co. Ltd. is a Pipe manufacturing company. Its production cycle indicates that materials, are introduced in the beginning of the production cycle, wages and overhead accrue evenly throughout the period of the cycle. Wages are paid in the next month following the month of accrual. Work in progress includes full units of raw materials used in the beginning of the process and 50% of wages and overheads are supposed to be conversion costs.

Details of production process and the components of working capital are as follows:

Production of pipes	12,00,000 units
Duration of the production cycle	One Month
Raw materials inventory held	One Month Consumption
Finished goods inventory held for	Two Months
Credit allowed by creditors	One MOtnhs
Cost price of raw materials	Rs. 60 per Unit
Direct wages	Rs. 10 per Unit
Overheads	Rs. 20 per Unit
Selling price of finished pipes	Rs. 100 per Unit

Required to calculate:

i) The amount of working capital required for the company.

ii) Its maximum permissible bank finance under all the three methods of lending norms as suggested by the Tandon Committee, assuming the value of core current assets: Rs. 1,00,00,000.

Solution

i) Estimation of Working Capital Requirement

			Rs.
Current Assets:			
Raw Materials Inventory	(12,00,000 x Rs.60 x 1/12)		60,00,000
Work in Progress			
Raw Materials	(12,00,000 x Rs.60 x 1/12)	60,00,000	
Wages	(12,00,000 x Rs.10 x 1/12 x 50/100)	5,00,000	
Overheads	(12,00,000 x Rs.20 x 1/12 x 50/100)	10,00,000	75,00,000
Finished Goods Inventory	(12,00,000 x Rs.90 x 2/12)		1,80,00,000
Debtors	(12,00,000 x Rs.90 x 2/12)		1.80,00,000
Current Liabilities:		(a)	4,95,00,000
Creditors for Raw Materials	(12,00,000 x Rs.60 x 1/12)		60,00,000
Creditors for Wages	(12,00,000 x Rs.10 x 1/12)		10,00,000
		(b)	70,00,000
Net Working Capital		(a) - (b)	4,25,00,000

Ii) Computation of Maximum Permissible Bank Finance(MPBF)

First Method of Lending

	Rs.
Current Assets	4,95,00,000
Less: Current Liabilities	70,00,000
Working Capital Gap	4,25,00,000
Less: 25%from long term sources	1,06,25,000
MPBF	3,18,75,000

Second method of Lending

	Rs.
Current Assets	4,95,00,000
Less: Current Liabilities	70,00,000
Working Capital Gap	4,25,00,000
Less: 25% of current Assets	1,23,75,000
MPBF	3,01,25,000

Third method of Lending

	Rs.
Current Assets	4,95,00,000
Less: Core Current Assets	1,00,00,000
	3,95,00,000
Less: 25% of 3,95,00,000	98,75,000
	2,96,25,000
Less : Current Liabilities	70,00,000
MPBF	2,26,25,000

14

INVENTORY MANAGEMENT

Unit Structure :

14.0 Objectives
14.1 Introduction
14.2 Techniques of Inventory Control
14.3 Problems & Solutions

14.0 OBJECTIVES

After studying the unit the students will be able to:

- Understand and explain the techniques of Inventory control.
- Solve the practical problems on the techniques of Inventory control.

14.1 INTRODUCTION

Inventory constitutes an important item in the working capital of many business concerns. Net working capital is the difference between current assets and current liabilities. Inventory is a major item of current assets. The term inventory refers to the stocks of the product of a firm is offering for sale and the components that make up the product Inventory is stores of goods and stocks. This includes raw materials, work-in-process and finished goods. Raw materials consist of those units or input which are used to manufactured goods that require further processing to become finished goods. Finished goods are products ready for sale. The classification of inventories and the levels of the components vary from organisaion to organisation depending upon the nature of business. For example steel is a finished product for a steel industry, but raw material for an automobile manufacturer. Thus, inventory may be defined as "Stock of goods that is held for future use". Since inventories constitute about 50 to 60 percent of current assets, the management of inventories is crucial to successful working capital management. Working capital requirements are influenced by inventory holding. Hence, the need for effective and efficient management of inventories.

A good inventory management is important to the successful operations of most organisaions, unfortunately the importance of

inventory is not always appreciated by top management. This may be due to a failure to recognise the link between inventories and achievement of organisational goals or due to ignorance of the impact that inventories can have on costs and profits.

Inventory management refers to an optimum investment in inventories. It should neither be too low to effect the production adversely nor too high to block the funds unnecessarily. Excess investment in inventories is unprofitable for the business. Both excess and inadequate investment in inventories are not desirable. The firm should operate within the two danger points. The purpose of inventory management is to determine and maintain the optimum level of inventory investment.

14.2 TECHNIQUES OF INVENTORY CONTROL

The following are the various measures of selective control of inventory:

A. Economic Ordering Quantity (EOQ)

It is important to note that only the correct quantity of materials is to be purchased. For this purpose, the factors such as maximum level, minimum level, danger level, re-ordering level, quantity already on order, quantity reserved, availability of funds, quantity discount, interest on capital, average consumption and availability of storage accommodation are to be kept in view. There should not be any over stock vis-a-vis no question of non-stock. Balance should be made between the cost of carrying and cost of non-carrying i.e. cost of stock-out. Cost of carrying includes the cost of storage, insurance, obsolescence, interest on capital invested. Cost of not carrying includes the costly purchase, loss of production and sales and loss of customer's goodwill. Economic Ordering Quantity (EOQ) is the quantity fixed at the point where the total cost of ordering and the cost of carrying the inventory will be the minimum. If the quantity of purchases is increased, the cost of ordering decreases while the cost of carrying increases. If the quantity of purchases is decreased, the cost of ordering increases while the cost of carrying decreases. But in this case, the total of both the costs should be kept at minimum. Thus, EOQ may be arrived at by Tabular method by preparing purchase order quantity tables showing the ordering cost, carrying cost and total cost of various sizes of purchase orders.

Economic ordering quantity may also be worked out mathematically by using the following formula.

$$EOQ = \sqrt{\frac{2 \times \text{Annual usage} \times \text{Buying Cost}}{\text{Cost of carrying of one unit expressed as perentage}}}$$

$$EOQ = \sqrt{\frac{2AB}{C}}$$

Note : Buying cost is the ordering cost.

B. Fixing levels (Quantity Control) - For fixing the various levels such as maximum, minimum, etc., average consumption and lead time i.e. the average time taken between the initiation of purchase order and the receipt of materials from suppliers are to be estimated for each item of materials.

a . Maximum Stock Level - The maximum stock level is that quantity above which stocks should not normally be allowed to exceed. The following factors are taken into consideration while fixing the maximum stock level:

1. Average rate of consumption of material.
2. Lead time.
3. Re-order level.
4. Maximum requirement of materials for production at any time.
5. Storage space available, cost of storage and insurance.
6. Financial consideration such as price fluctuations, availability of capital, discounts due to seasonal and bulk purchases, etc.
7. Keeping qualities e.g. risk of deterioration, obsolescence, evaporation, depletion and natural waste, etc.
8. Any restrictions imposed by local or national authority in regard to materials i.e. purchasing from small scale industries and public sector undertakings, price preference clauses, import policy, explosion in case of explosive materials, risk of fire, etc.; and
9. Economic ordering quantity is also considered.

Formula
Maximum Level = Re-order level — (Minimum consumption) x (Minimum lead times) + Reordering quantity

b. Minimum Stock Level - The minimum stock level is that quantity below which stocks should not normally be allowed to fall.

If stocks go below this level, there will be danger of stoppage of production due to shortage of supplies. The following factors are taken into account while fixing the minimum stock level:

1. Average rate of consumption of material.
2. Average lead time. The shorter the lead time, the lower is the minimum level.
3. Re-order level.
4. Nature of the item.
5. Stock out cost.

Formula
Minimum Level = Re-order level - (Average usage x Average lead time)

c. Re-order Level - This is the point fixed between the maximum and minimum stock levels and at this time, it is essential to initiate purchase action for fresh supplies of the material. In order to cover the abnormal usage of material or unexpected delay in delivery of fresh supplies, this point will usually be fixed slightly higher than the minimum stock level. The following factors are taken into account while fixing the re-order level:

1. Maximum usage of materials
2. Maximum lead time
3. Maximum stock level
4. Minimum stock level

Formula
Re-order level = Maximum usage X Maximum lead time or Minimum level + Consumption during lead time.
Re-ordering Quantity (How much to purchase): It is also called Economic Ordering Quantity.

d. Danger Level - This is the level below the minimum stock level. When the stock reaches this level, immediate action is needed for replenishment of stock. As the normal lead time is not available, regular purchase procedure cannot be adopted resulting in higher purchase cost. Hence, this level is useful for taking corrective action only. If this is fixed below the reorder level and above the minimum level, it will be possible to take preventive action.

C. ABC Analysis for value of items consumed

ABC Analysis for Inventory Control: ABC analysis is a method of material control according to value. The basic principle is that high value items are more closely controlled than the low value items. The materials are grouped according to the value and frequency of replenishment during a Period.
'A' Class items: Small percentage of the total items but having higher values.

'B' Class items: More percentage of the total items but having medium values.
'C' Class items: High percentage of the total items but having low values.

- **The general procedure for classifying A, B or C items is as follows:**

1. Ascertain the cost and consumption of each material over a given period of time.
2. Multiply unit cost by estimated usage to obtain net value.
3. List out all the items with quantity and value.
4. Arrange them in descending order in value i.e., ranking according to value.
5. Ascertain the monetary limits for A, B or C classification.
6. Accumulate value and add up number of items of A items. Calculate percentage on total inventory in value and in number.
7. Similar action for B and C class items.

- **Advantages of ABC Analysis**

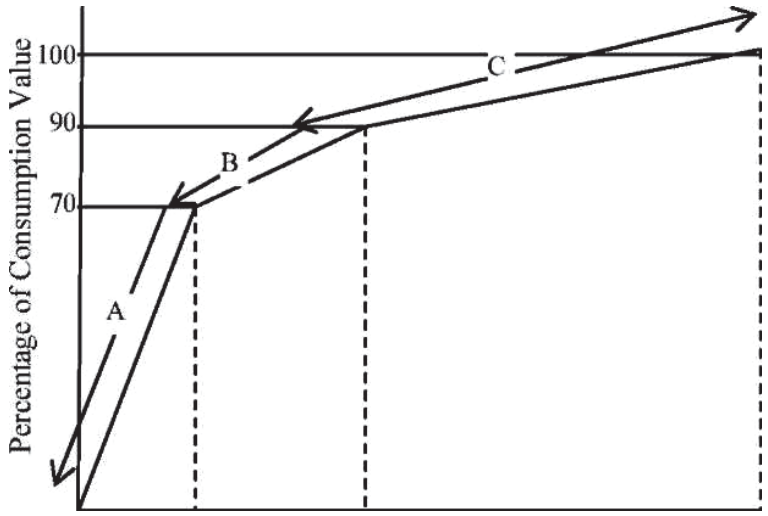
1. To minimize purchasing cost and carrying cost (i.e. holding cost).
2. Closer and stricter control on these items which represent a high portion of total stock value.
3 . Ensuring availability of supplies at all times.
4. Clerical costs can be reduced.
5 . Inventory is maintained at optimum level and thereby investment in Inventory can be regulated and will be minimum. 'A; items will be ordered more frequently and as such the investment in inventory is reduced.
6. Maintaining enough safety stock for 'C' items.
7. Equal attention to A, B and C items is not desirable as it is expensive.
8. It is based on the concept of Selective Inventory Management and it helps in maintaining high stock-turnover ratio.

Illustration :

A manufacturing concern is having 1,000 units of materials valuing Rs. 1,00,000 in total. Prepare the statement showing the stock according to ABC Analysis.

	Quantity		Value		Average values Rs.
Category	%	No. of items	%	Amount	
A (High value items)	10%	100	70%	70,000	70,000 ÷ 100 = 700
B (Medium value items)	20%	200	20%	20,000	20,000 ÷ 100 = 200
C (Low value items)	70%	700	10%	10,000	10,000 ÷ 700 = 14
Total:	100%	1000	100%	1,00,000	

For the sake of simplicity, the above percentage has been considered. But in practice, the percentage may vary between 5% to 10%, 10% to 20% and 70% to 85%.



In foreign countries, Bin Cards and Stores Ledger Cards are not maintained for 'C' class items. These are issued directly to the production foreman concerned and controlled through norms of consumption based on production targets. By doing this, 70% of the effort required for maintaining the Bin Cards and Stores Ledger Cards is eliminated. With 30% of the effort, an organization will be able to exercise control on the 90% of the inventory values. This reduces the clerical costs and ensures the closer control on costly items in which large amount of capital is invested.

D. Perpetual Inventory System

The Institute of Cost and Management Accountants, London defines the perpetual inventory system as "A system of records maintained by the controlling department, which reflects physical movements of stocks and their current balance."

This system consists of the following three:

a. Bin cards i.e. Quantitative Perpetual Inventory.
b. Stores ledger i.e. Quantitative and Value Perpetual Inventory.
c. Continuous Stock taking i.e. Physical Perpetual Inventory.

E. H.M.L. Classification

In ABC analysis, the consumption value of items has been taken into account. But in this case, the unit value of stores items is considered. The materials are classified according to their unit value as high, medium or low valued items. Combining ABC analysis and HML classification, it will be more useful to an organisation in the sense that the low value components having substantial consumption, that is to say, a small item costing Re. 1 each consumed a lakh numbers will cost Rs.1.00 lakh which is quite high and it is to be controlled properly.

F. F S N Analysis

According to this approach, the inventory items are categorized into 3 types. They are fast moving, slow moving and nonmoving. Inventory decisions are very carefully taken in the case of 'non moving category'. In the case of item of fast moving items, the manager can take decisions quite easily because any error happened will not trouble the firm so seriously. Since risk is less in fast moving items, because they can be consumed quickly unlike the non- moving category which are carried in the godowns for more time period.

As risk is high in case of slow - moving and non - moving - items, the inventory decisions have to be taken carefully without affecting the objectives of profitability and liquidity of the organisation.

G. V.E.D. Classification

The V.E.D. classification is applicable mainly to the spare parts. Spares are classified as vital (V), essential (E) and desirable (D). Vital class spares have to be stocked adequately to ensure the operations of the plant but some risk can be taken in the case of 'E' class spares. Stocking of desirable spares can even be done away with if the lead time for their procurement is low.

Similarly, classification may be done in respect of the plant and machinery as vital, essential, important and normal (VEIN). If the classifications VED and VEIN are combined, there will be 12 different classes as follows:

Vital spares for vital plant, vital spares for essential plant, vital spares for important plant and vital spares for normal plant. Essential spares for essential plant, essential spares for important plant, essential spares for normal plant and essential spares for vital plant, Desirable spares for essential plant, desirable spares for important plant, desirable spares in vital plant and desirable spares for normal plant.

H. Just in Time (JIT)

Normally, inventory costs are high and controlling inventory is complex because of uncertainities in supply, dispatching, transportation etc. Lack of coordination between suppliers and ordering firms is causing severe irregularities, ultimately the firm ends-up in inventory problems. Toyota Motors has first time suggested just - in - time approach in 1950s. This means the material will reach the points of production process directly form the suppliers as per the time schedule. It is possible in the case of companies with respective process. Since, it requires close coordination between suppliers and the ordering firms, and therefore, only units with systematic approach will be able to implement it.

I. Inventory Turnover Ratio

i) Inventory Turnover Ratio: Cost of goods sold / average total inventories. The higher the ratio, more the efficiency of the firm

ii) Work in process turnover ratio

$$= \frac{\text{Cost of Goods Sold}}{\text{Average inventory of finished goods at costs}}.$$

Here, in this ratio also higher the ratio, more the efficiency of the firm.

iii) Weeks inventory of finished goods on hand

$$= \frac{\text{Finished Goods}}{\text{Weekly sales of finished goods}}.$$

The ratio reveals that the lower the ratio, the higher the efficiency of the firm

iv) Weeks raw material on order

$$= \frac{\text{Raw Material on order}}{\text{Weekly consumption of raw material}}.$$

This ratio indicates that the lower the ratio, the higher the efficiency of the firm.

v) Average age of raw material inventory

$$= \frac{\text{Average raw material inventory at cost}}{\text{Average daily purchases of raw material}}.$$

This ratio says that the lower the ratio the higher the efficiency of the firm.

vi) Average age of finished goods inventory

$$= \frac{\text{Average finished goods inventory at cost}}{\text{Average cost of finished goods manufactured per day}}.$$

This ratio indicates that the lower the ratio the higher the efficiency of the firm.

1) Out of Stock Index $= \frac{\text{No. of times out of stock}}{\text{No. of items requisitioned}}$

This ratio indicates the lower the ratio higher the efficiency of the firm.

2) Spare parts index $= \frac{\text{Value of spare parts inventory}}{\text{Value of Capital Equipment}}$

This ratio reveals that the higher the ratio the more the efficiency of the firm.

14.3 PROBLEMS & SOLUTIONS

Illustration 1

From the following particulars, find out average value per item if a stores has 50,000 items of consumption and a yearly consumption is Rs. 60,00,000.

Class	Percentage of Total No. of Items	Percentage of Total Value
A	5	80
B	20	15
C	75	5

Solution:

Category	No. of Items 2	% of Total No. of Items 3	Value Rs. 4	% of the Total Value 5	Average Value Per Item Rs. 6
A	2,500	5	48,00,000	80	1,920
B	10,000	20	9,00,000	15	90
C	37,500	75	3,00,000	5	8
Total	50,000	100	60,00,000	100	

Illustration 2

M/s Air Cool Services Ltd., Jalgaon manufacturers of Air Coolers give the following information in respect of two components namely A and B used in the manufacturing process:

Normal Usage 200 units per week each.
Maximum usage 300 units per week each
Minimum Usage 100 units per week each.

Reorder quantity:
A 1,600 units
B 2,400 units

Reorder Period for:
A 2 to 4 weeks.
B 1 to 2 weeks.

Calculate for each component:

1. Reorder Level
2. Minimum Level
3. Maximum Level
4. Average stock Level

Solution:

	Component A	Component B
1. Reorder Level	= (Maximum Consumption X Maximum Reorder period) = 300 units x 4 weeks = 1,200 Units.	=(Maximum Consumption X Maximum Reorder period) = 300 units x 2 weeks = 600 Units.
2. Minimum Level	= [Reorder Level – (Normal Consumption X Average Period of Delivery)] = 1,200 – (200 X 2+4/2) = 600 Units	= [Reorder Level – (Normal Consumption X Average Period of Delivery)] = 600 – (200 X 1+2/2) = 300 Units
3. Maximum Level	= {Reorder Level + Reorder Quantity – (Minimum Consumption X minimum Time for Reordering)} = 1,200 + 1,600 – (100 X 2) = 2,600 Units	= {Reorder Level + Reorder Quantity – (Minimum Consumption X minimum Time for Reordering)} = 600 + 2,400 – (100 X 1) = 2,900 Units
4. Average stock Level	= (Maximum Level + Minimum Level / 2) = 2,600 +600 / 2 = 1,600 Units.	= (Maximum Level + Minimum Level / 2) = 2,900 +300 / 2 = 1,600 Units.

Illustration 3

POR Ltd. manufactures a special product, which requires 'ZED'. The following particulars were collected for the year 2009 – 10:

1. Monthly demand of Zed	7,500 Units
2. Cost of placing an order	Rs. 500
3. Reorder Period	5 to 8 weeks
4. Cost per unit	Rs. 60
5. Carrying Cost % p.a.	10%
6. Normal Usage	500 Units per week
7. Minimum Usage	250 Units per week
8. Maximum Usage	750 Units per week

Required:

1. Reorder Quantity
2. Reorder Level
3. Minimum Stock Level
4. Maximum Stock Level
5. Average Stock Level

Solution

1. Reorder Quantity = $\frac{\sqrt{2AS}}{CS}$ = $\frac{\sqrt{2 \times 7,500 \times 12 \times 500}}{\text{Rs. } 60 \times 10/100}$ =3,873 Units.
2. Reorder Level
   = Maximum reorder period x Maximum usage
   = 8 weeks x 750 unit per week
   = 6,000 Units.
3. Minimum Stock Level
   = Reorder Level + (Normal Usage x Normal reorder Period)
   = 6,000 units – (500 x 6.5 weeks)
   = 2,750 Units
4. Maximum stock Level
   = (Reorder level + Reorder quantity) – (Minimum Usage x Minimum reorder period)
   = (6,000 units + 3,873 units) – (250 units x 5 weeks)
   = 9,873 units - 1,250 Units
   = 8,623 units
5. Average Stock Level
   = (minimum Level + ½ reorder quantity) / 2
   = (2,750 units + 8,623 units)/ 2
   = 5,687
6. Minimum Level + ½ reorder quantity
   = 2,750 units + ½ X 3,873 Units
   = 4,686

Illustration 4
M/s Quality products Ltd. Nasik, is offered discounts on its order in the manner stated as follows:

Price per tone	Order (in Tonnes)
Rs. 12.00	Less than 500
Rs. 11.80	500 but less than 1,600
Rs. 11.60	1,600 but less than 4,000
Rs. 11.40	4,000 but less than 8,000
Rs. 11.20	8,000 and over

The annual demand for the material is 8,000 tonnes. Inventory carting costs are 20% of material cost per annum. The delivery cost per order is Rs. 12/-.
Calculate the "Best Quantity order' for M/s Quality Products Ltd.

Solution:
Determination of EOQ

Particulars	Order Size	Order Size	Order Size	Order Size	Order Size
I Annual Consumption	8,000	8,000	8,000	8,000	8,000
II Order size (units)	400	500	1,600	4,000	8,000
III No of orders (I/II)	20	16	5	2	1
IV Cost per order (Rs.)	12	12	12	12	12
V Total ordering cost (Rs.) (III X IV)	240	192	60	24	12
VI Average Inventory (units)	200	250	800	2,000	4,000
VII Carrying cost per unit (Rs.) 20%	2.4	2.36	2.32	2.28	2.24
VIII Total carrying cost (Rs.) (V+VII)	480	590	1856	4560	8960
IX Total cost of ordering & carrying (V + VIII)	720	782	1916	4584	8972
X Purchase Price (Rs.)	96,000	84,400	92,800	91,200	89,600
Total (IX + X)	96,720	95,182	94,716	95,784	98,572

The EOQ is 1600 units. As the purchase price varies, total cost is considered:

Illustration 5

A company is considering the possibility of purchasing from a supplier a component it now makes. The supplier will provide the components in the necessary quantities at a unit price of Rs. 9. Transportation and storage costs would be negligible.

The company produces the component from a single raw material in economic lots of 2,000 units at a cost of Rs. 2 per unit. Average annual demand is 20,000 units. The annual holding cost is Rs. 0.25 per unit and the minimum stock level is set at 400 units. Direct labour costs for the component are Rs. 6 per unit, fixed manufacturing overhead is charged at a rate of Rs. 3 per unit based on normal activity of 20,000 units. The company also hires the machine on which the components are produced at a rate of Rs. 200 per month.

Should the company make the component?

Solution:

The cost of placing an order can be ascertained on the basis of formula:

$$EOQ \quad \frac{\sqrt{2AB}}{CS}$$

EOQ = Economic Ordering Quantity

B = Cost of placing an order

A = Annual Demand

CS = Storage cost per unit per annum

Let ost of placing an order be taken as 'X'.

$$EOQ = \frac{\sqrt{2 \times 20{,}000 \times X}}{0.25}$$

$$2{,}000 = \frac{\sqrt{40{,}000\,X}}{0.25}$$

Or 2,000 = 1,60,000 X

Or X = 25

Cost of placing an order Rs. 25

Average stock level = Minimum stock level + ½ EOQ = 400 + ½ (2000) = 1,400 Units.

Computation of cost of Manufacturing the component

			Rs.
Cost of Direct Material	(20,000 X Rs. 2)	40,000	
Add: Storage Cost	(1,400 X Rs.0.25)	350	
Ordering cost	(10 X Rs. 25)	250	40,600
Director Labour	(20,000 X Rs.6)		1,20,000
Hire Charges for machinery	(Rs. 200 X 12)		2,400
			1,63,000

Conclusion: The cost of purchasing the component is 20,000 X Rs. 9 = Rs. 1,80,000. The cost of manufacturing the component is only Rs. 1,63,000. Hence, it will be cheaper to manufacture the component rather than purchasing it from outside. The saving in manufacturing is Rs. 17,000 per annum. Buying could be cheaper only when the facilities rendered surplus on account of not manufacturing the component in the factory could give an income exceeding Rs. 17,000 per annum.

Illustration 6

(a) The following details are available in respect of a firm:

(i) Annual requirement of inventory 40,000 Units
(ii) Cost per unit (other than carrying and ordering cost) Rs.16
(iii) Carrying costs are likely to be 15% per year
(iv) Cost of placing order Rs. 480 per order

Determine the economic quantity

(b) The experience of the firm being out of stock is summarized below:

1.

Stock out (no. of Units)	No. of times
500	1 (1)
400	2 (2)
250	3 (3)
100	4 (4)
50	10 (10)
0	80 (80)

Figure in brackets indicate percentage of time the firm has been out of stock.

2. Stock out costs are Rs. 40 per unit.
3. Carrying cost of inventory per unit is Rs. 20.

Determine the optimal level of stock out inventory.

(c) A firm has 5 different levels in its inventory.
The relevant details are given. Suggest a breakdown of the times into A, B and C Classification:

Item No.	Avg. No. of Unity inventory	Avg. Cost per unit Rs.
1	20,000	60
2	10,000	100
3	32,000	11
4	28,000	10
5	60,000	3.40

Solution:

a) Carrying cost per unit per annum
= Cost per unit X Carting cost % p.a. = Rs. 16 X 0.15 = Rs. 2.40

EOQ = $\sqrt{2 X Total\ Consumption\ p.a. X\ Ordering\ cost\ per\ order}$
Carrying cost per unit

= $\sqrt{2 \times 40,000 \times 480}$
2.40

= 4,000 Units

b)

Safety Stock Level (Units)	Stock Out (Units)	Stock out Cost @ Rs. per Unit Rs.	Probability of stock out	Expected Stock Out at this level	Total Expected Stock out cost
500	0	0	0	0	0
400	100	4,000	0.01	40	40
250	250	10,000	0.01	100	
	150	6,000	0.02	120	260
100	400	16,000	0.01	160	
	300	12,000	0.02	240	
	150	6,000	0.03	180	840
50	450	18,000	0.01	180	
	350	14,000	0.02	280	
	200	8,000	0.03	240	
	50	2,000	0.04	80	1,620
0	500	20,000	0.01	200	
	400	16,000	0.02	320	
	250	10,000	0.03	300	
	100	4,000	0.04	160	
	50	2,000	0.10	200	2,800

Safety stock Level (units)	Expected Stock Out Costs Rs.	Carrying cost at Rs. 20 per unit Rs.	Total Safety Stock Cost Rs.
0	2,800	0	2,800
50	1,620	1,000	2,620
100	840	2,000	2,840
250	260	5,000	5,260
400	40	8,000	8,040
500	0	10,000	10,000

Optimum safety stock where the total cost is the least is at 50 units level.

Item No.	Units	% of Total Units	Unit Cost Rs.	Total Cost Rs.	% of total Cost
1	20,000	13.3	60.00	12,00,000	39.5 A
2	10,000	6.7	100.00	10,00,000	32.9 A
3	32,000	21.3	11.00	3,52,000	11.6 B
4	28,000	18.7	10.00	2,80,000	9.2 B
5	60,000	40.0	3.40	2,04,000	6.8
	1,50,000	100.0		30,36,000	100.00

1. 20% of the units falling in category 'A' items are amounting to 72.4% of the total value of the inventory and strict inventory control and management is required for these times.
2. For Category 'B' items, consisting of 40% of the total units but its value is 20.8% of the total value of inventory. For these times moderate control is necessary?

3. The remaining 40% of the units are valuing only 6.8% of the total value of inventory and east controls can be exercised and management attention need not be diverted for management of time falling in Category 'C'.

15

CASH MANAGEMENT

Unit Structure :

15.0 Objectives
15.1 Introduction
15.2 Significance of Cash Management
15.3 Motives or Desires for Holding Cash
15.4 Objectives of Cash Management
15.5 Factors Determining Cash Needs
15.6 Strategies for Cash Management
15.7 Problems and Solutions
15.8 Exercise

15.0 OBJECTIVES

After studying the unit the students will be able to:

- Know the significance of cash management.
- Explain the desire for holding cash.
- Know the objectives of cash management.
- Discuss the factors determining the cash needs.
- Explain the strategies for cash management
- Solve the practical problems.

15.1 INTRODUCTION

Cash management is one of the key areas of working capital management. Cash is the most liquid current assets. Cash is the common denominator to which all current assets can be reduced because the other major liquid assets, i.e. receivable and inventory get eventually converted into cash. This underlines the importance of cash management.

The term "Cash" with reference to management of cash is used in two ways. In a narrow sense cash refers to coins, currency, cheques, drafts and deposits in banks. The broader view of cash includes near cash assets such as marketable securities and time deposits in banks. The reason why these near cash assets are included in cash is that they can readily be converted into cash.

Usually, excess cash is invested in marketable securities as it contributes to profitability.

Cash is one of the most important components of current assets. Every firm should have adequate cash, neither more nor less. Inadequate cash will lead to production interruptions, while excessive cash remains idle and will impair profitability. Hence, the need for cash management. The cash management assumes significance for the following reasons.

15.2 SIGNIFICANCE OF CASH MANAGEMENT

1. Cash planning - Cash is the most important as well as the least unproductive of all current assets. Though, it is necessary to meet the firm's obligations, yet idle cash earns nothing. Therefore, it is essential to have a sound cash planning neither excess nor inadequate.

2. Management of cash flows - This is another important aspect of cash management. Synchronisation between cash inflows and cash outflows rarely happens. Sometimes, the cash inflows will be more than outflows because of receipts from debtors, and cash sales in huge amounts. At other times, cash outflows exceed inflows due to payment of taxes, interest and dividends etc. Hence, the cash flows should be managed for better cash management.

3. Maintaining optimum cash balance - Every firm should maintain optimum cash balance. The management should also consider the factors determining and influencing the cash balances at various point of time. The cost of excess cash and danger of inadequate cash should be matched to determine the optimum level of cash balances.

4. Investment of excess cash - The firm has to invest the excess or idle funds in short term securities or investments to earn profits as idle funds earn nothing. This is one of the important aspects of management of cash.

Thus, the aim of cash management is to maintain adequate cash balances at one hand and to use excess cash in some profitable way on the other hand.

15.3 MOTIVES OR DESIRES FOR HOLDING CASH

Motives or desires for holding cash refer to various purposes. The purpose may be different from person to person and situation to situation. There are four important motives to hold cash.

a. Transactions motive - This motive refers to the holding of cash, to meet routine cash requirements in the ordinary course of business. A firm enters into a number of transactions which requires cash payment. For example, purchase of materials, payment of wages, salaries, taxes, interest etc. Similarly, a firm receives cash from cash sales, collections from debtors, return on investments etc. But the cash inflows and cash outflows do not perfectly synchronise. Sometimes, cash receipts are more than payments while at other times payments exceed receipts. The firm must have to maintain sufficient (funds) cash balance if the payments are more than receipts. Thus, the transactions motive refers to the holding of cash to meet expected obligations whose timing is not perfectly matched with cash receipts. Though, a large portion of cash held for transactions motive is in the form of cash, a part of it may be invested in marketable securities whose maturity conform to the timing of expected payments such as dividends, taxes etc.

b. Precautionary motive - Apart from the non-synchronisation of expected cash receipts and payments in the ordinary course of business, a firm may be failed to pay cash for unexpected contingencies. For example, strikes, sudden increase in cost of raw materials etc. Cash held to meet these unforeseen situations is known as precautionary cash balance and it provides a caution against them. The amount of cash balance under precautionary motive is influenced by two factors i.e. predictability of cash flows and the availability of short term credit. The more unpredictable the cash flows, the greater the need for such cash balances and vice versa. If the firm can borrow at short-notice, it will need a relatively small balance to meet contingencies and vice versa. Usually precautionary cash balances are invested in marketable securities so that they contribute something to profitability.

c. Speculative motive - Sometimes firms would like to hold cash in order to exploit, the profitable opportunities as and when they arise. This motive is called as speculative motive. For example, if the firm expects that the material prices will fall, it can delay the purchases and make purchases in future when price actually declines. Similarly, with the hope of buying securities when the interest rate is expected to decline, the firm will hold cash. By and large, firms rarely hold cash for speculative purposes.

d. Compensation motive - This motive to hold cash balances is to compensate banks and other financial institutes for providing certain services and loans. Banks provide variety of services to business firms like clearance of cheques, drafts, transfer of funds etc. Banks charge a commission or fee for their services to the customers as indirect compensation. Customers are required to maintain a minimum cash balance at the bank. This balance cannot

be used for transaction purposes. Banks can utilise the balances to earn a return to compensate their cost of services to the customers. Such balances are compensating balances. These balances are also required by some loan agreements between a bank and its customers. Banks require a chest to maintain a minimum cash balance in his account to compensate the bank when the supply of credit is restricted and interest rates are rising.

Thus cash is required to fulfill the above motives. Out of the four motives of holding cash balances, transaction motive and compensation motives are very important. Business firms usually do not speculate and need not have speculative balances. The requirement of precautionary balances can be met out of short-term borrowings.

15.4 OBJECTIVES OF CASH MANAGEMENT

The basic objectives of cash management are:

(i) to make the payments when they become due and
(ii) to minimize the cash balances. The task before the cash management is to reconcile the two conflicting nature of objectives.

1. Meeting the payments schedule - The basic objective of cash management is to meet the payment schedule. In the normal course of business, firms have to make payments of cash to suppliers of raw materials, employees and so on regularly. At the same time firm will be receiving cash on a regular basis from cash sales and debtors. Thus, every firm should have adequate cash to meet the payments schedule. In other words, the firm should be able to meet the obligations when they become due.

The firm can enjoy certain advantages associated with maintaining adequate cash. They are:

a. Insolvency - The question of insolvency does not arise as the firm will be able to meet its obligations.

b. Good relations - Adequate cash balance in the business firm helps in developing good relations with creditors and suppliers of raw materials.

c. Credit worthiness - The maintenance of adequate cash balances increase the credit worthiness of the firm. Consequently it will be able to purchase raw materials and procure credit with favorable terms and conditions.

d. Availing discount facilities - The firm can avail the discounts offered by the creditors for payments before the due date.

e. To meet unexpected facilities - The firm can easily meet the unexpected cash expenditure in situations like strikes, competition from customers etc. with little strain.

So, every firm should have adequate cash balances for effective cash management.

2. Minimising funds committed to cash balances - The second important objective of cash management is to minimise cash balance. In minimizing the cash balances two conflicting aspects have to be reconciled. A high level of cash balances will ensure prompt payment together with all advantages, but at the same time, cash is a non-earning asset and the larger balances of cash impair profitability. On the other hand, a low level of cash balance may lead to the inability of the firm to meet the payment schedule. Thus the objective of cash management would be to have an optimum cash balance.

15.5 FACTORS DETERMINING CASH NEEDS

Maintenance of optimum level of cash is the main problem of cash management. The level of cash holding differs from industry to industry, organization to organization. The factors determining the cash needs of the industry is explained as follows:

i. Matching of cash flows - The first and very important factor determining the level of cash requirement is matching cash inflows with cash outflows. If the receipts and payments are perfectly coinciding or balance each other, there would be no need for cash balances.

The need for cash management therefore, due to the non-synchronisation of cash receipts and disbursements. For this purpose, the cash inflows and outflows have to be forecast over a period of time say 12 months with the help of cash budget. The cash budget will pin point the months when the firm will have an excess or shortage of cash.

ii. Short costs - Short costs are defined as the expenses incurred as a result of shortfall of cash such as unexpected or expected shortage of cash balances to meet the requirements.

The short costs includes, transaction costs associated with raising cash to overcome the shortage, borrowing costs associated with borrowing to cover the shortage i.e. interest on loan, loss of

trade-discount, penalty rates by banks to meet a shortfall in compensating, cash balances and costs associated with deterioration of the firm's credit rating etc. which is reflected in higher bank charges on loans, decline in sales and profits.

iii. Cost of cash on excess balances - One of the important factors determining the cash needs is the cost of maintaining cash balances i.e. excess or idle cash balances. The cost of maintaining excess cash balance is called excess cash balance cost. If large funds are idle, the implication is that the firm has missed opportunities to invest and thereby lost interest. This is known as excess cost. Hence the cash management is necessary to maintain an optimum balance of cash.

iv. Uncertainty in business - Uncertainty plays a key role in cash management, because cash flows can not be predicted with complete accuracy. The first requirement of cash management is a precautionary cushion to cope with irregularities in cash flows, unexpected delays in collections and disbursements, efaults and expected cash needs the uncertainty can be overcome through accurate forecasting of tax payments, dividends,capital expenditure etc. and ability of the firm to borrow funds through over draft facility.

v. Cost of procurement and management of cash - The costs associated with establishing and operating cash management staff and activities determining the cash needs of a business firm. These costs are generally fixed and are accounted for by salary, storage and handling of securities etc. The above factors are considered to determine the cash needs of a business firm.

15.6 STRATEGIES FOR CASH MANAGEMENT

The strategies for Cash Management are discussed in detail in the Following Lines:

1. **Projection of cash flows and planning** - The cash planning and the projection of cash flows is determined with the help of cash budget. The cash budget is the most important tool in cash management. It is a device to help a firm to plan and control the use of cash. It is a statement showing the estimated cash inflows and cash outflows over the firm's planning horizon. In other words the net cash position i.e., surplus or deficiency of a firm is highlighted by the cash budget from one budgeting period to another period.

2. **Determining optimal level of cash holding in the company** - One of the important responsibilities of a finance manager is to maintain sufficient cash balances to meet the

current obligations of a company. Determining to optimum level of cash balance influenced by a tradeoff between risk and profitability. Every business enterprise holding cash balances for transaction purposes and to meet precautionary, speculative and compensative motives. With the help of cash budget the finance manager predicts the inflows and outflows of cash during a particular period of time and there by determines the cash requirements of the company. While determining the optimum level of cash balance (neither excess nor inadequate cash balances) the finance manager has to bring a tradeoff between the liquidity and profitability of the firm.

The optimum level of cash balances of a company can be determined in various ways : There are Inventory model (Economic Order Quantity) to cash management, Stochastic model, Probability model.

A) Inventory model (EOQ) to cash management - Economic Order Quantity (EOQ) model is used in determination of optimal level of cash of a company. According to this model optimal level of cash balance is one at which cost of carrying the inventory of cash and cost of going to the market for satisfying cash requirements is minimum. The carrying cost of holding cash refers to the interest foregone on marketable securities where as cost of giving to the market means cost of liquidating marketable securities in cash.

Optimum level of cash balance can be determined as follows:

$$= \sqrt{\frac{2AO}{C}}$$

Where Q = Optimum level of cash inventory
A = Total amount of transaction demand
O = Average fixed cost of securing cash from the market (ordering cost of cash / securities)
C = Cost of carrying cash inventory, i.e., interest rate on marketable securities for the period involved.

- **Assumptions**

The model is based on the following assumptions:
The demand for cash, transactions costs of obtaining cash and the holding costs for a particular period are given and do not change during that period.

There is a constant demand for cash during the period under consideration.

Cash payments are predictable:

Banks do not impose any restrictions on firms with respect of maintenance of minimum cash balances in the bank accounts.

- **Limitations –**

The EOQ model to determine the optimum size of cash balances is suffered with several practical problems. The first and important problem (limitation) is related with determination of fixed cost associated with replenishing cash. The fixed cost includes both explicit cost (interest rate at which required capital can be secured from the market and implicit cost (time spent in placing an order for getting financial assistance etc.) The computation of implicit cost is very difficult. The model is not useful and applicable where the cash flows are irregular in nature.

B) Stochastic (irregular) Model - This model is developed to avoid the problems associated with the EOQ model. This model was developed by Miller and Orr. The basic assumption of this model is that cash balances are irregular, i.e., changes randomly over a period of time both in size and direction and form a normal distribution as the number of periods observed increases. The model prescribes two control limits Upper control Limit (UCL) and Lower Control Limit (LCL). When the cash balances reaches the upper limit a transfer of cash to investment account should be made and when cash balances reach the lower point a portion of securities constituting investment account of the company should be liquidated to return the cash balances to its return point. The control limits are converting securities into cash and the vice - versa, and the cost carrying stock of cash.

The Miller and Orr model is the simplest model to determine the optimal behavior in irregular cash flows situation. The model is a control limit model designed to determine the time and size of transfers between an investment account and cash account. There are two control limits. Upper Limit (U) and lower limit (L).

According to this model when cash balance of the company reach the upper limit, cash equal to "U - O" should be invested in marketable securities so that new cash balance touches "O" point. If the cash balance touch the "L' point, finance manager should immediately liquidate that much portion of the investment portfolio which could return the cash balance to 'O' point. (O is optimal point of cash balance or target cash balance)

The "O" optimal point of cash balance is determined by using the formula

$$O = \sqrt[3]{\frac{3TV}{4I}}$$

Where,
0 = target cash balance (Optimal cash balance)
T = Fixed cost associated with security transactions
1 = Interest per day on marketable securities
V = Variance of daily net cash flows.

- **Limitations**

This model is subjected to some practical problems

The first and important problem is in respect of collection of accurate data about transfer costs, holding costs, number of transfers and expected average cash balance.

2. The cost of time devoted by financial managers in dealing with the transfers of cash to securities and vice versa.

3. The model does not take in account the short term borrowings as an alternative to selling of marketable securities when cash balance reaches lower limit.

Besides the practical difficulties in the application of the model, the model helps in providing more, better and quicker information for management of cash. It was observed that the model produced considerable cost savings in the real life situations.

C) Probability Model - This model was developed by William Beranek. Beranek observed that cash flows of a firm are neither completely predictable nor irregular (stochastic). The cash flows are predictable within a range. This occurrence calls for formulating the demand for cash as a probability distribution of possible outcomes.

According to this model, a finance manager has to estimate probabilistic out comes for net cash flows on the basis of his prior knowledge and experience. He has to determine what is the operating cash balance for a given period, what is the expected net cash flow at the end of the period and what is the probability of occurrence of this expected closing net cash flows.

The optimum cash balance at the beginning of the planning period is determined with the help of the probability distribution of net cash flows. Cost of cash shortages, opportunity cost of holding cash balances and the transaction cost.

- **Assumptions:**

1) Cash is invested in marketable securities at the end of the planning period say a week or a month.
2) Cash inflows take place continuously throughout the planning period.
3) Cash inflows are of different sizes.
4) Cash inflows are not fully controllable by the management of firm.
5) Sale of marketable securities and other short term investments will be effected at the end of the planning period.

The probability model prescribed the decision rule for the finance manager that the finance manager should go on investing in marketable securities from the opening cash balance until the expectation, that the ending cash balance will be below the optimum cash balance, where the ratio of the incremental net return per rupee of investment is equal to the incremental shortage cost per rupee.

3. Strategy for economizing cash - Once cash flow projections are made and appropriate cash balances are established, the finance manager should take steps towards effective utilization of available cash resources. A number of strategies have to be developed for this purpose they are:

(a) Strategy towards accelerating cash inflows, and
(b) Strategy towards decelerating cash outflows

a) Strategy towards accelerating cash inflows - In order to accelerate the cash inflows and maximize the available cash the firm has to employ several methods such as reduce the time lag between the movement of a payment to the company is mailed and the movement of the funds are ready for redeployment by the company. This includes the quick deposit of customer's cheques, establishing collection centers and lock - box system etc.

i) Quick deposit of customer's cheques - The inflow are accelerated through quick deposit of cheques in the banks, the moment they are received. Special attention should be given to deposit the cheques without any delay.

ii) Establishing collection centres - In order to accelerate the cash inflows the organization may establish collection centres in various marketing centres of the country. These centres may collect the cheques or payments from the customers and deposit them in the local bank. Thus, these cheques are collected immediately at the collection centre and the bank can transfer the surplus money, if any, to the company's main bank. Thus, the decentralized collection system of the company reduced the time lag in cash remittances and collections.

iii) Lock-box method - The new device which is popular in recent past is lock-box method which will help to reduce the time interval from the mailing of the cheque to the use of funds by the company. Under this arrangement, the company rents lock-box from post offices through its service area. The customer's are instructed to mail cheques to the lock-box. The company's bank collects the mail from the lock-box several times a day and deposit them directly in the company's account on the same day. This will reduce the time in mailing cheques, deposit them in bank and there by reduce overhead costs to the company. But one of the

serious limitations of the system is that the banks will charge additional service costs to the company. However, this system is proved useful and economic to the firm.

b) Strategy for slowing cash outflows - In order to accelerate cash availability in the company, finance manager must employ some devices that could slow down the speed of payments outward in addition to accelerating collections. The methods of slowing down disbursements are as follows:

i) Delaying outward payment - The finance manager can increase the cash turnover by delaying the payment on bills until the due date of the no-cost period. Thus, he can economies cash resources of the firm.

ii) Making pay roll periods less frequent - The firm can economies its cash resources by changing the frequency of disbursing pay to its employees. For example, if the company is presently paying wages weekly, it can effect substantial cash savings if the pay is disbursed only once in a month.

iii) Solving disbursement by use of drafts - A company can delay disbursement by use of drafts on funds located elsewhere. When the firm pays the amount through drafts, the bank will not make the payment against the draft unless the bank gets the acceptance of the issuer firm. Thus the firm need not have balance in its bank account till the draft is presented for acceptance. On the other hand, it will take several days for the draft to be actually paid by the company. Thus finance manager can economies large amounts of cash resources for at least a fort night. The funds saved could be invested in highly liquid low risk assets to earn income there on.

iv) Playing the float - Float is the difference between the company's cheque book balance and the balance shown in the bank's books of accounts. When the company writes a cheque, it will reduce the balance in its books of accounts by the amount of cheque. But the bank will debit the amount of its customers only when the cheque is collected. On the other hand, the company can maximize its cash utilization by ignoring its book balance and keep its cash invested until just before the cheques are actually presented for payment. This technique is known as "playing the float".

v) Centralised payment system - A firm can delay payments through centralized payment system. Under this system, payments will be made from a single central account. This will benefit the company.

vi) By transferring funds from one bank to another bank firm can maximize its cash turnover.

15.7 PROBLEMS AND SOLUTIONS

Illustration 1

United Industries Ltd. projects that cash outlays of Rs. 37,50,000 will occur uniformly throughout the coming year. United plans to meet its cash requirements by periodically selling marketable securities from its portfolio. The firm's marketable securities are invested to earn 12% and the cost per transaction of converting securities to cash is Rs. 40.

a. Use the Baumol Model to determine the optimal transaction size of marketable securities to cash.
b. What will be the company's average cash balance?
c. How many transfers per year will be required?
d. What will be the total annual cost of maintaining cash balances?

Solution:

a) Optimal size = $\sqrt{2TA/I}$ = $\sqrt{(2 \times 40 \times 37,50,000)/0.12}$
= 50000
b) average cash balance = Rs 25000
c) No of transactions per year = 3750000/50000
= 75
d) Total annual cost

Transaction cost	75×40	=	3000
Opportunity cost	50000×1/2×12%	=	3000
			6000

Illustration 2

The Cyber globe Company has experienced a stochastic demand for its product. With the result that cash balances fluctuate randomly. The standard deviation of daily net cash flows is Rs. 1,000, The company wants to impose upper and lower bound control limits for conversion of cash into marketable securities and vice-versa. The current interest rate on marketable securities is 6%. The fixed cost associated with each transfer is Rs. 1,000 and minimum cash balance to be maintained is Rs. 10,000.

Compute the upper lower limits.

Solution:

Standard Deviation		=	1000
Variance	= 1000 x 1000	=	1000000
Interest	= 6% / 365	=	0.016%
T	= 1000		
L	= 10000		

$Z = \sqrt[3]{(3TV / 4I)} = \sqrt[3]{(3 \times 1000 \times 1000) / (4 \times 0.016\%)}$
= 3573
Return point = Z + L
3573 + 10000 = 13573
Upper limit = 3R -2L
40719 – 20000 = 20719

Illustration 3
A Ltd. has just established a small manufacturing unit to manufacture a new product which is expected to have a high margin. The company has made the following estimates of production, sales and costs:

Production and Sales (both in units)

Year 2010	Production	Sales
April	2,000	--
May	3,000	--
June	4,000	1,000
July	5,000	2,000
August	5,000	4,000
September	5,000	5,000

Note : Both production and sales will stabilize at 5,000 units from September, 2010 onwards.

Selling price and cost

Selling price per unit		50
Less: Variable Cost:		
Materials	12	
Labour	5	
Overheads	5	22
Contribution per unit		28

Note: Fixed costs are expected to be Rs. 10,000 per month.

The following additional information is also given:

- An initial stock of materials to meet three months requirements will be purchased during April, 2010. Further purchases will be made at the beginning of each month to have sufficient stock of materials for three months.

- Suppliers of materials have agreed to give one month's credit.
- Labour is to be paid half a month in arrears.
- Variable overheard will be paid during the month following the month in which it is incurred.
- Fixed overheads will be incurred in advance at the beginning of every quarter.
- Sales will be 50% cash and the balance will be on two months credit.
- There will be an opening cash balance of Rs. 3, 00,000 (in hand and bank).

Prepare a cash budget of A Ltd. for the six months ending 30th September, 2010. Figures should be given monthly and the months, if any, during which additional funds are required, should be clearly indicated.

Solution:

Purchases Budget **(Units)**

Particulars	April	May	June	July	August	September
Opening Balance	--	7,000	9,000	10,000	10,000	10,000
Add: Purchases	9,000	5,000	5,000	5,000	5,000	5,000
	9,000	12,000	14,000	15,000	15,000	15,000
Less: Consumption	2,000	3,000	4,000	5,000	5,000	5,000
Closing Balance	7,000	9,000	10,000	10,000	10,000	10,000

Payment for Creditors

(Rs.)

Particulars	April	May	June	July	August	September
Purchases (Units)	9,000	5,000	5,000	5,000	5,000	5,000
Purchases (@Rs. 12 p.u.)	1,08,000	60,000	60,000	60,000	60,000	60,000
Payment Made(1 Month Credit)	--	1,08,000	60,000	60,000	60,000	60,000

Collection from debtors

(Rs.)

Particulars	April	May	June	July	August	September
Sales Unit	--	--	1,000	2,000	4,000	5,000
Sales (@50 p.u.)	--	--	50,000	1,00,000	2,00,000	2,50,000
Cash Sales (50%)	--	--	25,000	50,000	1,00,000	1,25,000
Credit Sales (50%) (2 Months Credit)	--	--	--	--	25,000	50,000
Receipts from Sales	--	--	25,000	50,000	1,25,000	1,75,000

Labour and Overheads

(Rs.)

Particulars	April	May	June	July	August	September
Wages	10,000	15,000	20,000	25,000	25,000	25,000
Wages Paid (1/2 Month Arrears)	5,000	12,500	17,500	22,500	25,000	25,000
Variable Overheads	10,000	15,000	20,000	25,000	25,000	25,000
Variable Overheads paid (1 Month Lag)	--	10,000	15,000	20,000	25,000	25,000

Cash Budget

For the year ending 30th September, 2010 **(Rs.)**

Particulars	April	May	June	July	August	September
Opening Balance	3,00,000	2,65,000	1,34,000	67,000	(15,500)	(500)
Budgeted Receipts:						
Cash Sales	--	--	25,000	50,000	1,00,000	1,25,000
Collection from Debtors	--	--	--	--	25,000	50,000
(i)	**3,00,000**	**2,65,000**	**1,59,500**	**1,17,000**	**1,09,500**	**1,74,500**
Budgeted Payments:						
Payment to Creditors	--	1,08,000	60,000	60,000	60,000	60,000

Wages	5,000	12,500	17,500	22,500	25,000	25,000
Variable Overheads	--	10,000	15,000	20,000	25,000	25,000
Fixed Overheads	30,000	--	--	30,000	--	--
(ii)	**35,000**	**1,30,500**	**92,500**	**1,32,500**	**1,10,000**	**1,10,000**
Closing Balance (i) – (ii)	**2,65,000**	**1,34,500**	**67,000**	**(15,500)**	**(500)**	**64,500**

Illustration 4

Modern Company wishes to arrange overdraft facilities with its bankers during the period April to June, 2012 when it will be manufacturing mostly for stock. Prepare a cash budget for the above period from the following data indicating the extent of facilities the company will be require at the end of each month.

(a)

Month	Sales Rs.	Purchase Rs.	Wages Rs.	Mfg. Expenses Rs.	Office Expenses Rs.	Selling Expenses Rs.
February	1,80,000	1,24,000	12,000	3,000	2,000	2,000
March	1,92,000	1,44,000	14,000	4,000	1,000	4,000
April	1,08,000	2,43,000	11,000	3,000	1,500	2,000
May	1,74,000	2,46,000	12,000	4,500	2,000	5,000
June	1,26,000	2,68,000	15,000	5,000	2,500	4,000
July	1,40,000	2,80,000	17,000	5,500	3,000	4,500
August	1,60,000	3,00,000	18,000	6,000	3,000	5,000

(b) Cash on hand 1-4-2012 (estimated) Rs. 25,000.

(c) 50% of credit sales are realized in the month following the sale and the remaining 50% in the second month following. Creditors are paid in the month following the month of purchase:

(d) Lag in payment of manufacturing expenses ½ month.

(e) Lag in payment of other expenses 1 month.

Solution:

Cash Budget
For 3 Months April to June 2012

	April Rs.	May Rs.	June Rs.
Opening Balance	25,000	44,500	– 66,750
Budgeted Receipts:			
Sales	1,86,000	1,50,000	1,41,000
	2,11,000	1,94,500	74,250
Budgeted Payments:			
Purchases	1,44,000	2,43,000	2,46,000
Wages	14,000	11,000	12,000
Mfg. Exp.	3,500	3,750	4,750
Office Exp.	1,000	1,500	2,000
Selling Exp.	4,000	2,000	5,000
	1,66,500	2,61,250	2,69,750
Closing Balance	44,500	– 66,750	– 1,95,000

1. Collection from credit sales in April will be as follows:
   50% of the credit sales of March Rs. 96,000
   50% of the credit sales of February Rs. 90,000
   Rs. 1,86,000

   Collection from the credit sale will be calculated similarly for May to June.

2. As the time lag of purchases is one month, the payment for March purchases will be made in April, April purchases will be paid in May and May purchases will be paid in June.

3. Similarly, as the time lag for payment of wages, office expenses and selling expense is one month, the payment will be made for the expenses of previous month i.e. March wages will be paid in April and so on.

4. The Time lag for manufacturing expenses is ½ month, which suggests that ½ month's expenses are paid in the next month. Thus in April, ½ mfg. expenses of March will be paid and ½ expenses of April will also be paid.

5. The above budget shows that there will be a deficit of Rs. 66,750 in May, for which arrangement of bank overdraft will have to be made. Similarly, in June, an overdraft will have to be arranged for Rs. 1,95,500.

Illustration 5

Make out cash budget for October to December from the following information:

1. Cash and Bank Balance on 1-10-2012 Rs. 10,000
2. Sales Actual and Budgeted:

	Rs.
June (Actual)	30,000
July (Actual)	32,000
August (Actual)	35,000
September (Estimated)	37,500
October (Estimated)	40,000
November (Estimated)	41,000
December (Estimated)	44,500

3. Purchases – Actual and Budgeted figures are:

	Rs.
June (Actual)	18,000
July (Actual)	20,000
August (Actual)	24,000
September (Estimated)	22,500
October (Estimated)	24,000
November (Estimated)	20,000
December (Estimated)	25,500

4. Wages and Other Expenses – Actual and Budgeted:

	Wages Rs.	Expenses Rs.
August (Actual)	7,500	2,500
September (Estimated)	7,500	3,000
October (Estimated)	9,000	3,000
November (Estimated)	9,000	4,000
December (Estimated)	10,000	4,000

5. Special:
   Advance payment of Income Tax Rs. 2,500 in November.
   Purchase of Plant of Rs. 5,000 in October.
6. Rent payable in advance Rs. 150.
7. 10% of purchases and sales are on cash terms.
8. Time Lag:
   Credit sales 2 Months
   Credit Purchases 1 Month
   Wages ½ Month
   Expenses ¼ Month.

Solution:

Cash Budget
For October to December, 2012

	October Rs.	November Rs.	December Rs.
Opening Balance	10,000	6,450	5,300
Budgeted Receipts:			
Cash Sales	4,000	4,100	4,450
Collection from Debtors	31,500	33,750	36,000
	45,500	44,300	45,750
Budgeted Payment:			
Cash purchases	2,400	2,000	2,500
Credit Purchases	20,250	21,600	18,000
Wages	8,250	9,000	9,500
Expenses	3,000	3,750	4,000
Rent	150	150	150
Plant	5,000	--	--
Income Tax	--	2,500	--
Total	39,050	39,000	34,150
Closing Cash Balance	6,450	5,300	11,600

15.8 EXERCISE

A - Find out the correct option:

1. The motives of holding cash include
   a) Transaction
   b) Precautionary
   c) Speculative
   d) All of the above

2. Cash budgets represents
   a) Cash receipts
   b) Cash payments
   c) Cash receipts and payments
   d) None of the above

3. The model which suggest that cash should be managed in the same way as inventory is
   a) Baumol's model
   b) Miller Orr model
   c) Water model
   d) CAP model

4. Availability of cash in future after concideration the financial commitment is known as :
   a) Cash flow
   b) Liquidity
   c) Solvency
   d) Cash Rich

5. One of the following is not an objective of cash management
   a) Cash planning
   b) Cash imbalance
   c) Holding optimum cash
   d) Investment of idle cash

6. Following is not the element of cash budgeting
   a) Determination of capital structure
   b) Selection of time period
   c) Operating cash flow
   d) Financial cash flow

B - State with reasons whether the following statements are true or false:

1. Float is the difference between available balance and the ledger balance.
2. Net float can be minimized by delaying payments.
3. Surplus cash may be invested in units of UTI.
4. Re – scheduling of loans improves liquidity position.
5. Inter – corporate deposit by private sector companies for a certain period are called as debentures.

C – Fill in blanks

1. Municipal bonds are issued by _____ bodies.
2. Increased operating profit creates _____ _____.
3. Daily cash report _____ cash.
4. _____ model applies EOG for cash management.

D- Match the column

	Group A		Group B
1	Fluctuation in prices	A	Expected receipts & payments
2	Cash budget	B	Difference between book balance and available balance
3	Float	C	Speculative motive
4	Cash exactly as per the need	D	Optimal cash balance
5	Ride the yield curve	E	Interest rate risk
		F	Strategy to manage cash

E – Answer the following Questions.

1. What are the motives of holding cash?
2. Explain the various aspects of cash management.
3. What are the strategies of handling excess cash?
4. Explain various models of cash management.
5. What are the criteria of selection of securities?
6. Write short notes on:
   a. Gilt edged securities,
   b. Treasury Bills
   c. Commercial paper

16

MANAGEMENT OF RECEIVABLES

Unit Structure :

16.0 Objectives
16.1 Introduction
16.2 Costs of Maintaining Receivables
16.3 Benefits of Maintaining Receivables
16.4 Factors Affecting the Size of Receivables
16.5 Optimum Size of Receivables
16.6 Determinants of Credit Policy
16.7 Optimum Credit Policy
16.8 Credit Evaluation of Customer
16.9 Problems and Solutions

16.0 OBJECTIVES

After studying the unit the students will be able to:

- Identify the costs of receivables.
- Explain the benefits of maintaining receivables.
- Discuss the factors affecting the size of receivables.
- Explain the process of Credit evaluation of the customer.
- Solve the practical problems.

16.1 INTRODUCTION

Receivables mean the book debts or debtors and these arise, if the goods are sold on credit. Debtors form about 30% of current assets in India. Debt involves an element of risk and bad debts also. Hence, it calls for careful analysis and proper management. The goal of receivables management is to maximize the value of the firm by achieving a tradeoff between risk and profitability. For this purpose, a finance manager has:

a. to obtain optimum (non-maximum) value of sales;

b. to control the cost of receivables, cost of collection, administrative expenses, bad debts and opportunity cost of funds blocked in the receivables.

c. to maintain the debtors at minimum according to the credit policy offered to customers.

d. to offer cash discounts suitably depending on the cost of receivables, bank rate of interest and opportunity cost of funds blocked in the receivables.

16.2 COSTS OF MAINTAINING RECEIVABLES

The costs with respect to maintenance of receivables can be identified as follows

1. Capital costs - Maintenance of accounts receivable results in blocking of the firm's financial resources in them. This is because there is a time lag between the sale of goods to customers and the payments by them. The firm has, therefore, to arrange for additional funds to meet its own obligations, such as payment to employees, suppliers of raw materials, etc., while awaiting for payments from its customers. Additional funds may either be raised from outside or out of profits retained in the business. In first the case, the firm has to pay interest to the outsider while in the latter case, there is an opportunity cost to the firm, i.e., the money which the firm could have earned otherwise by investing the funds elsewhere.

2. Administrative costs - The firm has to incur additional administrative costs for maintaining accounts receivable in the form of salaries to the staff kept for maintaining accounting records relating to customers, cost of conducting investigation regarding potential credit customers to determine their credit worthiness etc.

3. Collection costs - The firm has to incur costs for collecting the payments from its credit customers. Sometimes, additional steps may have to be taken to recover money from defaulting customers.

4. Defaulting costs - Sometimes after making all serious efforts to collect money from defaulting customers, the firm may not be able to recover the over dues because of the inability of the customers. Such debts are treated as bad debts and have to be written off since they cannot be realised.

16.3 BENEFITS OF MAINTAINING RECEIVABLES

a. Increase in Sales - Except a few monopolistic firms, most of the firms are required to sell goods on credit, either because of trade customers or other conditions. The sales can further be increased by liberalizing the credit terms. This will attract more

customers to the firm resulting in higher sales and growth of the firm.

b. Increase in Profits - Increase in sales will help the firm (i) to easily recover the fixed expenses and attaining the break-even level, and (ii) increase the operating profit of the firm. In a normal situation, there is a positive relation between the sales volume and the profit.

c. Extra Profit - Sometimes, the firms make the credit sales at a price which is higher than the usual cash selling price. This brings an opportunity to the firm to make extra profit over and above the normal profit.

16.4 FACTORS AFFECTING THE SIZE OF RECEIVABLES

The size of accounts receivable is determined by a number of factors. Some of the important factors are as follows:

1. Level of sales - This is the most important factor in determining the size of accounts receivable. Generally in the same industry, a firm having a large volume of sales will be having a larger level of receivables as compared to a firm with a small volume of sales.

Sales level can also be used for forecasting change in accounts receivable. For example, if a firm predicts that there will be an increase of 20% in its credit sales for the next period, it can be expected that there will also be a 20% increase in the level of receivables.

2. Credit policies - The term credit policy refers to those decision variables that influence the amount of trade credit, i.e., the investment in receivables. These variables include the quantity of trade accounts to be accepted, the length of the credit period to be extended, the cash discount to be given and any special terms to be offered depending upon particular circumstances of the firm and the customer. A firm's credit policy, as a matter of fact, determines the amount of risk the firm is willing to undertake in its sales activities. If a firm has a lenient or a relatively liberal credit policy, it will experience a higher level of receivables as compared to a firm with a more rigid or stringent credit policy. This is because of the two reasons:

i. A lenient credit policy encourages even the financially strong customers to make delays in payment resulting in increasing the size of the accounts receivables.

ii. Lenient credit policy will result in greater defaults in payments by financially weak customers thus resulting in increasing the size of receivables.

3. Terms of trade - The size of the receivables is also affected by terms of trade (or credit terms) offered by the firm. The two important components of the credit terms are (i) Credit period and (ii) Cash discount.

4. Credit Period

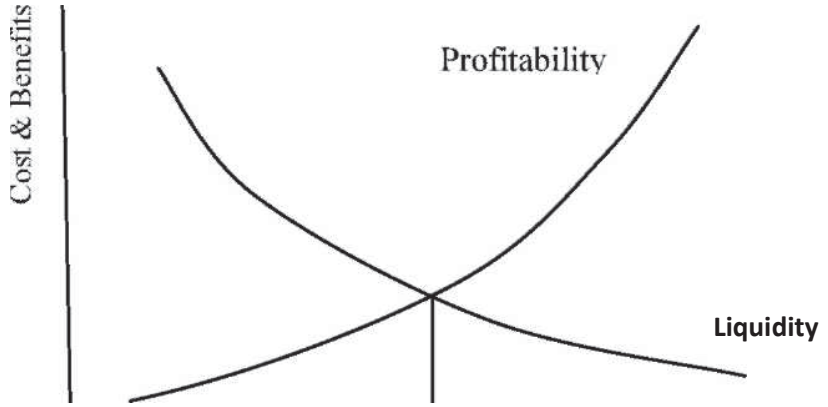
The term credit period refers to the time duration for which credit is extended to the customers. It is generally expressed in terms of "Net days". For example, if a firm's credit terms are "Net 15", it means the customers are expected to pay within 15 days from the date of credit sale.

5. Cash Discount

Most firms offer cash discount to their customers for encouraging them to pay their dues before the expiry of the credit period. The terms of cash discount indicate the rate of discount as well as the period for which the discount has been offered. For example, if the terms of cash discount are changed from "Net 30" to "2/10 Net 30", it means the credit period is of 30 days but in case customer pays in 10 days, he would get 2% discount on the amount due by him. Of course, allowing cash discount results in a loss to the firm because of recovery of less amount than what is due from the customer but it reduces the volume of receivables and puts extra funds at the disposal of the firm for alternative profitable investment. The amount of loss thus suffered is, therefore, compensated by the income otherwise earned by the firm.

16.5 OPTIMUM SIZE OF RECEIVABLES

The optimum investment in receivables will be at a level where there is a trade-off between costs and profitability. When the firm resorts to a liberal credit policy, the profitability of the firm increases on account of higher sales. However, such a policy results in increased investment in receivables, increased chances of bad debts and more collection costs. The total investment in receivables increases and, thus, the problem of liquidity is created. On the other hand, a stringent credit policy reduces the profitability but increases the liquidity of the firm. Thus, optimum credit policy occurs at a point where there is a "Trade-off" between liquidity and profitability as shown in the chart below.



Tight <- Credit Policy -> Loose

16.6 DETERMINANTS OF CREDIT POLICY

The following are the aspects of credit policy:

1. Level of credit sales required to optimise the profit.
2. Credit period i.e. duration of credit, whether it may be 15 days or 30 or 45 days etc.
3. Cash discount, discount period and seasonal offers.
4. Credit standard of a customer : 5 C's of credit :
   a. Character of the customer i.e. willingness to pay.
   b. Capacity ability to pay.
   c. Capital financial resources of a customer.
   d. Conditions special conditions for extension of credit to doubtful customers and prevailing economic and market conditions and
   e. Collateral Security.
5. Profit
6. Market and economic conditions.
7. Collection policy.
8. Paying habits of customers.
9. Billing efficiency, record-keeping etc.
10. Grant of credit-- size and age of receivables.

16.7 OPTIMUM CREDIT POLICY

A firm should establish receivables policies after carefully considering both benefits and costs of different policies. These policies relate to:
(i) Credit Standards, (ii) Credit Terms, and (iii) Collection Procedures.

Each of these have been explained below:

i. Credit standards - The term credit standards represent the basic criteria for extension of credit to customers. The levels of sales and receivables are likely to be high if the credit standards are relatively loose, as compared to a situation when they are relatively tight. The firm's credit standards are generally determined by the five "C's". Character, Capacity, Capital, Collateral and Conditions. Character denotes the integrity of the customer, i.e. his willingness to pay for the goods purchased. Capacity denotes his ability to manage the business. Capital denotes his financial soundness. Collateral refers to the assets which the customer can offer by way of security. Conditions refer to the impact of general economic trends on the firm or to special developments in certain areas of economy that may affect the customer's ability to meet his obligations.

Information about the five C's can be collected both from internal as well as external sources. Internal sources include the firm's previous experience with the customer supplemented by its own well developed information system. External resources include customer's references, trade associations and credit rating organisations such as Don & Brad Street Inc. of USA. This Organisation has more than hundred years experience in the field of credit reporting. It publishes a reference book six times a year containing information about important business firms region wise. It also supplies credit reports about different firms on request.

An individual firm can translate its credit information into risk classes or groups according to the probability of loss associated with each class. On the basis of this information, the firm can decide whether it will be advisable for it to extend credit to a particular class of customers.

ii. Credit terms

It refers to the terms under which a firm sells goods on credit to its customers. As stated earlier, the two components of the credit terms are (a) Credit Period and (b) Cash Discount. The approach to be adopted by the firm in respect of each of these components is discussed below:

(a) Credit period - Extending the credit period stimulates sales but increases the cost on account of more tying up of funds in receivables. Similarly, shortening the credit period reduces the profit on account of reduced sales, but also reduces the cost of tying up of funds in receivables. Determining the optimal credit period, therefore, involves locating the period where the marginal profits on increased sales are exactly offset by the cost of carrying the higher amount of accounts receivable.

(b) Cash discount - The effect of allowing cash discount can also be analysed on the same pattern as that of the credit period. Attractive cash discount terms reduce the average collection period resulting in reduced investment in accounts receivable. Thus, there is a saving in capital costs. On the other hand, cash iscount itself is a loss to the firm. Optimal discount is established at the point where the cost and benefit are exactly offsetting.

iii. Collection procedures

A stringent collection procedure is expensive for the firm because of high out-of-pocket costs and loss of goodwill of the firm among its customers. However, it minimises the loss on account of bad debts as well as increases savings in terms of lower capital costs on account of reduction in the size of receivables. A balance has therefore to be stuck between the costs and benefits of different collection procedures or policies.

16.8 CREDIT EVALUATION OF CUSTOMER

Credit evaluation of the customer involves the following 5 stages

i. Gathering credit information of the customer through:

a. financial statements of a firm,
b. bank references,
c. references from Trade and Chamber of Commerce,
d. reports of credit rating agencies,
e. credit bureau reports,
f. firm's own records (Past experience),
g. other sources such as trade journals, Income-tax returns, wealth tax returns, sales tax returns, Court cases, Gazette notifications etc.

ii. Credit analysis - After gathering the above information about the customer, the credit-worthiness of the applicant is to be analysed by a detailed study of 5 C's of credit as mentioned above.

iii. Credit decision - After the credit analysis, the next step is the decision to extend the credit facility to potential customer. If the analysis of the applicant is not upto the standard, he may be offered cash on delivery (COD) terms even by extending trade discount, if necessary, instead of rejecting the credit to the customer.

iv. Credit limit - If the decision is to extend the credit facility to the potential customer, a limit may be prescribed by the financial manager, say, Rs. 25,000 or Rs. 1,00,000 or so, depending upon the credit analysis and credit-worthiness of the customer.

v. Collection procedure - A suitable and clear-cut collection procedure is to be established by a firm and the same is to be intimated to every customer while granting credit facility. Cash discounts may also be offered for the early payment of dues. This facilitates faster recovery.

16.9 PROBLEMS AND SOLUTIONS

Illustration 1
The following are the details regarding the operations of a firm during a period of 12 months.

Sales	Rs.12,00,000
Selling price per unit	Rs.10
Variable cost price per unit	Rs. 7
Total cost per unit	Rs. 9

Credit period allowed to customers one month. The firm is considering a proposal for a more liberal extension of credit which will result in in-creasing the average collection period from one month to two months. This relaxation is expected to increase the sales by 25% from its existing level**.**

You are required to advise the firm regarding adoption of the new credit policy, presuming that the firm's required return on investment is 25%.

Solution:
Appraisal of Credit policy

	Present	Proposed	Incremental
Credit period (ACP)	1 month	2 months	
Sales (units)	120000	150000	
Sales @ 10 (in Rs)	1200000	1500000	300000
Total Cost	1080000	1290000	210000
Profit	120000	210000	90000

Investment in receivables 1080000 / 12 = 90000
1290000 / 6 = 215000 125000
Required return on Incremental Investment (125000@ 25%)
= 31250
Actual return on Investment = 90000
(or)
(90000 / 125000) x 100 = 72%

Since the Incremental return is greater than required return on Incremental investment advised to adopt new credit policy

Illustration 2

YASHWANTH Ltd. has received an order from Green Ltd. which insists that the Rs.50,000 of machinery ordered be supplied on 60 days credit. The variable costs of production which would be incurred by YASHWANTH Ltd. in meeting the order amount to Rs.40,000. Green's credit worth while ness is in doubt and the following estimates have been made:

Probability of Green Ltd. paying in full in 60 days 0.6
Probability of Green Ltd. completely defaulting 0.4
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However, if the order is accepted by YASHWANTH Ltd. and if Green Ltd. does not default, then there is felt to be a probability of about 0.7 that a further eight identical orders will be placed by Green Ltd. in exactly 1 year's time, and further orders in later years may also be forth coming. Experience has shown that once a firm meets the credit terms on an initial order, the probability of default in the next year reduces to 0.1. Any work carried out on Green's Ltd. order would take place in otherwise idle time and would not encroach upon YASHWANTH Ltd. other activities. Should Green Ltd. defaults, the legal and other costs of debt collection would equal any money obtained.

YASHWANTH Ltd. finances all trade credit with readily available overdrafts at a cost of 12% p.a. An appropriate discount rate for long term decisions is 15%p.a.

Evaluate the proposal if (i) only one order is expected from Green Ltd., and (ii) if further orders are also expected from it (year may be taken consisting of 360 days)

Solution:
YASHWANTH LTD
Evaluation of credit decision

I. If only one order is expected from GREEN Ltd

If Amount received in full in 60 days	
Selling price	50000
(-) variable cost	40000
	10000
(-) finance cost (40000@12%) × (60 / 360)	800
Net profit	9200

If GREEN Ltd defaulted
Loss = 50000

Expected return:

If paid in 60 days	9200 × 0.6	5520
If defaulted	50000 × 0.4	(20000)
		(14480)

If only one order is received from Green Ltd, it need not be accepted by YASHWANTH Ltd, Because net receipt is negative

II. If further Orders are expected from GREEN Ltd

Net return from each order (if not defaulted)	9200
For 8 orders	73600
Return expected if defaulted	(400000)
Net expected return from further orders [(73600 x 0.9) + (-400000) x (0.1)]	26240
PV of expected return from further orders [26240 x (0.7) x (100 / 115)]	15970
Revised value of order [15970 + (-14480)]	1490

Revised value of initial order on the basis of possibility of receiving further orders is Rs1490. so proposal is to be accepted.

Illustration 3

Trinadh Traders Ltd. currently sells on terms of net 30 days. All the sales are on credit basis and average collection period is 35 days. Currently, it sells 500,000 units at an average price of Rs. 50 per unit. The variable cost to sales ratio is 75% and a bad debt to sales ratio is 3%. In order to expand sales, the management of the company is considering changing the credit terms from net 30 to 2/10, net 30. Due to the change in policy, sales are expected to go up by 10%, bad debt loss on additional sales will be 5% and bad debt loss on existing sales will remain unchanged at 3%. 40% of the customers are expected to avail the discount and pay on the tenth day. The average collection period for the new policy is expected to be 34 day's: The Company required a return of'20% on its investment in receivables.

You are required to find out the impact of the change in credit policy on the profit of the company. Ignore taxes.

Solution:
Trinadh Traders
Appraisal of Credit policy:

	Present	Proposed	Gain/(loss)
Credit terms	Net30	(2 / 10)Net 30	
ACP	35 days	34 days	
Discount sales	-	40%	
Bad debts	3%	3 % + 5%	
Sales	500000	550000	
Incremental Profit	[50000 x 50 x 25%]	625000	
Incremental bad debts	[50000 x 50 x 5%]	(125000)	
Discount	[550000 x 40% x 50x 2%]	(220000)	

Investment	[500000 x 50 x (35/360)] = 2430555 [500000 x 50 x (37/365)] + [50000 x 50 x 75% x 34/360] = 2538194			
			107629	
Finance cost		(107629 x 20%)	(21528)	258472

By implementing new credit policy, the profit is increased by Rs258472. So the new credit policy is advised to implement.

Illustration 4

A small firm has a total sales of Rs. 100 lakhs, of which 80% is on credit. It is offering a discount-credit terms of 2/40 Net 30. Of the total, 50% of customers avail of discount and the balance pay in 120 days. The past experience indicates that bad debt losses are around 1% of credit sales. The firm spends about Rs. 1,20,000 per annum to administer its credit sales. These are avoidable as a factor is prepared to buy the firm's receivables. He will charge 2% commission. He will also pay advance against receivables to the firm at an interest rate of 18% after withholding 10% as reserve. Answer the following:

a) What is the total credit sales?
b) What is the average collection period?
c) What is the average receivables?
d) What is the factoring commission payable per annum?
e) What is the disbursable amount to the firm by the factor?
f) What is the total interest chargeable by the factor?
g) What is the cost of factoring?
h) Should the firm avail factoring services?

Solution:

	(Rs.)
a) Total credit sales (100lakhs x 80%)	8000000
b) Average collection period [(40x 0.5) + (120 x 0.5)]	80 days
c) Average debtors (80lakhs x 80 / 360)	1777778
d) Factoring commission (80lakhs x 2%)	160000

e) Disbursable amount

Average receivables	1777778	
(-) Factor reserve @10%	177778	
	1600000	
(-) Commission (1777778 x 2%)	35554	
		1564446

f) Total interest

Interest for 80 days	[1564446 x18% x (80 / 360)]	62578
Interest per year	[62578 x (360 / 80)]	281600

g) Effective cost of factoring

Commission	160000
Interest	281600
	441600
(-) savings in Bad debt	80000
Admin cost	120000
Effective cost	241600

Effective cost of factoring (241600 / 1564446) x 100 = 15.4 %

h) If the firm obtain funds less than 15.4% interest rate, then firm need not accept factoring services. Otherwise advised to accept factoring.

Illustration 5

The turnover of Modern Ltd. Is Rs. 60 lakhs of which 80% is on credit. Debtors are allowed on month to clear off the dues. A factor is willing to advance 90% of the bills raised on credit for a fee of 2% a month plus a commission of 4% on the total amount of debts. Modern Ltd. As a result of this arrangement is likely to save Rs. 21,600 annually in management costs and avoid bad debts at 1% on the credit sales.

A scheduled bank has come forward to make an advance equal to 90% of the debts at an interest rate of 18% p.a. However its processing fee will be at 2% on the debts. Would you accept factoring or the offer from the bank?

Solution:

Factoring vs. Bill Discounting:

Alternative 1: Factoring:

Calculation of Effective Cost of Factoring:

Sale for the year		6000000
Credit sales		4800000
Receivables = (4800000 / 12) x 1 month	=	400000

Cost of factoring: (Per month)

Fee (interest) 400000 x 90 % x 2%	=	7200
Commission 400000 x 4%	=	16000
Cost per month		23200

Savings:

Management cost (21600 / 12)	(1800)
Bad debts (400000 x 1%)	(4000)
	17400

Alternative 2: Bill Discounting:

Cost of Bill Discounting

Average debtors – 400000p.m	
Processing Fee (400000 x 2 %)	8,000
Interest / Discount [400000@90% x 18% x (1 /12)]	5,400
Loss due to bad debts p.m	4000
Administration cost	1800
	19200

Company may Opt Factoring but not Bill discounting.

Illustration 6

Star Limited manufacturers of Colour TV Sets, are considering the liberalization of existing credit terms to three of their large customers A, B and C. the credit period and likely quantity of TV sets that will be lifted by the customers are as follows:

Credit period (Days)			
	A	B	C
0	1,000	1,000	--
30	1,000	1,500	--
60	1,000	2,000	1,000
90	1,000	2,500	1,500

The selling price per TV set is Rs. 9,000. The expected contribution is 20% of the selling price. The cost of carting debtors averages 20% per annum.

You are required:

(a) Determine the credit period to be allowed to each customer. (Assume 360 days in a year for calculation purposes).

(b) What other problems the company might face in allowing the credit period as determined in (a) above?

Solution:

(a) Determination of Credit period to be allowed to customers A, B and C.

In case of Customer A there will be constant sales irrespective of the credit period allowed. Hence, it is suggested not to extend any credit period to Customer A. The only analysis to be made about the profitability of extending different credit period with different sales levels.

	Customers B				Customers C			
Credit Period (Days)	0	30	60	90	0	30	60	90
Sales (Units)	1,000	1,500	2,000	2,500	--	--	1,000	1,500
Sales	90	135	180	225			90	135
Contribution (20% of Sales)	18	27	36	45			18	27
Incremental Contribution (A)		9	9	9	-	-	18	9
Debtors (Credit Period X sales / 360)		11.25	30	56.25	--	--	15	33.75
Incremental debtors		11.25	18.75	26.25	--	--	15	18.75
Cost of Incremental Debtors at 80%		9	15	21	--	--	12	15
Cost of Carrying Incremental Debtors at 20% (B)		1.8	3	4.2	--	--	2.4	3
Net Margin (A) – (B)		7.2	6	4.8	--	--	15.6	6

Conciliation:

(a) It is observed from the above table that incremental contribution on sales exceeds incremental cost carrying additional debtors at each successive credit period. Hence it is suggested to allow credit period upto 90 days to both customers B and C.

(b) By giving credit period of 90 days to Customer B and C and no credit allowed to Customer A may cause to stop purchase T.V. sets from the company by Customer A.

Illustration 7

A trader whose current sales are in the region of Rs. 6 lakhs per annum and an average collection period of 30 days wants to pursue a more liberal policy to improve sales. A study made by a management consultant reveals the following information:

Credit Policy	Increase in Collection Period (Days)	Increase in sales Rs.	% Default Anticipated
A	10	30,000	1.5%
B	20	48,000	2%
C	30	75,000	3%
D	45	90,000	4%

Selling price per unit is Rs. 3, average cost per unit is Rs. 2.25 and variable cost per unit is Rs. 2.

Current bad debt loss is 1%. Require return on additional investment is 20%. Assume 360 days a year. Which of the above policies would you recommend for adoption?

Solution:
Evaluation of Credit Policies

Benefits				
a. Credit Policy	A	B	C	D
b. Credit Period (days)	40	50	60	75
c. Additional Sales (Rs.)	30,000	48,000	75,000	90,000
d. Contribution generated by Additional Sales (Rs.)	10,000	16,000	25,000	30,000
e. Total Sales (Rs.)	6,30,000	6,48,000	6,75,000	3,90,000
f. Bad debts	9,450	12,960	20,250	27,600
g. Additional bad debts (Rs.)	3,450	6,960	14,250	21,600
h. Net additional Contribution i.e. (d) – (g)	6,550	9,040	10,750	8,400

Costs				
a. Credit Policy	A	B	C	D
b. Credit Period (days)	40	50	60	75
c. Total Sales (Rs.)	6,30,000	6,48,000	6,75,000	6,90,000
d. Average Debtors (Rs.)	70,000	90,000	1,12,500	1,43,750
e. Investment in Receivables (Rs.)	46,667	60,000	75,000	95,833
f. Additional investment in Receivables	13,334	26,667	41,667	62,500
g. Return on Additional Investment	2,667	5,333	8,333	12,500
Net Benefit	3,883	3,707	2,417	(-) 4,100

Conclusion: As the net benefit is maximum in case of credit policy A, the company should adopt that policy.

Note:

(a) Additional bad debts will be considered as excess of anticipated bad debts as compared to the existing bad debts.

(b) Additional Investment in Receivables is calculated as below:
Existing Sales – Rs. 6,00,000.
Average Collection Period – 30 Days.
Average Debtors – Rs. 50,000
As variable Cost is 2/3 rd of Selling price,
Investment in Debtors = 50,000 X 2/3 = 33,333.

Illustration 8

X Ltd. currently has an annual turnover of Rs. 20 lakhs and an average collection period of 4 weeks. The company proposes to introduce a more liberal credit policy which they hope will generate additional sales, as shown below:

Proposed Credit Policy	Increase in		Percentage of Default
	Collection Period by	Sales Rs.	
1	2 Weeks	2,00,000	2%
2	4 Weeks	2,50,000	3%
3	6 Weeks	3,50,000	5%
4	8 Weeks	5,00,000	8%

The selling price of the product is Rs. 10 and the variable cost per unit is Rs. 7. The current bad debt loss is 1% and the desired rate of return on investment is 20%. For the purpose of calculation a year is to be taken to comprise of 52 weeks. Indicate which of the above policies you would recommend the company to adopt.

Solution:

	Current	Proposed			
	4 Weeks	**6 Weeks**	**8 Weeks**	**10 Weeks**	**12 Weeks**
Sales	20,00,000	22,00,000	22,50,000	23,50,000	25,00,000
Incremental Sales	--	2,00,000	2,50,000	3,50,000	5,00,000
1. Incremental Contribution (30% of Incremental sales)	--	60,000	75,000	1,05,000	1,50,000
Average Debtor	1,53,846	2,53,846	3,46,154	4,51,923	5,76,923
Incremental Debtors	--	1,00,000	1,92,308	2,98,077	4,23,077
Incremental Investment	--	70,000	1,34,616	2,08,654	2,96,154
2. Return on Investment (20% on incremental Investment in debtors balance)	--	14,000	26,923	41,731	59,231
Percentage of Default	1%	2%	3%	5%	8%
Bad debts on total Sales	20,000	44,000	67,500	1,17,500	2,00,000
3. Incremental Bad Debts	--	24,000	47,500	97,500	1,80,000
Incremental Returns (1) - (2) + (3)	--	22,000	577	(34,231)	(80,231)

Conclusion:

The incremental return is maximized if the credit period allowed is 6 weeks. Hence, it is suggested to 6weeks as credit period for collection of debtors balances.

M.COM PART II
PAPER - III
ADVANCE FINANCIAL MANAGEMENT

N.B. 1) Revised Course is applicable to Regular Students who have taken admission in college during academic year 2011-12 only.
2) Question Nos. 1 and 2 are compulsory and carry 20 and 16 marks respectively.
3) Solve any four questions from Questions Nos. 3 to 9, each carrying 16 marks.
4) Use of simple calculator is allowed.
5) Working notes and assumption should form part of your answers.

1. Prepare a cash Budget of Anil Ltd. from the following information for six months 20 commencing from April, 2011.

Month	Total Sales	Cash Purchases	Expenses
January'11	3,00,000	40,000	50,000
February'11	4,50,000	50,000	60,000
March'11	6,50,000	65,000	75,000
April'11	9,00,000	80,000	90,000
May'11	12,00,000	1,10,000	1,20,000
June'11	15,50,000	1,40,000	1,50,000
July'11	19,50,000	1,75,000	1,85,000
August'11	24,00,000	2,00,000	2,10,000
September'11	29,00,000	2,50,000	2,60,000

Additional Information :

a) Total Sales comprises of 20% of cash sales and 80% credit sales.

b) Credit Purchases are 75% of total purchases through out.

c) 40% of credit sales are collected in the month following the sales, balance 35% in the second month and remaining 25% in the third month.

d) 50% of credit purchases are paid in the month following the purchases, balance 30% in the second month and remaining 20% in the third month.

e) Wages for January, 2011 are ₹30,000, which increases every month by 20% of the previous month and are paid with a time lag of half month.

f) Opening Cash balance of ₹1,80,000 ast at 1st April, 2011.

g) Expenses of each month are paid with a time lag of one month.

h) Machinery purchases of ₹1,00,000 in May, 2011 on two months credit.

i) Income tax paid in the month of June, 2011 ₹75,000.

2. a) State True or False after rewriting the sentence :

i) Equity includes capital reserves.

ii) Proposed dividend is treated as current liability while preparing cash flow statement as per AS-3.

iii) Provision for tax is treated as non-current liability while preparing cash flow statement as per AS-3.

iv) A contract of lease is defined as a contract whereby the lessee grants to lessor, the exclusive right to use the asset usually for an agreed period of time in return for the payment of rent.

v) Fictitious assets include Debit Balance of Profit and Loss A/c.

vi) A company is said to be over capitalized, when its actual capitalization is lower than its proper capitalization as warranted by its earning capacity.

vii) Stock velocity given in terms of 'times', means stock turn over rate.

viii) Current ratio is used to comment upon the 'long term solvency' position of the business.

b) Match the column and rewrite the sentence : -

Column 'A'	Column 'B'
1) Acid test ratio	• $\frac{\text{Contribution}}{\text{EBIT}}$
2) Debtors Velocity	• $\frac{\text{EBIT}}{\text{EBT}}$
3) Finance Leverage	• Purchase of Land
4) Cash Inflow	• $\frac{\text{Quick Assets}}{\text{QuickLiabilities}}$
5) Operating Leverage	• $\frac{\text{Credit Sales}}{\text{Receivables}}$
6) W. Capital Ratio	• Sale of furniture
7) Preference Shares Redeemed	• $\frac{\text{Contribution}}{\text{EBT}}$

8) Combined Leverage	• $\frac{\text{Current Assets}}{\text{Current Liabilities}}$ • CRR Created • Debentures Issued • Bonus Shares Issued

3. A firm sales, variable costs and fixed costs amount to ₹75,00,000, ₹42,00,000 and ₹6,00,000 respectively. It has borrowed ₹45,00,000 at 9 percent and its equity capital totals ₹55,00,000.
   a) What is the firm's ROI?
   b) What are the operating, financial and combined leverage of the firm?
   c) If the firm belongs to an industry whose asset turnover is 3, does it have a high or low asset leverage?
   d) Does it have favourable financial leverage?
   e) If the sales drop to ₹50,00,000 what will be the new DBIT?
   f) At what level will the EBT of the firm equals to zero?

4. a) A project costs ₹5,00,000 and has a scrap value of ₹1,00,000 after 5 years. The net profit before depreciation and taxes for the five years period are expected to be ₹1,00,000, ₹1,20,000, ₹1,40,000, ₹1,60,000 and ₹2,00,000. You are required to calculate the Accounting Rate of Return, assuming 50% rate of tax and depreciation on straight line method. Average investment is to be taken as : -

$$\frac{(\text{Cost} - \text{Scrap value})}{2}$$

   b) A project costing ₹5,00,000 has a life of 10 years at the end of which its scrap value is likely to be ₹50,000. The firm's cut-off rate is 12%. The Project is expected to yield an annual profit after tax of ₹1,00,000, depreciation being charged on straight line basis, at 12% p.a. The present value of the rupee received annually for 10 years is ₹5.65 and the value of one rupee received at the end of 10^{th} year is ₹0.322.
   Ascertain the Net Present Value of the project.

5. XYZ Corporation is considering relaxing its present credit policy and is in the process of evaluating two alternative policies. Currently, the firm has annual credit sales of ₹50 lakh and accounts receivable turnover ratio of 4 times a year. The current level of loss is due to bad debts of ₹1,50,000. The firm is required to give a return of 25 percent on the investment in new accounts receivable. The company's variable costs are 70 percent of the selling price. Given the following information, which is a better option?

Particulars	Present policy	Policy Option I	Policy Option II
Annual Credit Sales	₹50,00,000	₹ 60,00,000	₹ 67,50,000
Accounts receivable turnover ratio	4		2.4
Bad debt losses	1,50,000	3,00,000	4,50,000

6. The existing capital structure of ABC Ltd. is as follows - :

	₹
Equity shares of Rs. 100 each	40,00,000
Retained Earnings	10,00,000
9% Preference Shares	25,00,000
7% Debentures	25,00,000

The company earns a return before Interest and tax at 12% and the tax on income is 50%. Company wants to raise ₹ 23,00,000 for its expansion programme, for which it is considering following alternatives : -

a) Issue of 20,000 Equity Shares at a premium of ₹25 per share.

b) Issue of 10% Preference Shares.

c) Issue of 9% Debentures.

It is forecasted that the price-earning ratio in case of these alternatives are (a) 20 (b) 17 and (c) 16.

Which alternative would you consider to be the best?

Give reasons for your choice

Also calculate expected market price in case of three alternative financing proposals.

7. T Ltd. has the following capital structure as on 31st March, 2012 : -

	₹
10% Debentures	3,00,000
9% Preference Shares	2,00,000
Equity Shares (₹ 100 each)	5,00,000
	10,00,000

The equity shares of the company are quoted at ₹102 and the company is expected to declare a dividend of ₹9 per share for the year ended 31st March, 2012. Expected growth rate is 5%.

a) Assuming tax rate applicable to the company at 50%, calculate weighted average cost of capital.

b) The company wants to raise additional term loan at 12% of ₹5,00,000 for expansion. The company's assessment is that, it will be able to pay dividend of ₹10 per share, but market price per share will reduce to ₹96. The expected growth rate will remain the same. Calculate the revised weighted average cost of capital.

8. You are required to prepare Balance-Sheet as on 31st March, 2012 on the basis of information given below : -

Fixed Assets (after providing 25% Depreciation on cost) ₹15,00,000

Fixed Assets Turnover ratio (Sales to Net Fixed Assets) 2 times.

Finished goods stock turnover ratio 6 times.

Gross Profit Ratio 25%

Net Profit before Interest to Sales Ratio 8%

Interest cover (PBIT ÷ I) (Debenture Interest at 12% p.a.) 8 times.

Debt-Collection period 1.50 months.

Materials Consumed to Sales Ratio 30%.

Stock of Raw Materials is three months of consumption

Current Ratio 2.2:1

Quick Ratio 1:1

Reserves to Net Worth (own funds) 0.25:1

Assume that all sales are credit sales.

There is Bank Overdraft and no non-quick assets other than stock of material and finished goods.

9. Write short notes on any four of the following : -

a) Payback Period
b) Internal Rate of Return
c) Working Capital Management
d) Leasing v/s Hire Purchase
e) Limitations of Ratio Analysis
f) Under Capitalisation.

❖❖❖❖

M.Com. (Part - II)

-: Accountancy Group :-

Advance Financial Management

(Paper-III)

{April – 2016}

Q.P. Code : 24466

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question **No.1** and Question **No.2** are Compulsory carry **20 Marks** and **16 Marks** respectively.

(2) Attempt **Any Four** questions from Question **No.3** to **9** each carrying **16 Marks**.

(3) **Figures** to the **Right** indicates **Full Marks**.

(4) **Working notes** forms part of an **answer**.

(5) Use of simple **Calculator** is permitted.

1. Panther claw productions Ltd. wants to introduce a new product with estimated Life of 5 years. The Manufacturing equipment will cost ₹ 2,50,000, with the scrap value of ₹15,000 at the end of 5 years. The Working capital requirement is ₹20,000 which will be released after 5 years. **20**

The annual cash inflow and PV factor @ 10% are :

Years	PV Factor	₹
1	0.9091	1,25,000
2	0.8264	1,50,000
3	0.7513	1,87,500
4	0.6830	1,80,000
5	0.6209	1,12,500

The depreciation to be charged under Straight line method. Tax applicable @ 40%. Evaluate the proposal under :

(1) N. P. V.

(2) Profitability index.

[TURN OVER

2. (a) Match the most appropriate pair and rewrite : 8

Column A	Column B
(a) Objectives of financial management	(1) Discounting cash flow
(b) Discounting	(2) Wealth maximization
(c) Finance	(3) Overall efficiency
(d) Interest on Debentures	(4) Cost of a specific source of capital
(e) Specific cost	(5) Tax benefits
(f) Return on capital employed	(6) Current Assets Less Current Liabilities
(g) Working capital	(7) Weighted average cost of capital
(h) Operating leverages	(8) Contribution / EBIT
	(9) Life blood of business organisation
	(10) EBIT / EBT

(b) State whether the following statements are **True** of **False** (Reason not required) : 8

(1) All sources of capital have the same cost.
(2) Gross working capital means, amount of Total current assets.
(3) Financial leverages are the change in EPS due to change in sales.
(4) MM approach is essentially, "Net operating income approach".
(5) "Net present value", is the best method of evaluation of Capital Budgeting project.
(6) Trading on equity is used to increase E.P.S.
(7) Lower Liquidity Ratio shows Bad Liquidity position.
(8) Bonus Shares are issued to the Debentureholders.

[TURN OVER

3. The 'Wilson & Clinton' Company has the following capital structure at 31st March 2014, which is considered to be optimum : **16**

	₹
13% Debenture	3,60,000
11% preference share capital	1,20,000
Equity share capital (2,00,000 shares)	19,20,000

The company's share has a current market price of ₹ 27.75 Per share. The expected dividend per share in next year is 50% of the Year 2014 EPS. The growth rate is 12%.

The company can issue 14% new Debenture. The company's Debenture is currently selling at ₹ 98. The new preference issue can be sold at a net price of ₹ 9.80, paying a dividend of ₹ 1.20 per share. The company's marginal tax rate is 50%. The existing capital structure assume to be optimum.

Calculate the after tax cost of :

(a) New Debts and new Preference share capital.

(b) Ordinary equity, assuming new equity comes from Retained earnings.

(c) Calculate the Marginal cost of capital.

4. The 'Alpha formal' company making for a stock in the first quarter of the year is assisted by its Bankers with overdraft accommodation. The following are the relevant Budgeted figures : **16**

Months	**Sales (₹)**	**Purchases (₹)**	**Wages (₹)**
November	1,20,000	83,000	9,800
December	1,28,000	96,000	10,000
January	72,000	1,62,000	8,000
February	1,16,000	1,64,000	4,000
March	84,000	1,79,000	10,400

[TURN OVER

Budgeted cash at Bank, 1st January, 2014 was ₹17,200. Credit terms of sales on payment by the end of the month following the month of supply. On an average, one-half of sales are paid on due date while the other half is paid during the next month. Creditors are paid during the month following the month of supply.

You are required to prepare a cash budget for the quarter, 1st January to 31st March, 2014 showing the budgeted amount of bank facilities required at each month.

5. The 'Yellow dart' corporation is considering relaxing its present credit policy and is in the process of evaluating two proposed policies. Currently, the company has the annual credit sales of ₹25 lakhs and accounts receivable turnover ratio of 4 times a year. The current level of loss due to bad debts is ₹7,50,000. The required rate of return is 25% on Investments. The company's variable cost is 70% of selling price. Given is the following information, which policy option to be selected? (Assume in a year 12 months) **16**

	Present Policy	**Policy Option 1**	**Policy Option 2**
Annual Sales ₹	25,00,000	30,00,000	33,75,000
Account Receivable turnover	4 times	3 times	2.4 times'
Bad Debts ₹	75,000	1,50,000	2,25,000

6. A newly formed company has applied to Lena Bank, for the first time for its working capital requirements. The following information is available about projections for the current year. **16**

Estimated level of activity 1,04,000 units of production. Based on the above activity, estimated cost per unit is :

Raw Marterial	₹	80/- per unit
Direct wages	₹	30/- per unit
Overheads	₹	60/- per unit
Total Cost	₹	170/- per unit
Selling Price	₹	200/- per unit

Other information :

(1) Raw material in stock : average 4 week's consumption.
(2) Work-in progress for 2 weeks. Materials are introduced at the beginning of production cycle. Wages & Overheads are taken at 50%.
(3) Finished goods for average 8 weeks.
(4) Credit allowed by the suppliers average 4 weeks.
(5) Credit allowed to the Debtors average 8 weeks.
(6) Time lag in payment of wages average 1.5 weeks.
(7) Cash at bank expected to be ₹ 25,000.

Assume that production is carried on evenly throughout the year (52 weeks) and wages and overheads accrue similarly. All the sales are on credit basis only. Debtors are valued at selling price. Find out : (1) The amount of Net Working Capital (2) The maximum permissible Bank Finance under First and Second methods of Financing as per Tandon Committee norms.

7. From the following find out the missing figures and rewrite the Balance Sheet : 16

Current ratio 2:1
Acid test ratio 5:3
Reserves and surplus are 50% of equity share capital
Long term Debts are 60% of Equity
Stock turnover ratio 10 times
Gross profit ratio on sales 20%
Sales are ₹ 15,62,500 (25% cash sales and balance on credit)
Closing stock is ₹ 50,000 more than the opening stock.
Accumulated depreciation is 1/6th of the original cost of Fixed Assets.

Balance Sheet as for March, 2007

Liabilities	**Rs.**	**Assest**	**Rs.**
Equity share capital	?	Fixed assets (at cost)	?
Reserves and Surplus	?	Less : accumulated depreciation	?
Long term loans	9,00,000	Stock	?
Bank overdraft	50,000	Debtors	2,00,000
Creditors	?	Cash	?
Total	?	**Total**	?

8. Prepare income statements from the data given below for P & Q companies: **16**

	P	Q
Variable cost as a % of sales	50%	60%
Interest	₹ 45,000	₹ 20,000
Degree of operating leverage	5:1	4:1
Degree of Financial leverage	4:1	5:1
Income Tax Rate	50%	50%

(1) Compute net profit (after tax) for the two companies.

(2) Calculate : (a) Operating Leverage
(b) Financial Leverage
(c) Combine Leverage

9. Write short notes (**Any Four**) : **16**

(1) Function of Finance.
(2) Combine Leverages.
(3) Sources of working capital.
(4) N.P.V.
(5) Inventory management.
(6) Investments objectives.
